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TWO ASPECTS OF MEASURING MANPOWER
INPUT IN PRIMARY HEALTH CARE:
STAFF AND CLIENTS

Discussion Paper

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HEALTH CARE: STAFF AND CLIENTS

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ABSTRACT

This study proposes two methods of measuring manpower input into a primary health care service. It reports the results of a tracking observation of staff and client activities in the Family Practice Unit of the Kiryat Hayovel Community Health Center. Analyses are given of the organization of the service, the time spent by professional teams in the delivery of care, waiting time invested by clients, proportionate division of staff efforts, and the availability of service. Finally, a mathematical model is developed for estimating the cost of primary health care programs in other health service settings.

1. Introduction

Economic, social, demographic, cultural and technological developments have led to increased demands for expansion of health services throughout the world. Health institutions have responded to the demand on three planes: expansion of existing services, addition of services, and intensification of specialization within the services. Improved planning methods can assure more efficient solutions for the problems that health services now deal with.

To rationally plan economic and convenient health services, the expectations of the population should be analyzed, as well as its objective and subjective needs, the services provided, and how they are utilized. The latter includes analysis of the demand for various components of the service, the time spent by professional teams in the delivery of care, waiting time invested by the clients, provision of care by various staff members and the availability of services.

Primary health care varies in kind when provided within different frameworks. This study proposes a method of measuring manpower input into a service that allows comparison of several services.

Hebrew University's Department of Social Medicine is interested in measuring the care provided by the Family Practice Unit of the Community Health Center in Kiryat Hayovel, as well as the component of a community program

within the service, for the purpose of estimating the cost of such programs in other settings.

This study proposes a method to facilitate detailed acquaintance with the roles of members of a team of health-care providers. It also illustrates certain components of the internal dynamics of a primary health-care service.

2. The Community Health Center

Kiryat Hayovel is divided into four areas according to the type of care delivered:

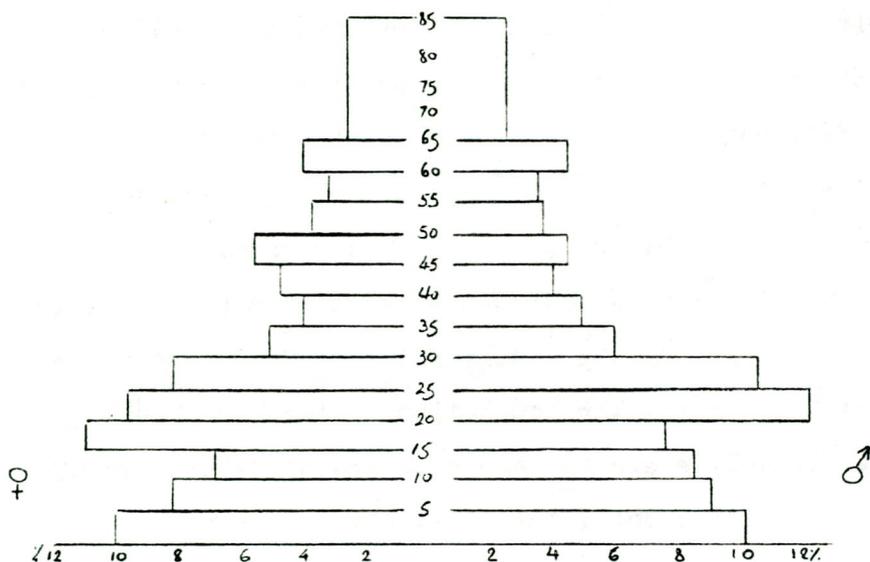
- I. Four housing projects (Olim, Amidar, Batei-Even and Even-Olim), the oldest areas.
- II. Housing projects built in the late '50s and early '60s (Shikun Vatikim, Sela, Alchanani, Mumchim, Amami and Zugot Zeirim).
- III. "Asbestonim" (an area of asbestos huts in the process of evacuation and demolition).
- IV. The remainder of Kiryat Hayovel - a developing area built in the late '60s and '70s.

Inhabitants of Area I receive comprehensive primary health care including curative, preventive and promotive services provided under an agreement with the Sick Fund of the General Federation of Labor (insuring 71% of the residents of this area) and with the local welfare bureau (insuring 17% of the residents of the area). Those living in Areas II-III are provided with mother-and-child services as well as a home-care program for the home-bound. Only

home-care is delivered to the residents of Area IV. The Family Practice Unit also provides curative care to Areas II-III inhabitants who are insured through the local welfare bureau.

The population of Area I consists of approximately 2,300 persons (roughly 700 families). The age and sex composition is described in Figure 2.1.

Figure 2.1 Age pyramid of the four housing projects' population



Distribution of the population by origin* is as follows:

- 20% North Africa
- 39% Asia (excluding Israel)
- 22% Israel
- 19% Europe (and elsewhere)

This is, in part, a mobile population. On one hand, there is a 10% annual turnover and, on the other, more than 40% are old-time residents dating from the neighborhood's establishment.

The four housing projects comprising Area I differ in their ethnic and socio-economic composition. As a result they vary in average family size:

Olim	3.6 persons per family
Amidar	3.0 persons per family
Batei-Even	2.9 persons per family
Even Olim	2.8 persons per family

There are about 70 births per year in the area.

About 700 welfare assistance recipients are provided with curative care by the Family Practice Unit. Most are from Area IV. Unlike the population of the four housing projects (Area I) where all are entitled to be treated by the Family Practice Unit, the residents of Areas II-IV are a "selected" group and not a complete population. It is not possible, for reasons irrelevant to this paper, to carry out a demographic follow-up of this group. The

* Origin is determined by the family head's country of birth.

population of Areas II-III totals 10,000 persons with approximately 300 births per year.

The Community Health Center in Kiryat Hayovel is part of the Department of Social Medicine of the Hebrew University - Hadassah Medical School and serves as a teaching center for students of public health, nursing and medicine. The nursing students help carry out nursing functions during their association with the Family Practice Unit.

The Family Practice Unit is made up of physicians (family practitioners and others) and nurses (a head nurse, family nurses and a clinic nurse). A pharmacy and a laboratory serve the unit. The pharmacy is open in the morning only and not all drugs are available there. Routine drugs are distributed by the nurses after pharmacy hours. The laboratory provides partial service and transfers certain tests to the Hadassah Hospital laboratories. The Family Practice Unit integrates curative, preventive and promotive components of primary health care.

The Unit considers itself responsible for the health of the residents of Area I. It responds to its clients' demands, as well as engaging in active outreach to potential clients. It conducts a continuous follow-up of the movement of the population in the area. The nurses arrange house-calls on their own initiative and hospitalization of the area's residents is followed up. The approach to the provision of care is that of community medicine, involving

constant surveillance of demographic and epidemiologic data. This enables feedback to the Unit and assessment of its work with the assistance of epidemiologists and statisticians.

A community program is a framework for health surveillance, community diagnosis and intervention in a standardized manner for a defined population and with built-in evaluation.

Several community programs have been constructed within the primary health care service of the Community Health Center. The largest of these are PROD, a program for the promotion of child development, and CHAD, a program for prevention of cardio-vascular disease (CHAD - Community syndrome of Hypertension, Atherosclerosis disease and Diabetes). The latter program is a focus of this study.

A community health survey carried out in 1970-1971 in Areas I-II provided the baseline for the CHAD program. The survey was meant to determine, among other things, the condition of the residents regarding risk factors for heart disease (blood pressure, serum cholesterol and glucose levels). The CHAD program was developed for the residents of Area I. Area II served as a control group. All the adult residents of Area I who had been examined in the 1970-1971 survey were invited to participate in the CHAD program. A risk profile was determined for each, based on the survey findings and additional information. Participation in the program involves appointments with physicians and nurses and various routine

examinations depending on status, by pre-determined standards. To assure consistency, a clerical system was established to set up pre-planned appointments for carrying out specific tasks. Special clinics were instituted for CHAD appointments with the physician and nurse, but the family practice unit team also met clients within the regular framework of the service and carried out elements of this program within it. In order to evaluate the impact of the CHAD program a second community survey was conducted to measure the change in risk factors in the community.

3. Goal and objectives

3.1 Goal

The development and testing of a method for measuring manpower input within a specific area of medical care must be general enough for utilization in health services delivering primary health care. It should serve as an important component in the planning of health services and programs.*

3.2 Objectives

(1) Construction of a suitable method for measuring the time invested by staff in a health program or providing health services.

(2) Utilization of the above method to describe the comprehensive care delivered in the Family Practice Unit of the Community Health Center in Kiryat Hayovel, with particular application to the CHAD program. This description

* The method must be based on a tracking-type observation, as the task inventory method has proved much less valid.

will include two points of view: the work of the staff (roles and procedures) and the population receiving care (its characteristics and the type of service received).

3.3 Secondary objectives

(1) Creation of an understanding between the investigators and the health team regarding the utilization of the input study and the importance of active collaboration on the part of the team, expressed in the recording of relevant details.

(2) Creation of tools to record all of the tasks executed by the health team as characterized by their nature and duration.

(3) Clarification of the method's validity, reliability and applicability.

(4) Measuring family practice manpower according to role types and task quantities and the time spent on them within each of the activities comprising the role.

(5) Measuring the service provided to the population:

(a) Provision of care aspects: types of contacts, their quantities and their duration.

(b) Client aspects: content of visits (contact profile), duration of the contacts, waiting periods and complete visits, and characteristics of the population receiving care.

(6) Measuring the integration of the CHAD program into the service.

4. The Method

4.1 Introduction

Before planning the study, the principal investigator observed all Family Practice Unit activities and those of other parts of the Center. Discussions were held with members of the staff. The discussions and observations were useful in becoming acquainted with the administrative and functional structure of the system. They led to an understanding of the decision-making processes within the Department of Social Medicine.

As a result of the preliminary observations (and taking into account statistical and budgetary considerations) tracking-observations were planned for staff members and clients. The former enables measuring the time spent on various tasks and in the care units, but does not allow for a correct sampling of the population's visits to the Center in terms of their frequency, distributions by individual, and by content. The tracking-observation of the clients was constructed to solve this problem.

The tracking-observations took place at the same time that the second Community Health Survey was carried out. They were preceded by a pre-test in order to identify and solve the problems encountered.

4.2 Components of the observations

A. Task

A task is the smallest unit of work involved in

the implementation of a specific assignment carried out by any staff member.

