Time Study of Public Health Activities In Mississippi

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OF IMMENSE potential value to the public health administrator in planning and executing an adequate public health program is the knowledge of the relative amount of time and effort devoted to each of the categories of public health service. Selection of the best means for determining this relative emphasis among program activities, however, presents a problem of some import. There are possibly infinite varieties of ways for the determination of emphasis among activities, each having certain merits when applied to a particular situation. The time study is a basic approach to the measurement of effort expended when dealing with a multiplicity of activities.

The Setting of the Problem

Public health needs have changed dramatically in the last 10 years. Concepts of a good public health program, and the services it should include, likewise have changed. A program of 10 years ago did not provide many of the services which today are considered necessary if recognized needs are to be met. Even today, it has not been possible to supply the minimum services essential in many communities.

The public health administrator not only must accept today's challenge but also must foresee and plan for future needs. It is as much his responsibility to work now for the expansion required to meet future needs promptly and efficiently as it is to provide currently the best possible service with the money and personnel at his disposal.

With pressures for more services in new and broader areas constantly building up around the public health worker, the evaluation of day-to-day operations frequently has been neglected. It is readily apparent that these same pressures, which urge more, better, and quicker services, make it doubly important that only essential and productive activities be conducted.

A sound, objective evaluation of a public health program is difficult in many instances. Programs have evolved so rapidly that the definition and the development of adequate measures of progress have not kept pace.

The Need for Bench Marks

To determine progress in any sphere, it is first necessary to know just what is being done at present. In the health department, information concerning activities and services is furnished in a variety of ways. There are annual program reports, local activity reports, special project reports, financial and statistical reports, and others. Each ordinarily portrays or emphasizes only a segment of the program.

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For comparative studies of program emphasis, however, actual numbers of visits or counts of services to individuals cannot, in most instances, be used, for one type of visit or service may consume several times the amount of time and effort that goes into another. Therefore, the determination of relative emphasis among the many health department programs cannot be made readily from material currently collected or assembled for other purposes.

Time Studies: Pro and Con

For many years, public health workers have been discussing the pros and cons of time studies of public health activities. The most commonly voiced arguments against time studies are that they are too expensive, too complicated in themselves, too time-consuming, or that they are not representative of actual operations if limited in scope and in the period of time covered.

Many time studies have been made which brought forth such a volume of detailed information that funds and personnel were not available to tabulate and analyze the mass of collected material. Also, results of some have proved unsatisfactory partly because of various defects in construction of the form, inadequate instruction of participants, and selection of a period of time not representative of the agency's activities.

Careful planning before the study is begun, however, should eliminate most, if not all, of the factors which are responsible for major criticisms of time studies.

Arguments favoring time studies aver that a time study of public health activities will produce information sorely needed by the public health administrator, specifically the percentage of the agency's total time devoted to each category of service. This information is of inestimable value to the administrator in determining whether or not the programs currently receiving the greatest emphasis are also the programs shown by the State's vital records and other sources of information to be those which should receive the greatest concentration of public health effort.

Mississippi's Objectives

A time study recently completed by the Mississippi State Board of Health dealt with the activities of all members of the staff and represents a useful approach to time study procedure, particularly in simplicity of execution and in reliability of results.

The immediate objective of the Mississippi time study was the justification of categorical grant expenditures — specifically earmarked funds received by the State board of health from Federal, State, and local sources. An urgent question was being asked: Is the Mississippi State Board of Health properly discharging its obligation to disburse all monies in accordance with Federal and State requirements?

The study was designed to be broad enough in scope not only to serve its immediate purpose but also to provide the basic background data for evaluating the overall State public health program. It was made with what was considered to be a minimum expenditure of time, money, and effort on the part of both participants and directors of the study.

Methodology

The study was made during the fiscal year 1951–52 and involved all employees in the central office of the Mississippi State Board of Health and in the local health departments. Plans for the study were made in consultation with staff members in the local health departments as well as in the central office. Designs for tabulation and analysis were developed well in advance. Every effort was made to define clearly the purposes of the study. Prior to its initiation, group conferences were held with staff members to assure the cooperation of all employees.

Instructions

Written instructions were distributed and explained in detail at these conferences (see pp. 381–385). To avoid confusion in interpretation, definitions used in the instructions conformed to those in the Mississippi daily report of activities with which all local health department personnel were familiar.

That the instructions seemed to be satisfactory to all concerned was indicated by the small number of requests for interpretation during the period of the study and by the apparent accuracy and completeness of the records.

Reminder notices were mailed to all depart-

ments immediately preceding each week of the study.

Daily Time Sheet

The daily time sheet was a single 8½ x 11-inch tumblehead form with space for recording time under specific activities. Space was provided for daily totals and for central office calculations. Illustrated (p. 382) is a sample of the recorded activities of a clerk-typist in a local health department.

The coding on the reverse of the sheet was performed in the central office. Sheets received from participants were processed as follows:

All sheets were checked against a master list of employees obtained from payroll records to assure completeness of return and to code budget and item numbers. This and other coded information for use of the key punch operator were recorded on the reverse of the sheet. Records for part-time employees were held separately, and an identifying code was placed on them for gang-punching.

Time on the daily sheets was summarized for each individual by weekly totals which were recorded on the sheet for each Monday. Although this process required additional clerical time, it provided a check of the total time recorded and also reduced the volume of punch cards. Errors up to 20 minutes were adjusted in the interrelated column. Sheets with greater discrepancies were returned for correction.