B. Activity

An activity is an aggregate of tasks of the same type: for example, administrative, nursing or medical tasks having direct contact with a client, etc.

C. Care unit

A care unit is all of the tasks carried out within one contact between the physician or nurse and a client. The care units were observed in tracking-observations of both the staff and clients.

D. Service unit

A service unit is all of the tasks carried out within one contact between a staff member who is not a physician or nurse and a client. These were observed only in the tracking-observations of clients as full units without detailing the tasks.

Care units and service units are contacts with staff members.

E. Visit

A visit is all of the client's contacts and waiting periods from the moment he enters the Family Practice Unit until he leaves it.

F. Framework

The framework is that part of the service (including community programs) determined by the time and place of its delivery.

4.3 Execution of the observations

A. Tracking-observation of the staff

The observations took place within two periods of six weeks each (October to November 1975 and December 1975 to January 1976). The tracking of a staff member was carried out by an observer who accompanied him from the moment he reached work on that day until he completed work. All of his/her tasks and their starting/ending times were recorded.

The choice of the staff member for each day of tracking was pre-arranged according to a scheme (Latin square) ensuring that within the period of six weeks every staff member would be tracked once each week, each time on a different day of the week. The tracking schedule was planned in advance but the staff members did not know when they would be tracked. During the period of the observations, staff members took maternity leave, returned from abroad, left for their annual vacations, etc., leading to deviations from the original plan.

The observers' instruments were a numbered list of tasks and an ordinary wrist-watch. The list included all of the tasks carried out by the health team. The observer used the list section relevant to the worker being tracked that day. There were separate task lists for physicians and nurses. The task list was organized as a catalogue compiled on the basis of earlier observations.

Recording the observations included: starting time of tracking-observation, identifying number of the first task,

the time that its execution ended (to the nearest whole minute), identifying number of the next task, the time that its execution was completed, and so on, until the end of the work day.

B. Tracking-observation of clients

The observation of clients took place during a period of four weeks. It was carried out with active collaboration between the observers and the health team. Every person entering the health center received a form upon entry. It was explained that each contact should be recorded on the form by the staff member contacted. The staff was requested to record the time when the contact began and ended, also the type. As they left the center the clients were supposed to return the forms to the observer, who then recorded the time of departure.

4.4 Main variables

A. Variables derived from the observations

I. Tracking-observation of staff

1. Classification related to CHAD

Classification of task content as relevant or irrelevant to the CHAD program was not possible during the observations, nor could it be done by the non-professional observers. On advice of the community program team, we compiled a list of tasks that nurses carry out which are never considered CHAD tasks (such as dressing wounds, gynecological treatment, etc.) and others which are always considered CHAD

tasks (such as weighing, measuring of blood pressure, etc.). Certain tasks can be included in both of the above classes, such as client counseling, injections and drawing blood for laboratory tests. In the first case, the investigators had the means for later classification, that is, the key words* recorded by the observers during the conversation. To decide how to act regarding the remaining two kinds of tasks, special brief observations were conducted in order to estimate what proportion was CHAD-related. It was decided that tasks carried out by physicians outside of the framework of the program, but on its subjects, would be considered as CHAD tasks.

2. Content of the care unit

A care unit is classified as CHAD if all the tasks comprising it are CHAD tasks.

A care unit is non-CHAD if all the constituent tasks are non-CHAD.

A care unit is mixed if at least one task is CHAD and one is non-CHAD.

3. Duration of the task

The time interval between the start of the task and its completion. All repetitions of the same task within one care unit are combined into one task. The duration is then calculated as the sum of the durations of the tasks comprising it.

* See Appendix II.

4. Duration of the care unit

The sum of the durations of the tasks comprising the care unit.

5. Duration of a contact

The time interval between the beginning of a contact (i.e. the care unit) and the time of its completion. The duration of the contact is equal to the duration of the care unit if the contact is not interrupted.

6. Productive time

The time spent on work which results in a product relevant to the execution of the professional role.

Non-productive time is the time spent within a work day in activities not considered to be work: eating, using the washrooms, private conversations, etc.

II. Observation of the clients1. Waiting time

The duration between the entrance of the client to the Family Practice Unit until his first contact and also the time between the end of one contact and the beginning of the next one within the same visit.

2. Route

The chronological order of contacts of the client within the same visit, listed according to the occupations of the team members with whom he had contacts.

3. Nurse-physician teamwork

This can be defined at various levels:

- a) tasks in which the nurse and physician work together,
- b) tasks in which the nurse directly assists the physician,
- c) tasks in which the nurse indirectly assists the physician (not necessarily in his presence).

B. Client-related variables

1. Age

Calculated by the year of birth, divided into age-groups (see paragraph 6.1).

2. Sex

3. Area of residence

According to the address: the area of the four housing projects (Area I in Chapter 2). The other areas were combined.

4. Country of birth

The countries of birth are divided by continent, except for Israel. South Africa, America, Australia are grouped with Europe.

5. Participation in the CHAD program

Participants are all persons who were candidates for the program according to given criteria (residing in the four housing projects and examined in the community health survey of 1970-71 when they were 25 or over), after an introductory appointment. Check cards were prepared for each of them for the purpose of follow-up within the program framework. They were asked to attend the special

physician and nurse clinics and to undergo various examinations in accordance with the standards of the program.

6. Risk profile in the CHAD program

Categorization of the participants in the program according to the level of the following risk factors: blood pressure, serum cholesterol, serum glucose and overweight (absence of risk, borderline risk, high risk). See Appendix I.

C. The Nature of the Care Unit

Defined by three variables: (1) content of the care unit; (2) participation of the client in the CHAD program; (3) the framework within which the care unit takes place, as follows:

Figure 4.1 The nature of the care unit

FRAMEWORK	PARTICIPATION IN THE PROGRAM		PARTICIPANTS	NON-PARTICIPANTS
	CONTENT			
FAMILY PRACTICE	CHAD		CHAD-2	DIFFUSION
	MIXED		INTEGRATION	
	non-CHAD		non-CHAD	
SPECIAL CHAD CLINIC			CHAD-1	

4.5 Selection and training of observers

Several criteria entered into the selection of the observers. They had to have a matriculation certificate, to ensure that they were capable of understanding their observations. It was undesirable that they should have had experience in the area of health services, so as not to come with preconceptions and set convictions which might influence their perceptions. A preference for women stemmed from the fact that most staff members were women and the clients were felt to be more likely to accept their presence.

The first stage of the observers' training consisted of familiarization with their roles and with the environment in which they would work. They received explanations regarding the center, its services, the population served, and the research itself.

The next stage was more practical. They conducted unstructured observations of the activities of the service, including preliminary use of the forms. Pairs of observers conducted a joint observation of the same staff members and simultaneously recorded his tasks. The findings were analyzed together with the observers in order to clarify notation differences.

The observers arranged a preliminary tracking-observation (pre-test) of the staff some time before the actual tracking. This served several purposes: (1) testing the instruments utilized for the observations, (2) enabling the observers to

gain experience and skill, and (3) accustoming the staff to the presence of observers. The observers were trained to disregard negative attitudes of staff members if and when they occurred.

4.6 Staff and client compliance

A. The staff

Compliance on the part of the staff was essential for the success of the tracking-observation. At times it was necessary to overcome the tendency of staff members to refuse to cooperate. In our opinion, the reason for this was fear of criticism. However, this was not verbalized. Their opposition was stated on several other grounds: (1) the presence of the observers would cause changes in regular behavior, (2) the observers were not professionals and it would be impossible to rely on their understandings, and (3) the observations would interfere with work.

Individual and group discussions were held to obtain the staff's cooperation. The method was explained without going into great detail, in order to avoid excessively involving the staff members. Through such efforts a high level of compliance was achieved. Those who cooperated best were interested from the beginning in the tracking-observations and in their outcomes.

During the course of the observations it became clear that there was no real change in the behavior of staff

members. Within a short time they became accustomed to the presence of observers. They called the observers "my shadow" and made sure that they accompanied them. Other staff members who did not belong to the Family Practice Unit expressed a desire to be observed.

B. The clients

Compliance on the part of the clients during the tracking of the staff was expressed by the fact that they did not object to the presence of the observer. To a certain extent this was because clients were used to the presence of medical and nursing students. The fact that the observers were white coats was helpful.

The clients also complied while they were being observed. Most of them asked the staff members to sign their forms. There were some refusals to accept the forms upon entering; however, in these cases the consent of the client was generally obtained after an explanation of the purposes of the study. There were only isolated cases of refusals.

4.7 Critique of the method

A. Reliability of recording of tracking observation of staff

In order to examine reliability, double observations were arranged by pairs of observers and the results compared for identification of tasks and recording of their duration. The tasks recorded by the two observers were categorized in three groups:

- (1) Those identified in the same manner and of identical duration ("identical tasks").
- (2) Those not identical but belonging to the same activity ("tasks belonging to the same activity").
- (3) Those identified by only one observer ("tasks recorded once only").

It should be noted that in no case were tasks differing in terms of the activities recorded.

Tables 4.1 and 4.2 show the comparison between observers.

Table 4.1 Comparison of observers, according to tasks

Task groups	Pairs of observers		
	I-II	I-III	II-III
Identical tasks	38	54	61
Tasks belonging to the same activity	52	42	25
Tasks recorded once only	10	4	14
TOTAL	100	100	100
Total duration of the observation:	2 hrs.	2-3/4 hrs.	3-3/4 hrs.

When the duration of tasks within a contact were combined, as was later done for data analysis, smaller differences were found.

Table 4.2 Differences in duration of tasks found when comparing observers

Time in minutes	Pairs of observers		
	I-II	I-III	II-III
Average duration of task	1.76	2.46	1.86
Standard deviation of duration of task	1.68	1.15	1.37
Number of tasks observed	.68	.67	1.18
Average difference in time	.176	.060	.025

The differences between the averages are statistically non-significant at a 5% level.

1. Recording the duration of care units

Two paired tracking-observations were conducted on physicians and the results are shown in Table 4.3. The third observation was performed on a nurse; comparison was therefore excluded.

Table 4.3 Differences in duration of care units found when comparing observers

Time in minutes	Pairs of observers	
	I-II	I-III
Average duration of care unit	9.5	12.7
Standard deviation of duration of care unit	1.88	2.32
Number of care units	13	12
Average difference in duration	.58	.31

The differences between the averages are statistically non-significant at a 5% level.

B. Identification of clients

The clients were identified correspondingly by both observers in all the paired observations.