On the basis of experience, it was found that some clerical time could have been saved in the central office if the following changes had been made on the daily time sheet:

Printing of code numbers for activities in calculation space.

Provision of space on reverse side for employees to record budget and item numbers.

Use of 6-minute instead of 5-minute intervals in order to cumulate and to punch the time in hours and decimal fractions of hours instead of minutes.

Punch Card Preparation

A 16-column machine punch card was used on which the budget number was carried in columns 1–3; item number, 4–6; classification of position, 7–8; activity, 9–10; minutes, 11–14; and month, 15–16.

For each employee one card was prepared for each activity listed on the summary time sheet. It was possible, therefore, for as many as 15 cards to have been punched for each employee for a particular week although examination of the records for the first week showed the average to be about 6. It was felt, therefore, that less punching and tabulating time would be required in the procedure followed than if separate fields for each activity were designated on the same punch card. In addition, greater flexibility in tabulating was possible under this procedure.

Tabulations

Preliminary tabulations prepared at the end of each week were used in further checking the accuracy of recorded information and in studying seasonal variations which might determine the duration of the study.

Final tabulations were prepared showing the distribution of time by individual budget elements, by activity, and by classification of position. The budgets were separated into two groups in the tables so that time for central office and time for local health departments are shown separately. In the final tabulations, employees of the State tuberculosis sanatorium and of the rapid treatment centers were excluded because these institutions primarily provide inpatient care. Time reported by the division of vital statistics was omitted from the tabulations because this division is not supported by funds from categorical grants.

Interrelated Time Element

Of the total time, approximately 29 percent was recorded as interrelated, a category which included time spent in general services, leave, and other activities (see instructions) which are necessary to the operation of any public health program. Thus, it was felt that for purposes of studying individual budgets, interrelated time should be allocated to the specific activities by some arbitrary method.

For allocation of interrelated time, budgets were divided into three broad categories: local health departments, central office divisions, and central office supportive services. In the final distribution for local health departments, in-

Continued on page 385.

Mississippi State Board of Health Time Study

—Instructions—

Purpose

To provide a basis and method for the proper and equitable distribution of funds within the budgets of the State offices and cooperating local health departments, with particular reference to the so-called categorical grants covering such specialized activities as maternal and child health, venereal diseases, tuberculosis, heart disease, cancer, mental health, and so forth. It is necessary that the State board of health submit a plan for the next budget period which will justify the expenditure of these funds in the various departments which make use of these monies. This plan must provide satisfactory evidence that services are being rendered at least in proportion to the amount of categorical funds which are included within that budget.

In order to formulate a state-wide plan to meet this request, a comprehensive time study of the activities of all personnel in the State office and county health departments is necessary if we plan to continue at least the present level of health services in the State of Mississippi.

All personnel in the State and local subdivisions of the Mississippi State Board of Health are required to participate.

Explanation and Definition

1 The plan of the study will be as follows: Each worker will keep a daily time study for 1 complete week each month, starting at 8 o'clock Monday morning and continuing through the entire working week. A separate sheet will be filled out for each day through Friday and through the 4-hour work period on Saturday morning. County variations due to midweek closures and working all day Saturday will be adjusted according to the local arrangement. Each worker will be held accountable for a full 5½-day workweek. The workday will be on the basis of 7½ hours.

2 In order to provide a sample that will take into account weekly as well as seasonal variations in activities, the study will be kept by weeks as follows until further notice:

4th week in July, beginning Monday, July 23.
1st week in August, beginning Monday, August 6.
2d week in September, beginning Monday, September 10.
3d week in October, beginning Monday, October 15.
4th week in November, beginning Monday, November 26.