C. Reliability of recording of observation of clients

1. Coverage

The forms given to clients upon their entrance to the health center were numbered to permit checking whether all of them were returned by the clients as they left the

center. The maximal estimate of lost forms among the 3,127 distributed was 0.9%.

2. Recording of contacts

Recordings of contacts by the staff were checked for completeness by observers asking a sample of departing clients what their route through the health center had been. During the seven days of checking there were 759 visits of which 342 (45.1%) were checked. Sixty-four of the forms (18.6%) were found to lack recording of contacts. In the 342 visits checked, there were 675 contacts, of which 64 had not been recorded (9.5%).

D. Comparison of findings of staff and client tracking

Mean duration of care units was estimated by both methods. Their comparison is presented in Table 4.4.

Table 4.4 Duration of care units estimated by two methods

	Nurse	Physician
Mean duration of contact in observation of clients	7.16 minutes	9.59 minutes
Standard deviation	6.84	6.72
Mean duration of care unit in observation of staff	6.16 minutes	9.45 minutes
Standard deviation	7.05	6.11

E. Comparison of observations with data from other sources

Extrapolating from the tracking observations to the entire year, one would estimate the annual number of physician contacts at 15,400. The corresponding figure found by routine reporting²⁸ was 14,982. Since the estimate is affected by both seasonality and random variation, these two figures may be considered reasonably close.

In order to estimate the CHAD component in the pharmacy activities an observation of ten weeks was conducted on the recordings of contacts and on items supplied by the pharmacy. Based on the observation of clients, it is estimated that the pharmacy has 20,300 contacts per year, while based on the observation mentioned above the estimated number is 23,000.

A comparison of the number of blood counts carried out in the laboratory was made. The estimated number, based on the observations of the staff, is 2600 per year, while 3100 blood counts were listed in the lab records.

4.8 Discussion

Measurement of manpower input in a specific health service (or, for that matter, in any other service) should be planned considering two basic factors: (a) who will measure activities, and (b) when the measuring will be done. Specifically, will the worker record his own tasks or will an observer do this? Will the recording be done while the task is performed or afterwards? According to these two criteria, it is possible to construct four different methods of

measurement. The least accurate of these methods is retrospective self-assessment, otherwise known as task inventory. The preferred method is measurement by an observer at the time of service delivery, which is the tracking-observation method.

The observation may be carried out either by persons with specific professional training enabling them to identify the tasks of the service,^{5,15} or by non-professionals who receive special training for the purpose of carrying out the observations.¹⁸

The observations may be done either continuously during several workdays^{5,14,15,18} or in a sampling of time points^{11,17,22}. Each technique has its advantages and disadvantages. For example, an observer sitting in the waiting room and following a physician's movements^{11,12,18} can categorize the tasks only by location. He cannot categorize the contents of these tasks. Therefore, in studies using this method, only a few activities were defined. On the other hand, in research in which observers acted as "shadows,"¹⁴ following the service provider, it was possible to measure the contents of the tasks in a more detailed manner.

The method of time measurement differs among various studies; some use an ordinary wrist-watch,^{15,18} others punch a clock.¹¹ The choice of observation periods should identify anticipated differences due to seasons of the year or other causes. One technique is to select observation days during

different seasons.^{5,11} Another method is to divide the observation into two or more periods and to compare the findings in order to clarify whether differences do exist and what they are, whether in frequency, duration or allocation of work.¹¹

Another aspect of the observation involves choosing a sampling unit. Usually the provider of the service is sampled, but there are studies in which the service recipients are tracked. When the sampling unit is the staff member, it is possible to measure the medical or nursing activities, their distribution according to content, and the time invested by staff. When the sampling unit is the client, it is possible to measure investment of time, route, and waiting time.

Studies utilizing such observations have been carried out in various places and in various types of services: private general practitioners and other physicians,^{5,15} physicians working in a group practice,^{11,14} nurse-practitioners,¹⁷ and hospital nurses.²⁷

Another factor determining the choice of method is the sample size. In general, continuous tracking observation of staff members is feasible only with a small sample of health workers. Observation of a clinic with sampled time points allows the observation of a larger number of physicians,¹⁵ or nurses.²⁷ The presence of an observer or "shadow" might interfere with the normal course of service and thus alter it. There are those who claim that an observation utilizing

time-points reduces such interference to a minimum and is preferable.¹¹ However, this method reduces the chances of observing infrequent tasks and their contents cannot be identified.

The choice of an observation technique, with all its implications, depends on the type of service provided, the structure of the system, the resources available and the study objectives. The preference given tracking observation to task inventory recorded by staff members at the end of a working day is based on study results comparing these two methods.¹⁵ It was found that physicians tend to exaggerate when reporting their tasks, both in terms of duration and content.

The staff observation periods were to have been separated by season in order to sample possible seasonal service variations. Due to technical reasons, this was not possible. Periods were chosen in which there were no holidays or vacations in order to avoid deviations from the plan. Nevertheless, it became clear that changes in the basic plan were inevitable.

To ensure proper observations, despite changes, it is important to prepare alternative plans. One option is to construct a system of rules by which it is possible to decide at the last minute how to carry out the observation in the face of unforeseen circumstances. We chose a tracking observation of the staff for six weeks with a Latin square

structure so as to obtain a representative work week for each staff member.

The work varied according to day of the week. Certain tasks, such as the mother-and-child clinics and CHAD clinics, took place on specific days. While work assignment changes within the team caused certain activities to be represented inaccurately, the sample did reflect the actual situation.

Tracking-observation of the staff cannot measure clients' routes within the center. If observation of clients had been arranged by the same method as that of tracking-observation of the staff, assuring equal probabilities that each client would have all his actions recorded, it would have been wasteful and difficult. We preferred to use a more efficient method in which clients and staff had to actively cooperate with each other.

The special observations for estimating the proportion of CHAD-related tasks in activities such as injections, supplying medications, and blood-counts were performed separately from the main observation since they necessitated different sample choices and information detail.

Staff cooperation is essential for carrying out such observations. Its absence can lead to biased results. The senior people, who identified with the attitudes and goals of the Center, complied better. Temporary workers or those less identified with the Center's attitudes tended to comply less.

One technical point that led to inconvenience and survey error was the absence of an information storage system. This experience taught that where there is an interest in continuous client recording, or in survey and research situations, there should be a central card system containing basic information. Improvement of the client identification method is important, as it appears to be a major source of error.

In an observation of nurses' activities ²⁶ which somewhat resembled our observation of the clients, it was found that clients tended to report contacts arranged in advance and were less likely to do so for unexpected contacts. For example, if a client came to see the physician, he was likely to neglect reporting that he also spoke to a nurse or secretary. One can conclude that the estimate of deletions in client observation performed by completing the forms according to client reports is a minimum estimate. According to our calculations, 8.9% should be added to this estimate to reach a corrected estimate of the number of client contacts.

In our opinion, it is sufficient to organize a one-time observation to measure provision of health service. In the absence of major changes in the basic structure, there is no need to repeat the observation. To update differences in the allocation of time for specified tasks and programs, it should be sufficient to have staff members record their activities in detail, according to general categories. If this is impossible,

it is preferable to use the clerical staff or outside observers to conduct a brief observation for specific purposes.

5. The Service

5.1 Introduction

A. Structure and hierarchy of the system

The Family Practice Unit is an independent subsystem of the Community Health Center. The Center is the service provision branch of the Hadassah Department of Social Medicine. It was established by Hadassah in 1953 as a result of an agreement with Kupat Holim.

The Department, which is a part of both Hadassah and the Hebrew University Medical School, has three basic roles: teaching, research and service. It is divided into the following units: The Center, family medicine, epidemiology and biostatistics, mother-and-child, social organization and nursing. The Department conducts community programs within the service. Staff members of the various units collaborate with the staff of the service on different programs. The Department is headed by a professor of epidemiology who is a proponent of a comprehensive approach to community medicine in which epidemiology is a tool in measuring the provision of service.⁹ Discussions of policy regarding the service, research and teaching are conducted during meetings of the Department executive. Those participating have responsible roles in various departmental activities and the Center decisions are transmitted from this framework to the lower levels.

Meetings of 'Epidemiology in Practice' are devoted to discussion and decision-making on the epidemiological aspects of the service. Physicians, nurses and other senior workers in the service take part in the meetings.

The Epidemiologic and Biostatistics Unit provides advice on and critiques of the various research studies conducted by the Department. It is responsible for the surveillance system and evaluation of programs (SHAPE) within the service.

B. The staff

Six physicians and nine nurses occupy 4 and 5.6 full-time posts respectively, with a half-time clinic secretary in the Family Practice Unit. The director of the Unit is a physician who is responsible for all services provided by the unit. The head nurse of the unit is responsible for the nursing staff and their work. She is subordinate to the head nurse of the center and to the unit director, involving two separate hierarchies.

The nursing staff includes several senior family nurses from the community. Younger nurses have been added to this nucleus. They have adopted the approach of family practice as well as its work methods. Most of the nurses have completed a course in public health and participate in in-service training courses.

Several of the physicians have had a great deal of experience working in the Kiryat Hayovel community. Others are temporary and are less familiar with the territory. The

senior physicians participate in teaching, the main purpose of this Center, and lecture on community health and epidemiology.

C. Reception system

The clients are seen by the staff either on their own initiative or on that of the staff physicians or nurses. A client who is interested in seeing a physician can come to the clinic during regular clinic hours or can arrange an appointment in advance through the clinic secretary. There are several types of staff initiative: 1) instructions to the client to return after a certain period, 2) instructions to the client to make an appointment with the clinic secretary, 3) a nurse contact asking the client to come, made by home visit, telephone call or letter.

D. Recording system

The recording system is based on personal files and card indices. The contents of all medical contacts, including mother-and-child, home visits, CHAD clinics, medications, laboratory tests, information on hospitalization, etc. are recorded in the files. Records on the entire family are located in a family file, making it possible to obtain a demographic picture of the family.

The office family card index identifies the family members and their entitlements to care within the Family Practice framework. The demographic family card is kept by the medical recorder. The clinic has a card index in which

the number of each client is recorded if he has a file in the Family Practice. All three card indices are constantly updated.

E. The characteristics of the Family Medicine service

Because the service focus is community medicine there are basic differences between it and others, such as Kupat Holim. The Family Practice Unit relates to the individual as part of a whole within the family and the broader environment.