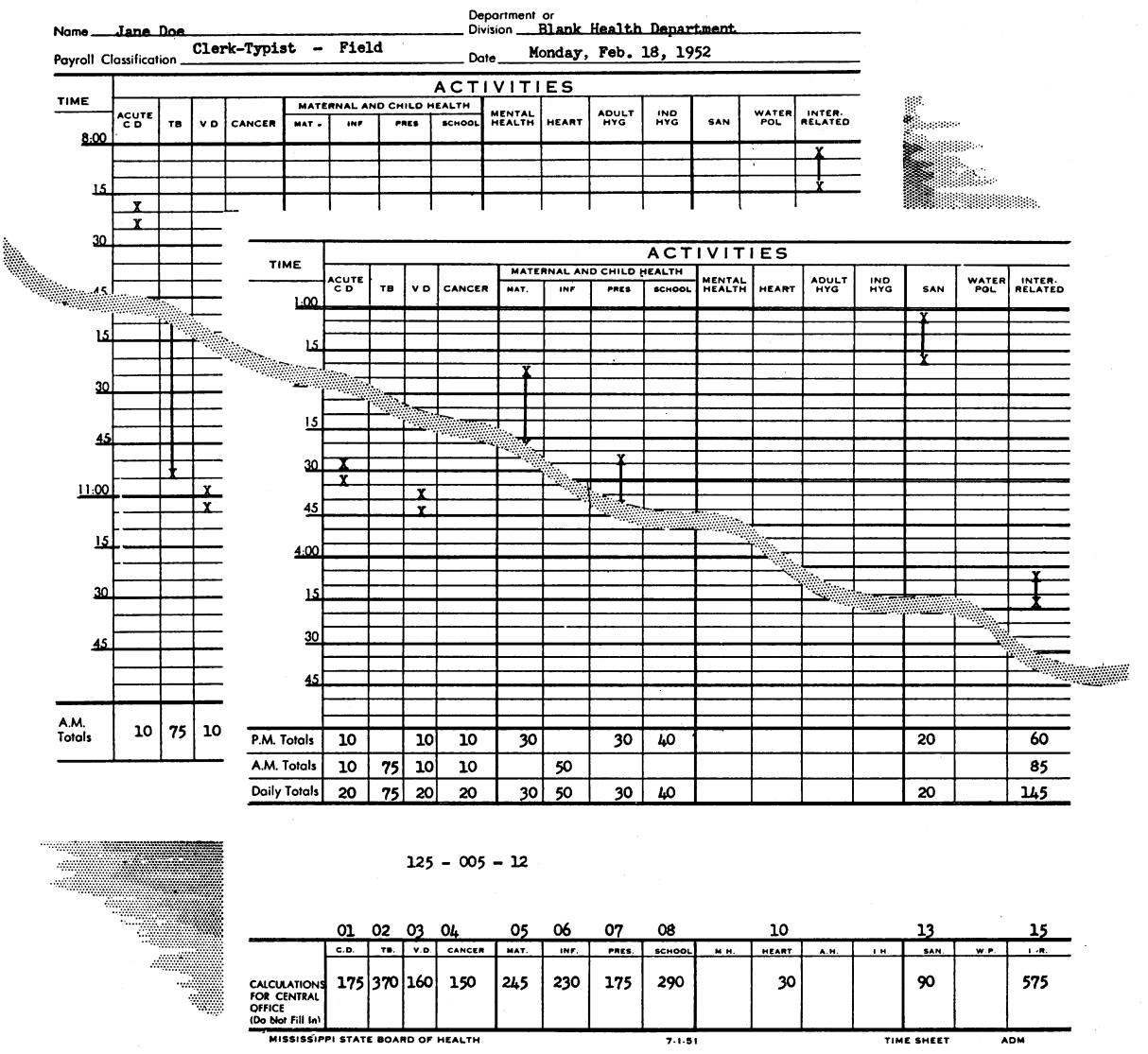
Then begin over again with the week of the first Monday in December and so on until the study period is completed. The occurrence of 5th weeks in certain months will be disregarded and not included in this sequence.

3 Every effort has been made to provide a simplified form for this study. The single daily sheet is made up of a heading for identification and coding purposes, followed by a time and an activity table for the period of 8–12 o'clock each day. Space is provided at the bottom of this page for adding the one-half day morning time totals which are to be carried over to the reverse side of the form which covers the afternoon work period from 1 to 4:30 o'clock. At the bottom of the reverse side, another line is provided for the time totals for the entire workday. The remaining space labeled "calculations for central office" is for central office tabulation purposes and is not to be filled out by the workers at either the State or local level.

(*See reproduction of form on next page*)

4 The vertical time breakdown of the sheet provides major hourly divisions, 15-minute subdivisions, and is finally further subdivided into 5-minute intervals. Therefore, all activities should be designated to the nearest 5-minutes' time insofar as possible. In showing activities of 15 minutes or less, place the symbol "x" in the center of *each 5-minute space* of the time so devoted. For activities exceeding 15 minutes, a vertical line may be drawn down through the center of the proper activity column. However, an "x" should be placed at

Daily time sheet—front and reverse



Name Jane Doe
Department or Division Blank Health Department
Payroll Classification Clerk-Typist - Field
Date Monday, Feb. 18, 1952

ACTIVITIES

TIME	ACUTE C D	TB	V D	CANCER	MATERNAL AND CHILD HEALTH: MAT.	INF	PRES	SCHOOL	MENTAL HEALTH	HEART	ADULT HYG	IND HYG	SAN	WATER POL	INTER. RELATED
A.M. Totals	10	75	10												
P.M. Totals	10		10	10	30		30	40					20		60
A.M. Totals	10	75	10	10		50									85
Daily Totals	20	75	20	20	30	50	30	40					20		145

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	01 C.D.	02 TB.	03 V.D.	04 CANCER	05 MAT.	06 INF.	07 PRES.	08 SCHOOL	10 M.H.	HEART	A.H.	I.H.	13 SAN.	W.P.	15 I.-R.
CALCULATIONS FOR CENTRAL OFFICE (Do Not Fill In)	175	370	160	150	245	230	175	290		30			90		575

MISSISSIPPI STATE BOARD OF HEALTH 7-1-51 TIME SHEET ADM

Instructions—Continued

the beginning and end of this line so that the exact time of the beginning and end of the service can be noted. For example, if a visit or activity takes 1 hour, an "x" is placed in the 5-minute interval or space that it begins, say at 10:15, and the other at 11:15 when it is completed. The line connecting the two time intervals will give the total time of 60 minutes devoted to this activity. This will simplify the recording of such activities that cover one-half day or all-day clinics, which are devoted strictly to one category. All activity time and totals will be designated in minutes to the nearest 5-minute interval.

5 The horizontal activity listing across the top of the page should be interpreted in the same manner as you code your daily activities for the quarterly tabulation of activities. However, it is assumed that all personnel concerned will use their own judgment in making honest estimates where multiple activities in the categories in question occur within a fixed work period such as a generalized conference or clinic wherein a nurse or health officer may see antepartum, infant, preschool, venereal disease, or tuberculosis patients. For example, in a general clinic or conference of 4 hours' duration, of 20 patients registered 10 were antepartum,

Instructions—Continued

5 infants, and 5 venereal disease, the breakdown of the 4 hours should be divided proportionately to *service time* devoted to those three activities.