The staff views itself as responsible for the health of the community and the individuals in it even if the clients do not turn to the service. They try to prevent problems by health education rather than merely solving problems after they have developed. A continuing epidemiological follow-up of health of the community is carried out as an integral part of the care.

In other services the focus is on individuals requesting treatment and the clients come to the service whenever they are motivated to do so. Medical responsibility also exists in other places but it is individualistic and felt only towards those known as patients.

In most primary health services in Israel the role of the nurse is very limited regarding examinations, treatment and assisting the physician. In the Family Practice Unit the nurse provides counseling and preventative instruction, often filling the roles of social worker and health educator. The nurse-physician teamwork in family practice is more than collaboration of a physician and a technical helper, there is

two-way communication and joint contact with the clients.

F. The importance of program development and its introduction into the service

In principle it is possible to construct an independent program without a primary care service. However, there are a number of advantages to the building of a program within a service. Integration of a program within a service leads to a higher level of care, in that the staff knows the clients and can deal with their problems within the context of their overall situation. The clients tend to comply more fully when the program is provided by their regular service. It is also more efficient, as the existing team and facilities (including records) can be utilized and an extensive population can be reached. In addition, it is possible to try out various programs within existing systems, which would be difficult to do in an independent set-up.

5.2 Distribution of the physicians' and nurses' work-time during the execution of their tasks

The length of tracking-observation of each nurse and physician in the sample was roughly proportional to job proportion (full or part-time), as presented in Table 5.1.

Table 5.1 Distribution of tracking observation time and distribution of job proportions (percentages)

Nurse	Tracking time	Job proportion	<u>Index of observation time work time</u>
1	17.4	18.1	.96
2	11.9	12.1	.98
3	3.5	3.1	1.13
4	4.2	4.5	.93
5	7.9	9.0	.88
6	10.1	9.0	1.12
7	19.5	18.1	1.08
8	13.5	15.0	.90
9	11.9	11.2	1.06
TOTAL	100	100	

N=409 hours

Physician	Tracking time	Job proportion	<u>Index of observation time work time</u>
1	27.9	25.0	1.12
2	27.6	25.0	1.10
3	21.8	25.0	.87
4	4.6	6.2	.74
5	8.5	12.5	.68
6	9.5	6.2	1.52
TOTAL	100	100	

N=272 hours

Table 5.2 presents the proportions of productive time of the physicians' and nurses' work.

Table 5.2 Proportion of productive time

Nurses	%	Physicians	%
1	87	1	91
2	90	2	89
3	84	3	89
4	89	4	92
5	79	5	89
6	91	6	91
7	80		
8	90		
9	86		
All Nurses	<u>86</u>	All Physicians	<u>90</u>

Both physicians and nurses have substantially the same productive time, that is, 90%. According to Bar-Noon²³ this is definitely a high percentage.

5.3 Distribution of productive work time among various activities

Seventy per cent of the physicians' and nurses' work time is spent in the regular clinic. However, the nurses' work is distributed in a different manner from the physicians', the former devoting more time to administrative activities and less to client contact. A detailed

description is presented in Table 5.3.

Table 5.3 Distribution of productive work time by activities and occupations (percentages)

Activity/Occupation	Nurses	Physicians
Administrative	28	9
Nursing/Medical		
{ Outside of contacts	23	22
{ Involving contacts with clients	19	41
Instruction	7	3
Meetings	9	14
Home visits	6	5
Mother-and-child care	7	4
CHAD	1	2
TOTAL	100	100
Total Productive Hours	352	245

5.4 Main tasks

One hundred seventeen nurses' tasks and 89 physicians' tasks were noted during the observations. Identical tasks performed within different activities were combined for the purposes of discussion. Tables 5.4A and B present the main tasks carried out by the physicians and nurses during the course of their work. Those performed during contacts with clients are measured as repetitions. Those outside of contacts with clients are measured by the duration of time spent on them.

Table 5.4A Most Common Tasks Performed by the Nurses*In Contacts with Clients

Tasks	Number of times recorded	Percent of all tasks within contacts
Verbal contacts	271	13.6
Handing out medication	232	11.6
Recording entries in files	200	10.0
Checking medications and giving prescriptions	186	9.3
Measuring blood pressure	155	7.8

Outside Contacts with Clients

Task	Duration (minutes)	Percent of productive time
Professional communications with physician or with another nurse	1883	8.9
As above, regarding administration	956	4.5
Work on appointments book and register	895	4.2
Instructing students	820	3.9
Retrieving files	728	3.4
Care of equipment	703	3.3

* About 35% of the nurses' work time was spent on these principal tasks.

Table 5.4B Most Common Tasks Performed by the Physicians*In Contacts with Clients

Tasks	Number of times recorded	Percent of all tasks within contacts
Physical examination	596	16.7
Recording entries in files	656	18.4
Prescribing medications	586	16.4
Verbal contact with clients	762	21.3

Outside of Contacts with Clients

Tasks	Duration (minutes)	Percent of productive time
Professional communication with nurse or other physician	1141	7.8
Recording entries in files	674	4.6
Epidemiological work	652	4.4
Participation in regular epidemiological meetings	486	3.3

* About 47% of the physicians' work time was devoted to these basic tasks.

5.5 The role-performances

A. Professional roles of the health team

A role is defined as the institutionalized expectations people have of what a professional must do.

This study deals with role performance. Within the role performance it is possible to define two dimensions, extension and diversity. Each dimension has a gradient.

Some examples of these terms are presented below:

Extension is measured by the range of the different activities. Diversity is measured by the range of tasks within the respective activities.

A task is composed of all actions carried out for one purpose (examples: measurement of blood pressure, checking instruments, participation in a meeting, recording entries in the file of a patient, etc.).

An activity is composed of tasks grouped according to a certain criterion.

A team member who is qualified to carry out only a certain portion of the range of activities of care is defined as a specialist. In our system, not all team members with the same occupation carry out all possible tasks. However, they should not be defined as specialists, since their roles are defined by an agreed-upon division of labor.

B. Professional roles of the physicians and nurses in the Family Practice Unit

Nine nurses were followed during the tracking-observation. Of these, one was responsible for coordinating the work of the other nurses. One was also involved in teaching nursing students. The role of coordinating nurse in the CHAD program was transferred during the course of the observations from one nurse to another. Altogether, the nurses filled 5.6 full-time posts.

Similarly, the work of six physicians was examined during the course of the observations. One was the director of the Family Practice Unit. Another directed the CHAD program and a third was the director of the Center and of the home care program. Altogether, the physicians filled four full-time posts.

5.6 Qualitative role profiles

The qualitative aspect of the role of nurses and physicians is defined by dimensions of both extension and diversity of activities performed. To the extent that any nurse or physician performed more of the activities and a larger percentage of tasks within the various activities, their role was broader. Nine activities were observed. The tasks themselves were defined at the pretest stage.

It is possible to distinguish two types of physicians' roles: those with a wide range, usually the role of family practitioner as found in the community health center, and those with a narrow range tending to complement the work of the former. Among nurses it is also possible to distinguish two types: those with a broad role (performing all the activities and tasks within) and those with a very narrow role, performing only 40% of the activities defined as being performed by nurses. (See in Appendix III the division of tasks according to activities.)

5.7 Quantitative role profiles

The quantitative role profile of each nurse or physician is defined by the distribution of his/her productive work time according to activities.

The maximum range among the nurses re direct client contact was 45%. The maximum range for teaching was 1/3 of the total productive time of one nurse. In CHAD clinics the maximum was 73% of the total productive time of one nurse. The administrative and nursing activity outside of contacts with clients differentiate the roles of the various nurses from each other only slightly though their activities are very different.

Among physicians, activities involving patient direct contact comprise a sizeable portion of all the physicians' roles. However, we can distinguish one group of physicians for whom this activity was the major part of their role, while a second group performed the entire range of activities.

Some of the tasks performed by the nurses are exclusively theirs, so that other professions cannot fill their places. Other tasks can be carried out by other workers - some by the physicians and some by the clerks. Almost all of the physicians' tasks are specifically theirs, except for several administrative tasks. These are not necessarily part of the physicians' roles, but result from the system's organization. (See Appendix IV.)

5.8 Collaboration of nurses and physicians

The level of collaboration between nurses and physicians in the Family Practice Unit is very high compared to most primary care services in Israel.

It is possible to divide this collaboration into three levels. 1) Nurse's work for a physician, e.g. preparation of forms. These activities do not necessarily require skilled nursing personnel. 2) Nurses' assistance to a physician during a client contact. These are tasks requiring professional-technical assistance from the nurse, but no decision-making or assumption of responsibility on her part. 3) Mutuality of nurse and physician - in these tasks both the nurse and the physician contribute their professional knowledge during a contact with a client and each assumes both individual and joint responsibility. This also includes the exchange of information and consultation between physician and nurse regarding clients in general.

Of the productive work time of the nurse, 0.5% was spent on Type A, 0.8% on Type B, and 10.1% on Type C. In all, 1/9 of nurses' work time was spent in some sort of collaboration with a physician.

The physicians are assisted by the nurses during 1.3% of their productive time and 7.1% of their time is spent working together.

The routine contacts of physicians in the mother-and-child service are performed, in general, in collaboration

with a nurse, as are contacts of the physician in CHAD clinics. However, the method of observation utilized in this study did not permit the measurement of the proportion of work time spent in the presence of the team partner.

Similarly, the method does not allow us to measure the "higher level" of collaboration between a nurse and physician, in which the nurse performs roles which otherwise would be a physician's. Nor does it measure the extent to which the physicians relate to the clients' problems in family and society, functions which may traditionally be considered in the realm of nursing.