6 a. *Name.* Use your official payroll name.

b. *Department or division.* Designate county health department or central office division.

c. *Payroll classification.* Use your official merit system classification which is on the payroll.

d. *Date.* Designate the day of the week and date. For example, Monday, July 2.

e. *Acute communicable disease.* Include all activities that would fall under section A of the tabulation of activities. Time devoted to immunizations in generalized clinics, school clinics, and so forth will be recorded here; also, school inspections for communicable diseases.

f. *Tuberculosis.* Include all activities in section C of the tabulation of activities. The taking of X-rays regardless of what type of clinic they are done in should be listed here. Clerical time in X-ray clinics, working with tuberculosis records or tuberculosis register, and so forth will be allocated to this column.

g. *Venereal disease.* Include all activities in section B of the tabulation of activities. Time estimated in taking of blood tests, or seeing patients relative to venereal disease in any type clinics whether it be maternal and child health, food handlers, and so forth will be coded to this column.

h. *Cancer.* Include time spent on special cancer clinics, on visits to cancer patients, special examinations, education, and so forth, in connection with State cancer control programs.

i. *Maternal and child health:*

1. Maternity — Include time covering those activities listed in tabulation of activities.
2. Infant—Include time covering those activities listed in tabulation of activities.
3. Preschool—Include time covering those activities listed in tabulation of activities.
4. School—Include time covering those activities listed in tabulation of activities.

j. *Mental health.* Include time spent in special clinics, home visits, and special examinations in connection with State mental hygiene program. Lunacy hearings should also be coded in this section.

k. *Heart disease.* Include time spent in special clinics, home visits, and special examinations in connection with State heart disease control program.

l. *Adult hygiene.* Include here the items as included in section H of the quarterly tabulation of activities except service to cancer and heart patients which have a special column. General type food handler clinics will fall in this category.

m. *Industrial hygiene.* County personnel who are called on to do special industrial hygiene inspections, investigations, or surveys within their own county as a part of the State industrial hygiene service will code activities in this column.

n. *Sanitation.* In general the major part of the sanitation supervisor's activities as listed in the quarterly tabulation of activities section J will be reported here. Environmental typhus and malaria activities and other special projects, unless otherwise instructed, will also be coded here. When the sanitation supervisor renders service in acute communicable disease control, tuberculosis control, or other health activities with the health officer, nurse, and other members of the staff, these services should be carefully evaluated and credited to the proper category. The health officer, nurse, clerk, and other members of the staff will also use the sanitation column on occasions if their activities are evaluated in the field of sanitation.

o. *Water pollution.* There shall be recorded in this column all time devoted to water pollution control activities; that is, any work carried on by an individual relating to stream sanitation studies, investigations of existing municipal sewage or industrial waste treatment plants, investigations made for the purpose of securing the installation of a municipal sewage or industrial waste treatment plant, and activities related to removal of pollution from any streams, lakes, or coastal waters of the State. This includes time performed by any county sanitation supervisor individually or in company with a representative of the division of sanitary engineering.

p. *Interrelated.* This column should not be abused. Some general administrative items that will fall into this classification are contacts with boards and other officials unless the meeting is for a specific purpose; answering the telephone and meeting the public; preparing of financial reports; administrative correspondence; preparation of quar-

terly reports and narratives; preparation of personnel records and handling of personnel problems; preparation of leave requests; staff conferences for program review or planning; and conferences with lay groups or clubs unless a specific subject or talk is given.

Clerical time has been covered in some of the above listed administrative activities; however, when possible, specific work on certain records, such as immunization cards, tuberculosis records, venereal disease records, milk ledgers, and so forth, should be properly charged to the appropriate column. General indexing, checking and filing of daily reports, recording of laboratory data, vital statistics activities, and other programs that cover multiple health activities should be charged to the interrelated column.

General Remarks

1 *Travel time.* The time going to and returning from a particular activity, clinic, or series of home visits, or inspections, if they are in the same category, will be charged against it. However, in the instance of multiple home visits or inspections where the category or purpose may vary from visit to visit, going to the first premise will be charged to the purpose of that visit; between visit 1 and visit 2, to the purpose of the second visit; and so forth. The return time following the last visit of such a series will be charged to interrelated activity. Travel to and from an outlying mixed general type of clinic will be charged to interrelated.

2 *Leave time.* All leave time will be charged to interrelated activity.

3 *Lost time.* When a patient or individual is not located or not at home, this time will be charged to the planned activity or original purpose of the effort.

4 *Overtime.* No overtime will be coded. All activities will be limited to the hours of the official workday.

5 *Preparation time and posting time.* Such preparation for a clinic or visit will be charged against the major service given during this activity, or allocated proportionately to the time given to the specific activity.

6 *Classes, lectures, movies, exhibits, and so forth.* Code this time against the category you consider received the major interest during the activity.

7 *Lunch hours.* In many departments lunch hours are staggered. Since a 12–1 o'clock interval is not provided for coding worktime, bring the work period backward or forward as the case may be so that it is tabulated between 11–12 or 1–2. For example, personnel taking off for lunch from 11:30–12:30 will list the half hour 12:30 to 1 o'clock as occurring between 11:30 and 12:00. Morning and afternoon breaks for rest period should be charged to interrelated.