5.9 Continuity of the care-unit

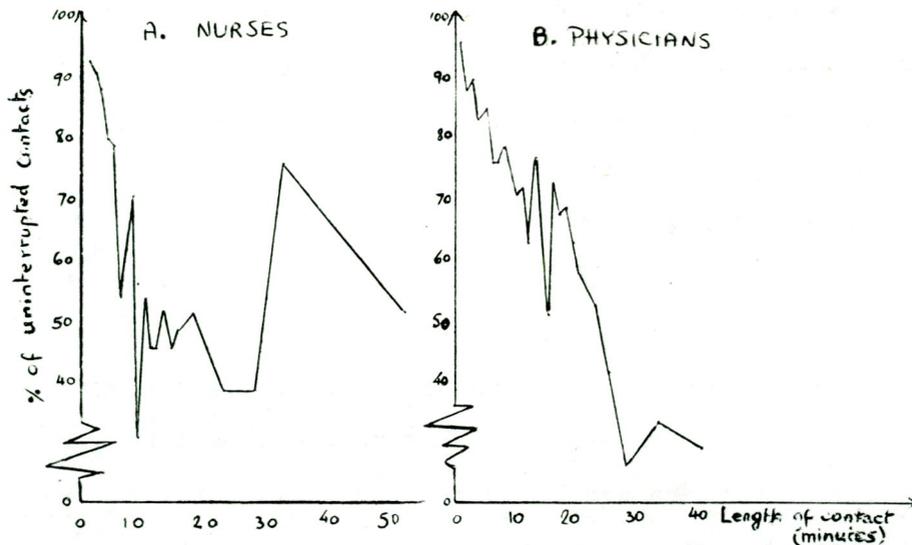
The work in the Family Practice Unit is characterized by frequently discontinuous client contacts. Therefore, the duration from the beginning of the contact to its end is not identical with the duration of the care-unit itself.

It was found that the difference between the duration of time from the beginning to the end of a contact, and the duration of the care-unit itself, was almost twice as large for nurses as for physicians, 1.9 minutes compared to 1.0 minutes respectively. This difference results only from the size of the "interruptions" and not from their relative frequencies, as 78% of the physicians' contacts were without "interruption" and 80% of the nurses' contacts were without "interruption." This is true even though the physicians' contact with clients usually takes place in conditions of

privacy, whereas nurses see clients in the treatment rooms and waiting area.

Consideration of the proportion of "uninterrupted" contacts suggests that in the physicians' case the degree of interruptions is related to the duration of the contact. As it grows longer, there are more opportunities for interruptions. This phenomenon was less obvious among the nurses, as can be seen in Figure 5.1.

Figure 5.1 Percentage of Complete Contacts by Length of Contact



5.10 The roles of other staff members

A. The role of the secretary

The secretary of the Family Practice Unit worked on a half-time basis. She received the public and knew the clients very well. During her absence the role was performed by the nurses. Thus, part of the secretary's role was measured within the nurses' roles.

B. The role of the secretary of the CHAD program

The secretary of the CHAD program worked half-time. Her role included inviting clients participating in the CHAD program and updating program follow-up cards.

C. Roles of the laboratory workers

Three laboratory workers (one microbiologist and two technicians) worked on a half-time basis. Many of the tests requested by the medical and nursing staff of the center are done in the laboratory. For others, test specimens are prepared and sent to the appropriate laboratory of the Hadassah Hospital.

The most frequent tasks were: blood counts and urine tests, drawing of blood, providing explanations to the clients, recording test results and administrative matters.

When necessary, each of the workers could perform all of the tasks, but there was an internal division of labor so that each had her own area of activities. Table 5.5 indicates the nature of the work distribution.

Table 5.5 Distribution of productive time of laboratory workers, by activity and worker (percentages)

Activity	<u>Lab Tech</u>			<u>Total</u>
	1	2	3	
Laboratory tests	45.5	47.7	73.5	56.4
Contact with clients	25.0	8.0	26.2	19.7
Administrative tasks	29.5	43.3	.3	23.9
Total	100	100	100	100

N = 88 hours

D. The role of the pharmacist

The pharmacist worked three-quarters time. Her activities consisted of the distribution of medications to clients with explanations; professional communication with physicians and nurses; preparing orders, receiving deliveries and arranging stock. The pharmacist maintained constant contact with the physician directing the Family Practice Unit. They decided together on orders for medications.

6. Service to clients

6.1 The clients

As previously described, the Family Practice Unit serves the residents of four housing projects, as well as clients insured by the welfare bureau residing in the rest of Kiryat Hayovel. Staff and special cases are also entitled to the services of the Unit, but this is a relatively small group.

During the four weeks of observation, 3058 visits were recorded, an average of 124 visits per day. These visits were made by 1258 people, averaging 2.4 visits per person of those who visited the center at least once during the observation period. Of these, 879 were residents of the four housing projects (Area I), or 39.3% of its total population. Assuming that the rate of visits is constant, the rate of visits per person residing in Area I would be 12.3 annually. Most of the other 379 who visited the Family Practice Unit were welfare recipients. They represented about half of the eligible welfare population.

The age and sex distribution of the client population is known for the four housing projects and it is therefore possible to calculate differential use of the service. Such analysis is not possible for other clients.* However, it is clear that their distribution according to age and sex is very different from that of the four housing projects. Many of the welfare recipients are aged, explaining the high frequency of aged among those visiting the service. Aside from this information, there is no data with which to speculate on variations among different groups using the service.

* The welfare recipients are not listed individually and therefore it is impossible to calculate the percentage of those eligible who actually make use of the service.

Table 6.1 Distribution of visitors to the Family Practice Unit during the observation period according to care area, by age and sex* (percentage)

Age	Area I			Other		
	Male	Female	Total	male	Female	Total
65+	17.4	15.4	16.2	49.1	47.3	48.0
45-	24.4	24.3	24.3	10.0	15.9	13.9
25-	18.8	22.1	20.8	5.9	15.0	11.8
2-	30.9	32.4	31.9	25.8	14.8	18.5
0-	8.5	5.8	6.8	9.2	7.0	7.8
Total	100	100	100	100	100	100
N	340	539	879	120	226	346

Table 6.2 Percentage of the four housing projects residents visiting the Family Practice Unit during the observation period, by age and sex

Age	Male	Female	Total
65+	44.4	77.6	59.2
45-	35.3	77.5	53.0
25-	24.7	43.1	34.2
2-	21.3	36.9	28.9
0-	61.7	70.5	65.9
All ages	29.1	50.4	39.3

* Unknowns excluded

Of those residing in the four housing projects, females visited the Family Practice Unit more frequently than males, at all ages. In most of the age groups the ratio of male to female visitors is 1:1.75, except for infants up to the age of two, among whom the difference between the sexes is negligible.

The percentage of visitors varies with age among both males and females. Between ages 0-2, two-thirds of the infants appear in the observations. From the age of two, the percentage of visitors is smaller and increases with age.

As mentioned above, it is impossible to calculate the use of service by clients residing outside of the housing projects. However, it is significant that half of the visitors during the period of observation, of these clients, were aged 65 years and more.

6.2 Visits by selected variables

When examining the frequency of visits to the Family Practice Unit it seems that certain variables are associated with frequency and others are not.

Tables 6.3 - 6.6 present the distribution of visitors by number of visits and sex, age, origin and care area. Table 6.3 shows that there is apparently no difference in average number of visits per visitor between males and females. When clinic visits are calculated by sex out of the total population, it is often found that females utilize health services more than males.¹⁹ Such findings are actually made

up of two components, percentage of visitors out of the total population and the number of visits per visitor. In light of our findings it might be concluded that the differences in use of service by sex stem from a difference in the first component, that is, more females visit than males.

Within the population of visitors there was no difference by sex in regard to number of visits per individual.

Table 6.3 Distribution of visitors by number of visits and sex (percentage)

Number of visits	Male	Female
1	47.8	41.5
2	23.6	24.9
3	12.3	13.3
4	6.8	8.9
5	2.8	4.4
6	2.1	3.4
7	.8	1.4
8+	3.8	2.2
Total	100	100
N	471	788
Mean	2.31	2.42
Standard deviation	2.15	1.91

Table 6.4 Distribution of visitors by number of visits and age group (percentage)

	Age 65+	45-	25-	2-	1-
Number of visits					
1	35.1	38.5	45.1	54.9	39.0
2	21.4	22.9	24.6	25.6	35.6
3	15.7	16.0	11.6	10.5	10.3
4	11.0	9.2	8.8	4.1	7.0
5	4.5	3.4	4.5	2.0	7.0
6	5.5	2.3	3.6	1.4	-
7	1.9	1.5	.9	.6	1.1
8	2.6	1.1	-	.6	-
9	1.0	.8	.9	-	-
10	1.0	1.9	-	.3	-
11-15	.3	1.6	-	-	-
16+	-	.8	-	-	-
Total	100	100	100	100	100
N	308	262	224	344	87
Mean	2.82	2.82	2.23	1.84	2.11
Standard deviation	2.14	2.81	1.58	1.32	1.30

Table 6.4 shows that the frequency of visits per visitor was lower at younger ages and relatively higher at older ages. However, the relationship is not so simple: we can see that there is no difference in average frequency among visitors aged 45 and over and that the lowest frequency is not necessarily among those of the youngest age.

The differences in use by age stem from variations in the percentage of visitors and in frequency of visits per visitor. An exception is the high percentage of visitors among infants of up to two years old, but the frequency of visits per visitor is relatively low.

There is no difference in frequency of visits among visitors born in various countries, except for those born in Israel. It is very possible that the frequency of those born in Israel is low ($p < .001$) because most of them belong to younger groups whose visits are relatively fewer.

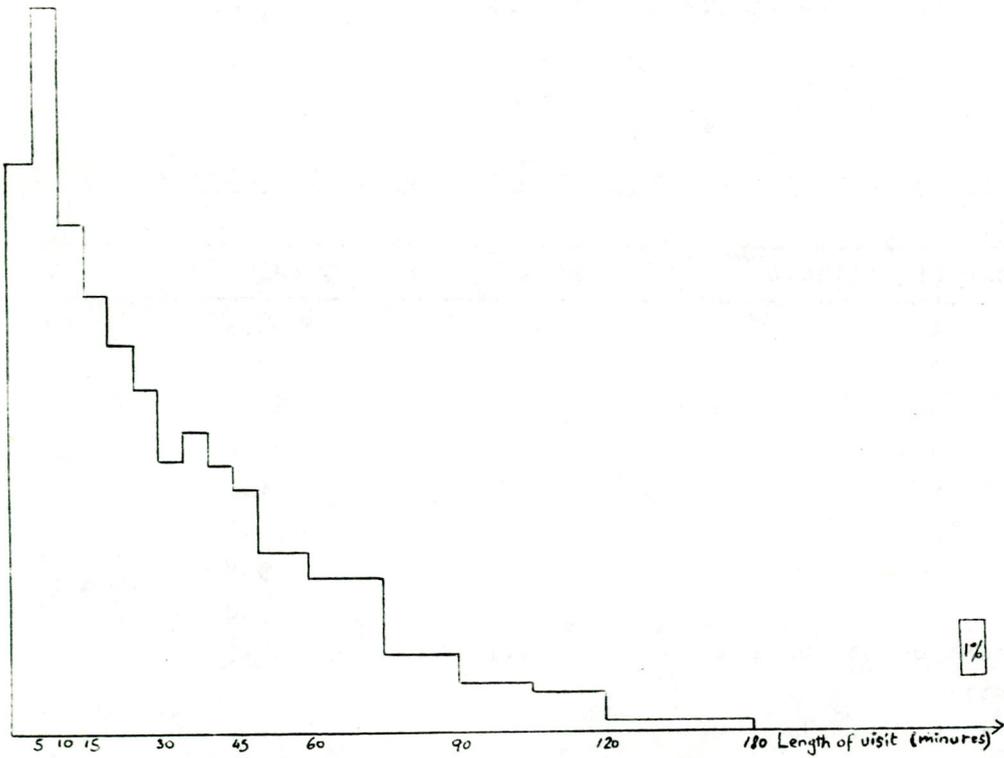
No difference was found between visitors from the housing projects and others in the frequency of their visits to the Family Practice Unit.