8 *Special and part-time personnel.* Label all part-time forms with notation P-T in parentheses by payroll classification.

a. *Health educators.* These activities are sufficiently diversified, so that careful evaluation should be given in coding their activity time properly according to the quarterly tabulation of activities.

b. *Laboratory workers.* This work falls principally into the fields of acute communicable disease control, venereal disease, tuberculosis, maternal and child health, and sanitation, with some specialized activities in certain areas in connection with shellfish control and stream pollution. Code accordingly.

c. *Veterinarians.* Both full- and part-time personnel will be included in the study. The major part of these activities will be coded under sanitation but on occasion certain activities if properly evaluated should be coded under communicable disease, such as rabies control or other epidemiological investigations.

d. *Nurses aides and clinic technicians.* Full-time, part-time or those working on an hourly basis will maintain their own study records.

e. *Dental hygienist and dentist.* This activity is primarily in the field of maternal and child health or school health. Dental hygienists will be held responsible for the reporting of all dental service time.

f. *Venereal disease investigator.* These activities will for the most part be coded under venereal disease control as listed in section B of the quarterly tabulation of activities. However, when taking part in other special projects, these should be accounted for under the proper category.

g. *Special administrative, special clerical, and part-time administrative or clerical personnel.* These are usually concerned with specific activities

or projects and should be coded as indicated. However, general service personnel in the above category can list their activities under interrelated unless otherwise instructed.

h. *Porters and maids.* Charge to interrelated unless employed for special purpose or special clinic.

Office Mechanics and Filing

1 Each person will be held responsible for the neatness, accuracy, and completeness of his own time study sheet. The daily time sheets will be kept by the individual concerned until all the sheets for the week are complete. Each worker will be responsible for *checking* the accuracy of the information and the time totals at the end of each daily sheet, which should be added horizontally across the column marked daily total. This total *will not be more nor less* than 450 minutes for a full workday and will be 240 minutes for a half day.

2 On Monday of the week following the study, the completed forms in proper daily sequence will be turned over to the responsible health officer or secretary or clerk for checking their completeness and to see that all personnel in the department have been accounted for. The responsible health officer or clerk will *be sure to recheck the items* mentioned in paragraph 1, namely the accuracy of the heading and daily totals.

3 The forms for the entire department will be mailed or delivered to the division of county health work, arranged in daily sequence and properly separated by individuals for the entire week, so as to reach the division of county health work not later than 1 week after the end of the completed study week.

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terrelated time was distributed according to the percentage distribution of total identified time for all counties combined. In the central office, interrelated time for each division except for selected supportive services was distributed according to the percentage distribution of identified time in that division. Interrelated time in the supportive services—administration office, business office, statistical service, county health administration, personnel office, and merit system—was allocated according to the distribution of all identified time in the central office.

In future analyses, interrelated time reported by the division of vital statistics will be distributed on the same basis as that for the supportive services.

If the purpose of the study were expanded to include more detailed examination of program content, additional subdivisions might be used to account for major activities included in interrelated time, for example, sick and annual leave, and general administration.

Findings of the Study

The comparatively uniform distribution of activity time prompted discontinuation of the study after 8 sample weeks, 1 each in July–December (1951) and January and February (1952). The number of employees varied only slightly during this period with the smallest number, about 795, in October and the largest number, about 810, in July. These employees reported 15,946,165 minutes—or 265,769 hours—for the 8 weeks.

Time Distribution

Final distribution of time and percentages for the various activities are shown in table 1. As was expected, there were wide variations in distribution both in the local health departments and in the central office. Because of the assignment to central office budgets of some employees who serve at the local level, venereal disease investigators and mobile X-ray personnel for example, time and percentage proportions in the central office for several activities exceeded proportions in local health departments.

The percentage distribution of time in local health departments by program activity and by personnel category is shown in table 2. In general, the time for medical, nursing, and clerical personnel was spread throughout all activities and did not show as much concentration as did the time for personnel classified as sanitation, dental, and health education.

Table 1. Mississippi time study: Distribution of time by minutes and percentages for activities in central office and local health departments—8 weeks during July 1951–February 1952

Activity	Total		Central office		Local health departments	
	Minutes	Percent	Minutes	Percent	Minutes	Percent
Total	15, 946, 165	100. 0	5, 648, 245	100. 0	10, 297, 920	100. 0
Acute communicable disease	1, 580, 845	9. 9	429, 597	7. 6	1, 151, 248	11. 2
Tuberculosis	1, 686, 463	10. 6	642, 194	11. 4	1, 044, 269	10. 1
Venereal disease	2, 795, 646	17. 5	1, 796, 605	31. 8	999, 041	9. 7
Cancer	401, 279	2. 5	284, 203	5. 0	117, 076	1. 1
Maternal	1, 703, 052	10. 7	342, 577	6. 1	1, 360, 475	13. 2
Infant	906, 060	5. 7	119, 560	2. 1	786, 500	7. 6
Preschool	514, 692	3. 2	64, 450	1. 1	450, 242	4. 4
School	1, 740, 958	10. 9	572, 184	10. 1	1, 168, 774	11. 3
Mental health	347, 360	2. 2	286, 719	5. 1	60, 641	. 6
Heart	150, 345	. 9	129, 532	2. 3	20, 813	. 2
Adult hygiene	265, 024	1. 7	44, 420	. 8	220, 604	2. 1
Industrial hygiene	149, 159	. 9	125, 343	2. 2	23, 816	. 2
Sanitation	3, 654, 582	22. 9	773, 517	13. 7	2, 881, 065	28. 0
Water pollution	50, 700	. 3	37, 344	. 7	13, 356	. 1

Credited to certain types of personnel is time spent in activities usually considered outside their province. This was primarily the result of the procedure used in allocating interrelated time. For instance, some time of the dental hygienists was credited to environmental sanitation and some time of the sanitarians to cancer control. All personnel in local health departments assist each other when necessary but probably not to the extent indicated in table 2.

Categorical Comparisons

The first column of table 3 shows the proportions of categorical grants plus matching funds for fiscal year ending June 30, 1952. The second column of this table shows the percentages of personnel time devoted to categorical programs.

Table 2. Mississippi time study: Percentage distribution [1] of time by activity and by classification of position in local health departments—8 weeks during July 1951–February 1952

Activity	Total	Medical	Nursing	Dental	Laboratory	Health education	Sanitation	Clerical	Other
Percent		100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
Acute communicable disease	1, 151, 248	11. 0	14. 9	2. 2	15. 6	6. 4	1. 5	13. 4	13. 8
Tuberculosis	1, 044, 269	9. 0	12. 2	2. 0	9. 4	6. 7	1. 4	14. 0	20. 4
Venereal disease	999, 041	13. 5	8. 6	1. 9	9. 2	5. 5	1. 6	16. 3	16. 4
Cancer	117, 076	2. 1	1. 5	. 2	. 4	2. 8	. 1	1. 1	. 7
Maternal	1, 360, 475	15. 5	20. 1	3. 0	14. 5	6. 4	1. 4	11. 9	16. 9
Infant	786, 500	8. 8	11. 7	1. 5	3. 2	3. 2	. 8	7. 3	7. 7
Preschool	450, 242	4. 7	6. 8	5. 1	3. 2	2. 5	. 5	4. 0	3. 6
School	1, 168, 774	14. 6	14. 4	77. 4	7. 7	46. 0	1. 2	11. 2	8. 2
Mental health	60, 641	1. 5	. 7	. 6	. 2	2. 3	. 1	. 4	. 3
Heart	20, 813	. 5	. 3	0	0	. 8	0	. 1	. 1
Adult hygiene	220, 604	3. 8	2. 2	. 4	3. 5	5. 1	. 2	2. 7	3. 3
Industrial hygiene	23, 816	. 5	. 1	0	. 2	. 2	. 4	. 2	. 2
Sanitation	2, 881, 065	14. 2	6. 4	5. 5	32. 5	11. 9	90. 5	17. 4	8. 3
Water pollution	13, 356	. 2	0	0	. 1	0	. 3	. 1	0
Total minutes	10, 297, 920	903, 870	3, 973, 905	39, 840	148, 375	161, 850	2, 141, 230	2, 721, 080	207, 770

[1] Percentages less than 0.1 are shown as 0.

Table 3. Mississippi time study: Percentage distribution of time and categorical grants by programs

Program	Categorical grants [1]	Time
Total	100. 0	100. 0
Tuberculosis	6. 3	10. 6
Venereal disease	8. 6	17. 5
Cancer	2. 9	2. 5
Maternal and child health	13. 8	30. 5
Mental health	2. 6	2. 2
Heart	2. 0	. 9
Water pollution	. 5	. 3
General and other	63. 1	35. 4

[1] Appropriations for fiscal year 1951–52 classified by category of grant plus matching funds. Includes funds encumbered in 1951 but paid in 1952 and excludes encumbrances in 1952 paid in 1953. Excludes funds spent at the rapid treatment centers and at the tuberculosis sanatorium.

It will be noted that in the relatively large categorical grants (maternal and child health, venereal disease, and tuberculosis) the percentages of personnel time devoted to the specified programs were greater than the percentages of total categorical grants plus matching funds.

In the relatively small categorical grants (cancer, mental, heart disease, and water pollution) the differences were small, and apparently were due to the fact that expenditures in these programs for hospital service, for supply and equipment purchases, and for special training courses were relatively large compared to personnel service costs.

Further Use of Data

The data obtained provide a basis for crude evaluations of several major programs and suggest ways of studying the services provided. For example, the director of the maternal and child health program will be interested to know that 36.5 percent of all local health department time was devoted to maternal, infant, preschool, and school activities (table 1). He and the local administrators will want to know whether the variation from a low of 25.3 percent in one county to a high of 52.2 percent in another is commensurate with maternal and child health problems in those counties or whether the program is overbalanced because of pressures, interest, or lack of personnel. He can study the contribution of types of personnel to his programs, and he will probably wish to break down all data on maternal and child health services to determine where concentration is occurring.

Local conditions may offer complete justification for the wide variations in activity time for

Table 4. Mississippi time study: Percentage distribution of time by activity and by week of study in local health departments—8 weeks during July 1951–February 1952

Activity	Total	July, 4th week	August, 1st week	September, 2d week	October, 3d week	November, 4th week	December, 1st week	January, 2d week	February, 3d week
Total	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0	100. 0
Acute communicable disease	11. 2	13. 5	14. 5	10. 3	10. 8	10. 2	11. 0	9. 7	10. 0
Tuberculosis	10. 1	11. 9	11. 1	10. 3	9. 5	9. 4	8. 6	9. 3	11. 3
Venereal disease	9. 7	11. 1	11. 3	11. 1	8. 8	9. 2	9. 2	8. 8	8. 5
Cancer	1. 1	. 9	. 8	. 8	2. 3	1. 1	1. 5	. 8	. 8
Maternal	13. 2	14. 1	14. 3	13. 4	11. 8	12. 4	13. 0	14. 0	12. 7
Infant	7. 6	7. 8	8. 2	7. 3	7. 1	7. 5	7. 8	7. 9	7. 3
Preschool	4. 4	5. 3	5. 2	4. 3	3. 8	3. 8	3. 9	4. 3	4. 4
School	11. 3	4. 7	4. 9	9. 6	15. 2	14. 8	12. 5	13. 5	13. 9
Mental health	. 6	. 6	. 5	. 5	. 6	. 6	. 7	. 5	. 6
Heart	. 2	. 1	. 1	. 2	. 3	. 2	. 2	. 1	. 4
Adult hygiene	2. 1	2. 2	2. 2	2. 3	2. 0	1. 8	2. 0	2. 5	2. 0
Industrial hygiene	. 2	. 6	. 4	. 2	. 1	. 1	. 2	. 1	. 1
Sanitation	28. 0	26. 6	26. 2	29. 5	27. 5	28. 8	29. 1	28. 2	27. 6
Water pollution	. 1	. 5	. 2	0	. 1	0	0	. 1	. 1