6.3 Duration of the visits

The most frequent visit duration was 6-10 minutes. More than 80% of the visits ended within an hour. However, 13% of the visits did last $1\frac{1}{2}$ hours and 1.5% were longer than an hour and a half. Isolated visits lasted up to three hours. The median duration of the visits was 26.4 minutes. The mean duration was 34.7 minutes. The distribution of visits by

duration is presented in Figure 6.1. It is J-shaped.

Figure 6.1 Distribution of visits by their length



6.4 Reception arrangements

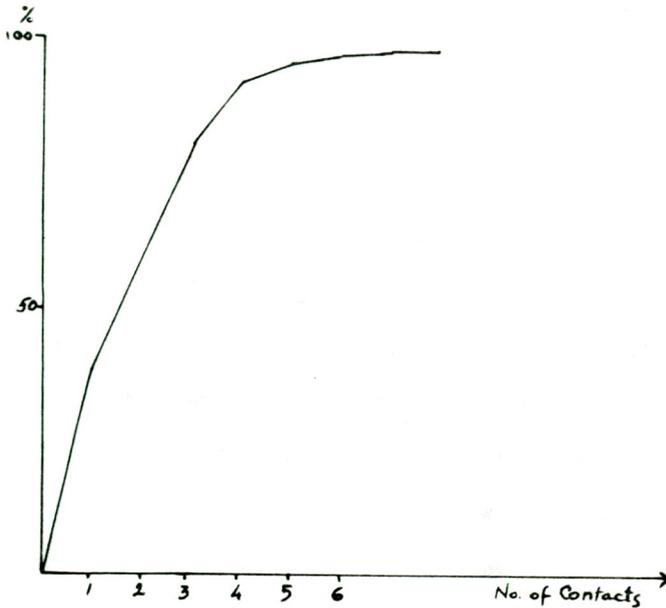
In order to measure the arrangements for receiving the public, the movements of the clients within each visit were analyzed. Table 6.5 presents the distribution of visits by the number of contacts which took place within each. Ninety-two percent of the visits were concluded within four contacts. A few visits required longer routes. There were 6428 contacts within the 3058 visits, an average of 2.1 contacts per visit.

Table 6.5 Distribution of visits by number of contacts

Number of contacts	%	Cumulative %
1	38.9	38.9
2	20.4	59.3
3	20.8	80.1
4	11.9	92.0
5	3.0	95.0
6	.7	95.7
7	.1	95.8
8	0	95.8
Unknown or no contact	4.1	99.5
Total	100	
N = 3058 visits		

Figure 6.2 presents this information in graphic form.

Figure 6.2 Cumulative distribution of visits by number of contacts



There were two types of visits, complete and incomplete. A complete visit is one in which the client completes the entire route necessary to the purpose of his visit. An incomplete visit is one in which additional visits needed for laboratory tests, visits to the pharmacy or special visits to arrange appointments. The reasons for incomplete visits can be divided into two categories: (a) the required procedure itself (repeated blood pressure measurements) and (b) the structure of the service (outside laboratory services, pharmacy hours). Planning of this tracking observation did not permit service category differentiation as this was not one of its goals. It can be guessed that visits including only a contact with the pharmacy, laboratory or office were

incomplete or might have been the completion of a previous visit.

In all, there were 230 different service routes. The eighteen most frequent routes, as detailed in Table 6.6, covered 81% of the total visits which included a contact. Figure 6.3 describes these routes. All the other routes, more than 200, ranged from a frequency of 16 (.5%) to one. This indicates that most of the clients followed a standard route and may be explained by client reception arrangements.

Visits to a "physician only," "nurse only," "others only," and "secretary only" are characterized by a standard route. The visits to a "physician and Others" and to "nurse and others" are also characterized by a standard route, but to a lesser extent. The routes including a physician and nurse in any order (physician first or nurse first or physician-nurse team) are infrequent and not standard. None of the standard routes included seeing a nurse after a contact with a physician.

Table 6.6 Visits by most frequent routes

Route	Number of Visits	%*
Nurse	646	22.0
Nurse, office, pharmacy	314	10.7
Secretary, physician, office, pharmacy	229	7.8
Pharmacy	181	6.2
Physician	177	6.0
Physician, office	143	4.9
Physician, office, pharmacy	102	3.5
Nurse, pharmacy	90	3.1
Nurse, office	84	2.9
Office, pharmacy	80	2.7
Laboratory	73	2.5
Clinic secretary	53	1.8
Office	47	1.6
Clinic secretary, physician, pharmacy	39	1.3
Clinic secretary, physician	34	1.2
Physician, pharmacy	29	1.0
Clinic secretary, physician, office	29	1.0
Nurse, physician, office	26	.9

* Of 2933 visits in which there was at least one contact.

Table 6.7 describes the ten most frequent routes by mean duration. It may be seen that visits including contact with a physician were longer, those including contact with a nurse were shorter, and visits which did not include contact with a physician or nurse were the shortest.

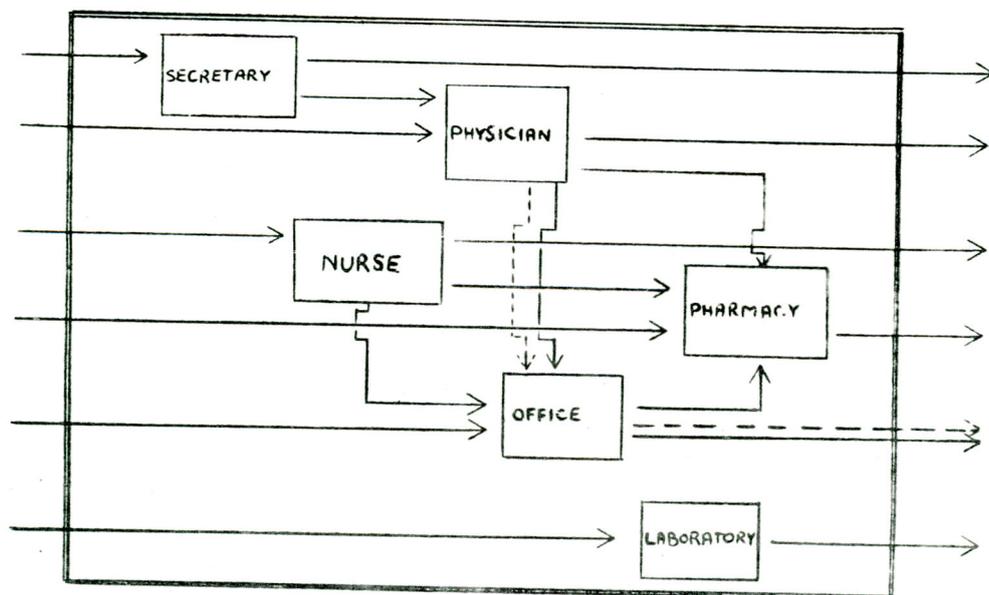
Table 6.7 Description of the ten most frequent routes

Route	No. of Visits*	Mean duration	Standard deviation
1. Nurse	593	19.6	17.6
2. Nurse, office, pharmacy	310	33.7	20.0
3. Secretary, physician, office, pharmacy	229	68.0	30.1
4. Pharmacy	177	10.3	13.7
5. Physician	164	42.3	30.0
6. Physician, office	141	47.1	29.1
7. Physician, office, pharmacy	100	53.8	26.5
8. Nurse, pharmacy	89	30.2	19.8
9. Nurse, office	82	22.6	15.7
10. Office, pharmacy	77	17.9	22.0

* The number of visitors was less than in Table 6.6 because the duration of the visit was unknown in some cases. The percentage of unknown in the different categories ranged between 0 to 8.2

The variations are greater in routes in which contact with a physician is involved, due to the variability of physician contacts.

Figure 6.3 The eighteen most frequent routes in the process of receiving care in the Family Practice Unit



6.5 Visits including contact with a physician or nurse

Visits including a contact with a physician or nurse comprised 79.3% of all visits. Thirty-eight percent of these visits included contact with a physician and not with a nurse. Fifty-four percent included contact with a nurse and not with a physician and 8% included contact with both a physician and a nurse. In general, males and females visit physicians and nurses in similar patterns. However, there are differences according to the visitors' age, as seen in Table 6.8.

Table 6.8 Distribution of visits including contact with physician or nurse by age of the visitor
(percentage)*

Age	Physician	Physician and nurse	Nurse	Total	No. of visits
65+	25.1	8.3	66.6	100	662
45-	27.9	8.5	63.7	100	603
25-	41.9	7.4	50.8	100	394
2-	59.7	9.0	31.2	100	509
1-	49.1	10.7	40.2	100	169
Total	37.9	8.5	53.6	100	2337

* Of all the visits in which there was a contact with a physician or nurse

There is little difference between the percentage of visits in which there were contacts with both physician and nurse at various ages. On the other hand, the percentages of "physician only" or "nurse only" contacts show an interesting pattern. From age 45 up most of the visits are with a nurse. At younger ages the opposite is true.

6.6 Content of contacts

A. Content of contacts with nurses

Nurses' contacts with clients vary as to their framework and contents. Most of these contacts are within the framework of the regular clinic (83.5%). Most clinic contacts (81.3%) consist of one task only.

Tasks can be divided into three types: those which usually constitute a complete contact, those which sometimes constitute a complete contact, and those which, in general, do not make up a complete contact.

Table 6.9 shows that the first group includes injections, drawing blood, giving a prescription and specific treatment. In the second group we find measuring blood pressure and counseling or explanation. Weighing is the only task in the third group. The most frequent tasks carried out by the nurses are giving prescriptions, counseling or explanation, injections and specific treatment.