NOTE: Interrelated time in each week was distributed according to the distribution of identified time in that week.

individual health departments, but the wise administrator will investigate to find out why one department spent only 4.4 percent of its time on acute communicable disease and why another county spent 24.4 percent; why the range for venereal disease was from 3.1 to 24.0 percent and for sanitation, from 6.2 to 44.0 percent.

It is planned to make such tabulations of activities by counties available to the local health departments and to assign each county a tabulation number known only to itself.

Sampling Investigations

The percentage distributions of time in local health departments by activity for each week are shown in table 4. The relative uniformity in the last six sample weeks will be noted. In this study, average deviations from the total distribution were smallest during the first week in December and during the second week in September. Relatively small deviations also occurred during the second week in January, the third week in February, the fourth week in November, and the third week in October. It is likely that the larger variations which occurred during the fourth week in July and the first week in August were due to seasonal circumstances and not to the choice of week. Larger proportions of interrelated time were recorded in these months because of employee vacations. Also, relatively little time was assigned to school activities because few schools were in session.

Policies of the State board of health probably influence many of the variations. Examinations of school children are customarily made in October and November of each year, and the proportions in table 4 reflect this increased activity. Time spent on tuberculosis control varied in part because of reduction in mobile screening services during the fall months when equipment was undergoing repair. Immunizations and epidemiological investigations of acute communicable diseases increased the time spent on this category during the summer months. Venereal disease activity was highest during the first 3 weeks of the study in agreement with the increase noted in other venereal disease reports for this time of the year. The variations in sanitation time were small and did not follow a trend. Since most time in this category was contributed by personnel assigned to sanitation, a relatively stable group, the slight changes may have occurred because of special sanitation activities performed by other personnel groups. The time for cancer activities was relatively high during the fall, especially in October, when many of the public health nurses attended in-service training courses in cancer.

Valid Sample Week

The distributions, especially uniform during the last 6 sample weeks, indicate that a reasonably accurate estimate of total local health department time could have been obtained if the study had been limited to any one of the last 6 sample weeks. From a practical standpoint, the second week in September would probably be the period of choice in Mississippi.

The weekly variations in the central offices were smaller than those in the local health departments, and any one of the 8 weeks would have furnished a satisfactory distribution of time.

Table 5. Mississippi time study: Distribution of time by activity for sample composed of every fifth local health department budget and for all local health departments combined—8 weeks during July 1951–February 1952

Activity	13-county sample		All local health departments (percent)
	Minutes	Percent	
Total	1, 833, 980	100. 0	100. 0
Acute communicable disease	200, 839	11. 0	11. 2
Tuberculosis	194, 908	10. 6	10. 1
Venereal disease	192, 959	10. 5	9. 7
Cancer	26, 772	1. 5	1. 1
Maternal	269, 547	14. 7	13. 2
Infant	142, 624	7. 8	7. 6
Preschool	80, 343	4. 4	4. 4
School	212, 049	11. 6	11. 3
Mental health	13, 194	. 7	. 6
Heart	3, 437	. 2	. 2
Adult hygiene	44, 896	2. 4	2. 1
Industrial hygiene	7, 935	. 4	. 2
Sanitation	438, 931	23. 9	28. 0
Water pollution	5, 546	. 3	. 1

Size of Population

To check the validity of further sampling, the punch cards were sorted in terms of the local health department budgets. They were arranged in order of population size of the counties, and every fifth health department was selected. By this method, 11 county or district health departments were chosen including 13 of the 80 counties with full-time health departments and an aggregate population of 379,296, or about 18 percent of the State population served by local health departments.

Employee time in this group is shown in table 5. Some changes from the distribution for all departments will be noted, but the percentages for this sample furnished another estimate of activity distribution which may be adequate for practical purposes. This estimate, however, did not agree so closely as the single weeks in September, November, December, January, or February agreed with the total distribution.

The selection of the sample probably introduced some bias. Although this sample was based on population, and the rural-urban composition was approximately the same as for the entire State, the sample was somewhat weighted with nonwhites. However, this did not cause any apparent deviations in activity time.

The only consistent difference was in the proportion for sanitation activities. This percentage was lower in the selected counties than in the entire State for every week of the study, as a comparison of tables 4 and 6 will show.

Evidently, a sample of counties based on population size of counties does not provide a representative sample for sanitation activities since problems in this category are less likely to be directly related to the number of persons than in other categories. In this sample, for example, little shellfish sanitation, no military installations, and no high milk-producing areas were included, and consequently, important parts of the sanitation program were omitted.

The weekly distributions for this sample are shown in table 6. In these distributions, as in the total, the average deviations were highest during the fourth week in July and the first week in August and lowest during the other 6 weeks of the study. All these deviations are greater than those for single weeks for all employees and also for the 8 weeks combined for the sample group of counties. An estimate of activity time, however, could have been made from a time study of every fifth county according to population size for a period of only 1 week. And, further reductions in the sample could have been made. In the other samples

Table 6. Mississippi time study: Percentage distribution of time by activity by week of study for sample composed of every fifth local health department budget—8 weeks during July 1951–February 1952

Activity	Total	July, 4th week	August, 1st week	September, 2d week	October, 3d week	November, 4th week	December, 1st week	January, 2d week	February, 3d week
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Acute communicable disease	11.0	11.8	12.5	9.3	10.5	10.0	14.5	9.1	10.0
Tuberculosis	10.6	11.4	11.0	10.1	10.1	9.5	8.9	10.1	13.8
Venereal disease	10.5	11.9	11.5	12.6	9.7	9.1	10.3	9.8	9.6
Cancer	1.5	.8	1.1	.6	4.2	1.3	1.2	1.4	1.0
Maternal	14.7	15.5	16.8	15.8	12.9	14.6	13.7	15.9	12.9
Infant	7.8	7.8	8.3	8.7	7.5	7.9	7.1	7.7	7.4
Preschool	4.4	6.7	5.5	4.8	3.6	3.6	3.7	3.8	3.7
School	11.6	5.9	6.3	10.2	14.3	15.8	11.9	12.6	14.4
Mental health	.7	.8	.3	.5	.6	.9	1.1	.6	1.0
Heart	.2	0	0	.1	.3	.1	.2	.1	.6
Adult hygiene	2.4	1.9	2.2	1.8	1.9	2.4	2.3	4.6	2.3
Industrial hygiene	.4	1.7	.2	.4	.3	.1	.3	.4	.1
Sanitation	23.9	22.8	24.1	25.0	23.6	24.5	24.8	23.8	23.0
Water pollution	.3	1.0	.3	.2	.5	.2	.1	.1	.1

NOTE: Interrelated time in each week was distributed according to the distribution of identified time in that week.

illustrated here, some accuracy has been sacrificed; that is, the smaller the sample, the greater the error.

Of the four estimates of activity distribution shown, the most accurate is assumed to be the one based on total employees for the entire 8 sample weeks (table 2).

Summary and Conclusions

The Mississippi time study included all State and local health department employees for a period of 8 sample weeks. It produced with what is considered to be a minimum expenditure of time and effort the information for which it was designed: factual data for the justification of categorical grant expenditures; and information for crude evaluation of program activities.

On the basis of the crude evaluations of several of the larger programs, there is evidence of the need for further study in these areas.

Analysis indicates that a reasonably accurate estimate of total time distributions could have been obtained if the study had been further limited in time to any 1 of the last 6 sample weeks. An estimate of activity distribution procured by limiting the study in area did not agree so closely with the total distribution as did the single weeks. However, even this variation is not necessarily great enough to preclude the use of smaller areas in studies of this kind. Apparently, a reasonably accurate estimate of time devoted to the various health department activities can be obtained from a study made on the basis of a relatively short period of time, probably without including the entire State and local staffs.

Public Health Service Staff Announcements

Dr. Louis L. Williams, Jr., a career officer of the Public Health Service since 1915 and chief of the Division of International Health since 1948, retired January 31, 1953. A specialist in malaria control research, Dr. Williams long directed Public Health Service malaria investigations. He served as field director of rural malaria control investigations in Virginia from 1921 to 1930 and was in charge of malaria studies at the National Institutes of Health from 1926 to 1940. Before World War II, Dr. Williams headed the malaria commission to China-Burma Highway, and at the war's start he organized malaria control in areas of camps and war industries. In 1943, he was detailed to the U. S. Army as malariologist in the Mediterranean Theater of Operations.

From 1945 to 1948, Dr. Williams was Public Health Service liaison officer to the Department of State, assisting in organizing its international health affairs branch. He was a member of the United States delegation to the International Health Conference, which in 1946 drew up the constitution of the World Health Organization. He also served as a delegate to the Pan American Sanitary Conference in Caracas in 1947 and as a member of the organizing committee, Fourth International Congress on Tropical Medicine and Malaria, in 1947.

Dr. H. Trendley Dean, director of the National Institute of Dental Research, National Institutes of Health, Public Health Service, retired April 1, 1953. A pioneer in research leading to the use of fluoridated water to reduce dental decay in children, Dr. Dean made the discovery that people using fluoride drinking water had teeth that resisted decay. He has been a Public Health Service officer since 1921, and in recent years at the National Institutes of Health he directed a broad program of investigation into the diseases of softening tissues, pyorrhea, and other oral conditions.

Dr. Dean's interest in the relationship of fluoride to dental caries grew out of his earlier work on mottled enamel. Dr. Dean was assigned in 1931 to determine where in the United States people drank water containing fluoride and how it caused dental fluorosis—mottled enamel. In 1942, after a study of 21 cities, he and his colleagues at the National Institutes of Health were able to determine that one part of fluoride to a million parts of water was sufficient to inhibit dental decay without causing fluorosis.

Dr. Francis A. Arnold, Jr., associate director of the National Institute of Dental Research since 1948, has been named as the new director. Dr. Arnold, who has been with the Public Health Service since 1934, has worked with Dr. Dean since the first studies on the relationship of fluoride to dental caries were made in 1937. He made the first report on production of carious teeth in hamsters, these animals having since become one of the principal experimental animals in this work.