Table 6.9 Tasks carried out by nurses within a client contact by content of task and content of contact

<u>Content of task</u>	<u>No. of contacts</u>		<u>Total</u>	<u>Percentage as only task</u>
	As only task of the contact	As part of the contact		
Counseling or explanation	174	160	334	52.1
Injection	206	39	245	84.1
Care	85	37	122	69.7
Measuring blood pressure	104	75	179	58.1
Weighing	6	43	49	12.2
Drawing blood	77	19	96	80.2
Giving prescriptions	424	171	595	71.3
Total		1076		

B. Content of physicians' contacts

The recording of physicians' contacts was not as satisfactory as the recording of the nurses' contacts. Fourteen percent did not include a record of the contacts' contents. Three percent of the contacts were together with a nurse. Almost all joint contacts were within the framework of mother-and-child care, where physician-nurse contacts comprised 33.3% of all contacts. Five percent of the physicians' contacts were solely for the purpose of giving a certificate or prescription.

6.7 Waiting time

Total waiting time, which corresponds to the movement of a client along his route in the Family Practice Unit, depends on contacts made during this route. Therefore, it is preferable to analyze the waiting period by contacts. This was done separately for physicians and nurses.

Table 6.10 Distribution of physicians' and nurses' contacts by waiting time (minutes)

Duration of waiting time	Contact with Physician	%	Contact with Nurse	%
0-15	389	36.0	1142	76.2
16-30	245	22.7	222	14.8
31-60	306	28.3	113	7.5
61-90	95	8.8	17	1.1
91-120	37	3.4	5	.3
121+	8	.7	-	-
Total	1080	100	1499	100

Figure 6.4 Cumulative distribution of nurses' and physicians' contacts by waiting time

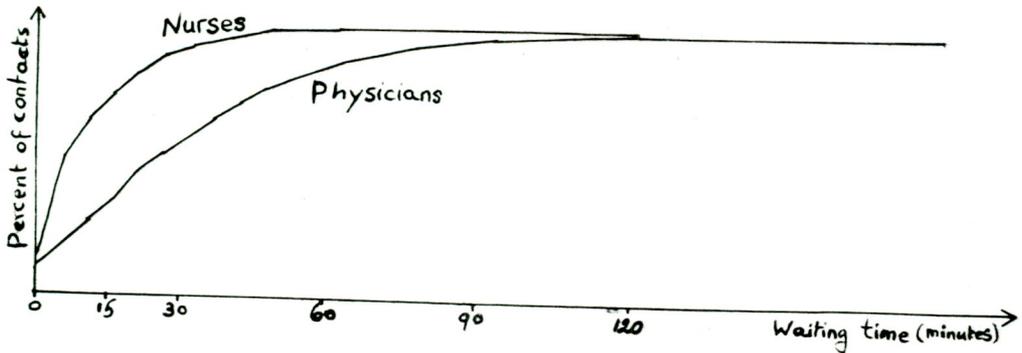


Table 6.10 and Figure 6.4 show that more than a third of those visiting a physician wait up to 15 minutes. More than half wait up to 30 minutes. A few wait for two hours or more. The waiting time for a nurse is far shorter. More than three-quarters of those visiting her wait no more than 15 minutes. Only a small minority wait more than an hour.

The mean waiting time for a physician is 30.7 minutes and there are no differences among age groups. The mean waiting time for a nurse is 11.2 minutes and there is a slight difference among age groups.

Table 6.11 Average waiting time and index of work-load for (A) nurses and (B) physicians, by specific team member

A. Nurse	Average waiting time (minutes)	Percentage of contacts	Percentage of contacts work hours*
1	11.8	14.6	.82
2	12.9	36.7	3.08
3	13.4	8.4	1.87
4	11.1	6.1	1.36
5	18.8	3.3	.56
6	6.2	6.0	.34
7	7.1	19.4	1.09
8	13.0	.3	.00
9	9.4	5.2	2.36
Total	11.2	100	

B. Physician	Average waiting time (minutes)	Percentage of contacts	Percentage of contacts work hours*
1	32.8	18.9	.76
2	25.0	22.4	.90
3	45.6	11.6	.46
4	40.2	6.6	1.00
5	29.4	27.9	2.23
6	21.8	12.6	1.90
Total	30.7	100	

* Full-time position = 100%

7. Discussion

Table 7.1 compares the proportions of non-productive physician time found in the various studies.

Table 7.1 Percent of physicians' non-productive time

Source	%
Indianapolis ¹¹	2
Seattle ⁵	8
Missouri ¹⁵	2.6
Ofakim ²³	8
Kiryat Hayovel)	
) - physicians	10
) - nurses	14

In the Ofakim study, in addition to the 8% mentioned above, 28% of the physician's time was found as having been spent away from the clinic. It may be assumed that part of this time is non-productive. In other places, non-productive time was measured only in terms of time during which the worker was present at his place of work. In the present study, this does not seem a serious drawback inasmuch as the hours of observation were similar to the required work hours. Bar-Noon²³ maintains that a 15% rate of non-productive time is a reasonable proportion. The situation in the Family Practice Unit was better than this.

Comparison of the proportion of time found devoted to contacts with clients in various studies is presented in Table 7.2.

Table 7.2 Time devoted to clients

Source	% of total time
Indianapolis ¹¹	55
Seattle ⁵	60
Missouri ¹⁵	90*
Ofakim ²³	49
Kiryat Hayovel) - physicians	47
) - nurses	28

* See p. 70.

This comparison is qualified by the fact that the criteria for categorization are different in each of the studies. In the Missouri study, categorization of activities does not consider contact with clients as such, but it is deducible from the lists of tasks included in each activity.

The Family Practice team functions differently in comparison with other primary care services because of its unique approach⁹ as well as its teaching role. This is expressed by the fact that a sizeable portion of the work day is set aside for epidemiological work, meetings and teaching.

It is especially significant that "communication" was among the most frequent tasks carried out by the physicians. This illustrates the emphasis placed on communication with clients.

Individual differences were found among the nurses in the frequency and duration of the same tasks or activities. This may be explained by their relative independence, allowing for greater differences in work style.

A certain amount of collaboration between a physician and nurse takes place when both are present during client contacts. However, most of their collaboration consists of extensive communication between them, not necessarily during contacts with patients. The division of labor between doctors and nurses raises the question of the desirability and feasibility of task transference from doctor to nurse, and from nurse to clerical staff. The fact that the nurses spend a great deal of time doing administrative tasks, even though they do not record enough, demonstrates that such role transfers might be desirable.^{15,17}

It is difficult to compare distribution of time by tasks in various studies because of variations in the parameters used to categorize them. This is partly due to the variations in research methodology which dictate criteria for categorization and data analysis. Two studies were comparable, as follows:

	Contact	Reading and Writing in files	Consultations	walking Traveling	Miscellaneous	Non-productive time
Indiana- ¹¹ polis	55%	38%	5%	-		2%
Seattle ⁵	60%	9%	8%	6%	7%	8%

In other places the categorization methods were totally different. The Ofakim study found that 32% of the physicians' time was spent in direct contacts, 17% in indirect contacts, 15% in other activities, 8% was non-work and 28% involved an absence from the clinic.²³

In the Missouri study, where activities were categorized according to content, 2.6% of physicians' time was spent in private activities ("non-work"), 6.5% in administrative tasks, 13.5% in preventive tasks, 19.3% in advice and information, 33.4% in diagnostic tasks and 24.7% in curative tasks. This division does not differentiate between tasks involving client contact and tasks which do not. However, according to the recording of the tasks in the four last categories, it may be deduced from the four latter categories that most took place within a client contact. Therefore, 90% of the physicians' time involved contacts with a patient.

Continuity of contact between physician and client and between nurse and client has important implications for the quality of the service. Many factors contribute to the discontinuity observed in many contacts - a) the physical structure of the clinic, which often does not allow for privacy (especially in the nurses' contacts), b) the behavior of clients who will wait in line, c) the attitude of team members that immediate contact must be made with clients. This latter factor has certain advantages but

it is questionable whether these justify the disruptions created.

A comparison of the average number of visits per year with the physician or with a primary care facility is presented below in Table 7.3.

Table 7.3 Average number of visits in various places

Insured by Kupat Cholim, visiting a physician in Israel, 1950s ³	8
Insured by Kupat Cholim, visiting a physician in Israel, 1960s ³	9
Estimate of a government committee - all visits to physicians 1963-1964 ³	10-12
Estimate, late 1960s ³	13.5
3 Israeli settlements, 1964-1965 ²⁵	9.4
3 Israeli settlements, 1967 ²⁴	5
Ofakim - visits with the physician ²²	8.2
Ofakim - all clinic visits ²²	15.6
American physicians, 1968 (including telephone contacts) ³	4.2
English physicians, 1969 ³	3.9
Yugoslavian physicians, 1965 ³	3.1

In the present study we found that the residents of the four housing projects receiving service visit the clinic 12.3 times per year on the average. As only 46% of the visits included a contact with a physician, it can be estimated that

there are 5.7 visits with a physician. The average frequency of visits per year of residents of the comprehensive-care area resembles the frequency of all clinic visits in Ofakim, as well as the average frequency of visits to physicians in Israel generally.

In both the Family Practice Unit and the Ofakim clinic nurses carry out half of the client contacts. They perform some of the latent functions which the physician generally fills in other health services.¹⁹ On the other hand, the number of visits per year to a physician in the Family Practice Unit (and in Ofakim, though to a lesser degree) is closer to the number of visits to a physician in other countries.

The number of visits in the Family Practice Unit could be decreased if it were possible to cut down the number of incomplete visits. This might not greatly relieve the load on the team members but would surely make it easier for the clients. On the other hand, the need to return for completion of a visit can fill certain latent functions which medical services usually provide. The fact that there were people who appeared a number of times during the four weeks' observation raises questions concerning their characteristics that might be worthwhile investigating.

The ranking of age groups according to the percentage of visits which include contact with a nurse (Table 6.8) is identical to that of the average number of visits per visitor

according to age (Table 6.4). It appears that there is a link of some sort between the tendency to visit many times and the preference to turn to a nurse rather than to a physician. This finding seems reasonable in that older people (aged 45 and over), among whom chronic diseases are relatively more frequent, visit more often and come to the nurse to receive care or medications. Younger people come less frequently, for more acute diseases and turn to the physician.

In the present observation, the physician-client contact lasted for an average of 9.4 minutes and nurse-client contact lasted for 6.2 minutes. An entire visit lasted an average of 35 minutes.

In research carried out in New Mexico on service provided by a nurse-practitioner, it was found that the duration of a client contact with a nurse was 12 minutes and the length of the entire visit was 74 minutes.¹⁸ In Stanford, California, a 7.7 minute average physician-client contact was measured; in Columbia, Missouri, 10.4 minutes; and in Indianapolis, Indiana, 13-20 minutes.¹¹

In the Ofakim study it was found that the average duration of physician-client contact in the Kupat Cholim clinic was 6.4 minutes and 6.9 minutes in the mother-and-child station. The average duration of the nurse-client contact was found to be 3.8 minutes in Kupat Cholim, 2.8 minutes in the mother-and-child station, and 17.4 minutes with the public

health nurse. A visit to a Kupat Cholim clinic lasted 19.4 minutes on the average and in the mother-and-child station, 25.7 minutes.²²

The components of each of the above services differ and therefore it is difficult to evaluate the implications of the differences found. The New Mexico study refers to the recommendations of the Nuffield Trust* that 75% of the clients should not wait more than 30 minutes and not more than 3% should wait more than an hour to receive care from a physician. The research findings attest to an average waiting time of 10 minutes.¹⁸ From an article describing service in the Community Health Center in Kiryat Hayovel in 1962¹² it appears that the median waiting time for a physician was less than 15 minutes. The upper quartile waited somewhat more than 30 minutes. Regarding waiting time for a nurse, it was found that 84% of the visitors waited not more than 15 minutes and 97.5% waited at most 30 minutes. Table 6.10 indicates that the Kiryat Hayovel waiting situation was poorer. The Ofakim study indicated that the median waiting time for the family physician was 10 minutes.²² However, when one considers the fact that the appointment system exists only for special CHAD clinics and for mother-and-child clinics, waiting times are not unreasonable.

* Waiting in outpatient department systems, Nuffield Provincial Hospital Trust. Oxford University Press, London, 1965

8. The CHAD Program

8.1 The CHAD program and health surveys

Heart and vascular diseases are the main causes of mortality in Israel and the majority of developed countries. Kiryat Hayovel is no exception. In order to minimize the risk of these diseases, the Social Medicine Department initiated a special preventative program (CHAD) for the population served by the Family Practice Unit.

As the first stage of this program, a health survey of the entire community was conducted. It attempted to find cases needing care, find out the distributions of health variables in the community, examine whether early discovery was feasible, and test whether it was possible to prevent heart and vascular disease by means of a community program.

The community program, which is an interventive one, is based on information accumulated during the health survey. Its main goal is to reduce the risks of heart and vascular disease, and it can be divided into three objectives:⁹

- (1) Modification of the distribution of blood pressure, serum cholesterol, serum glucose, and the height-weight index in the population;
- (2) Reduction of the incidence and prevalence of hypertension, hypercholesterolemia, diabetes and obesity, by treatment of those with high risk factors for heart and vascular diseases;

- (3) Treatment of those already ill with heart and vascular diseases with an emphasis on secondary prevention.

In the four-week tracking observation of clients it was found that 18 of 1088 physician-client contacts took place in the special framework of the program, as did 58 of 1544 nurse-client contacts (most of which were during the second survey). During the period of the observations, 369 out of 685 (54%) people participating in the CHAD program visited the Family Practice Unit. The average rate of visits per year of the CHAD program participants is estimated at 20, according to data presented in Table 8.1.

Table 8.1 Distribution of participants in the CHAD program
by number of visits during the period of observation

Number of visits	Participating in program	%
0	316	46.1
1	124	18.1
2	82	12.0
3	62	9.1
4	42	6.1
5	21	3.1
6	12	1.8
7	7	1.0
8	6	.9
9	5	.7
10+	8	1.2
Total	685	100

8.2 Differences in time spent with clients of various
risk profiles

An interesting question is: does each care unit of clients with a higher level of risks require a larger investment of time than for those with lower level of risks? It would also be interesting to know if there is any difference in time spent with such program participants in the regular clinic and the special program clinic. One may assume a priori that a difference in time need not be

expected in all the tasks comprising a care unit. For example, we would not expect that measuring blood pressure would take longer if the blood pressure was higher. Therefore, instead of comparing entire care units, only those tasks in which the time spent is likely to be influenced by risk level of the client were checked, namely, communications. This comparison is presented in Table 8.2.

Table 8.2 Average duration of selected tasks (in minutes)
by risk level of client^(a)

Risk profile ^(b)	Risk level					Total
	1	2	3	4	5	
Communication with physician in the regular clinic	3.2(25)	2.1(39)	3.4(17)	3.4(34)	3.4(40)	3.0(155)
Communication with physician in the special clinic	-	2.3(3)	6.8(5)	4.0(5)	3.6(5)	4.4 (18)
Communication with nurse involving CHAD in regular clinic	2.0(1)	5.7(3)	2.0(3)	2.5(12)	5.4(12)	3.9(31)
Communication with nurse involving non-CHAD matters in regular clinic	3.0(6)	2.2(5)	2.5(4)	1.9(9)	2.6(7)	2.4(31)
Communication with nurse in special clinic	2.3(3)	2.2(4)	2.5(2)	4.3(6)	1.0(2)	2.9(17)

(a) Number of cases in brackets

(b) As the number increases, the level of risks is higher.

Not enough of these tasks were observed to enable us to reach an unequivocal conclusion, but it seems that there were no real differences among the various risk profiles, and there the findings certainly do not show a gradient.

8.3 The proportion of CHAD tasks within various care frameworks

CHAD-related tasks are carried out within the various primary health frameworks. Within the special CHAD clinics, tasks relevant to the program comprise 92% of all tasks, which is to be expected. There are no differences between the physicians and nurses.

The percentage of CHAD tasks in regular clinics and house calls ranges between 20% and 24% both for physicians and nurses. Thus, a fifth to a quarter of all tasks carried out during contacts with clients within the framework of primary health care (except for the mother-and-child service) are CHAD-related. One cannot maintain that this is a result of the program within the service - some of the tasks were carried out in the service prior to the initiation of the program. Since the practice had not been measured before the program was started, it is impossible to estimate the increment contributed by the program. Table 8.3 indicates what proportion of the entire input involving direct contact of nurses and physicians with clients, is made up of CHAD-relevant tasks.

Table 8.3 The proportion of CHAD-relevant tasks in various care frameworks

Framework	Special CHAD clinic	Regular clinic	House calls	Total *
<u>Nurses</u>				
CHAD tasks	112	368	37	517
All tasks	118	1593	153	2295
% CHAD tasks	95	23	24	22
<u>Physicians</u>				
CHAD tasks	98	645	51	795
All tasks	108	3230	214	3698
% CHAD tasks	91	20	24	22

* Including mother-and-child, in which CHAD plays a small part

8.4 Integration of the CHAD program with the primary health service

This study deals with the integration of a program within a service. The program was built upon the Family Practice Unit, its geographic area and its team. Since the program requires standard procedures determined by risk status, we may assume that the team uses these procedures for all clients, whether they belong to the program or not.

In order to measure the integration of the CHAD program within the primary health service, one must use care units rather than tasks, because the very concept of integration

involves the contents of the tasks constituting the care unit. For this purpose, the nature of the care unit variable was defined as a combination of three variables: the framework, participation in the program and the content of the care unit. The degree of integration is measured by the distribution of care units according to their nature, as described in Section 4.4 (p.12-16).

Tables 8.4 and 8.5 show the distribution of the number of care units and their duration by their nature respectively.

Table 8.4 Distribution of care units by their nature and by profession (percentage)*

Nature of Care Units	Nurses	Physicians
CHAD-1	2.8	2.1
CHAD-2	10.4	4.5
Integration	5.1	4.4
Diffusion	5.8	15.3
Non-CHAD	75.8	73.6
Total	100	100
Total care units	1060	841

* See Fig. 4.1 (p. 16).

Table 8.5 Distribution of duration of care units by their nature and by profession (percentage)

Nature of Care Units	Nurses	Physicians
CHAD-1	4.3	3.5
CHAD-2	6.8	5.5
Integration	6.2	6.8
Diffusion	5.7	19.2
Non-CHAD	77.0	65.1
Total	100	100
Total duration	6533	7945

The most outstanding differences between physicians and nurses were in regard to the distribution of care units that involved CHAD-2 and diffusion. Diffusion in this context means that program procedures are carried over to care of non-CHAD participants. The nurses provide relatively more care units of the CHAD-2 type (a contact relevant to CHAD with participants in the program, within the regular clinic). A possible explanation is that the nurses weigh clients, measure blood pressure, etc., in reference to the CHAD program while in the regular clinic. However, the proportion of 'diffusion' stands out among physicians. This is because physicians provide more care than nurses to people from outside the area of the four housing projects, who by definition do not participate in the program.

Physicians spent a greater part of their time (compared to nurses) on CHAD-related care units. This difference is due mainly to "diffusion."

Each of the physicians working within the CHAD program spent about 20% of his time on care units of any CHAD-nature or in 'integration.' There were large variations among the nurses.

Interestingly enough, if we measure the proportion of time spent on CHAD within the care units, first using number of the care units and then using tasks, it is found that both measurements indicate that about 25% of time is spent on CHAD-related topics.

It seems that care units whose nature is CHAD-related are longer, though the three physicians involved in the program differed as to the categories of the nature of their units. Two of the physicians were characterized by shorter care units in all categories. Since they carried out a sizeable part of non-CHAD care units, they caused a decrease in the overall average of these units. There are also differences among the nurses in average durations of care units by their nature.

Table 8.6 Average duration of care units (in minutes) of physicians and nurses

Nature of care unit	Physicians Mean	Nurses Mean
CHAD-1	15.3	9.2
CHAD-2	11.4	4.0
Integration	14.8	7.5
Diffusion	11.8	6.0
Non-CHAD	8.4	6.3
Total	9.4	6.2
N	841	1060

The nurses' contacts with clients within the special framework of the program were longer. CHAD-2 care units, which are within the framework of the regular clinic, were shorter. This might be due to the fact that most of the care units with only CHAD content take place within the regular clinic (which are CHAD-2) and are single task care units such as measurement of blood pressure.

Another measure of the program's integration with the service is the proportion of program work in the framework of the regular clinic. Eighty-five percent of the program care units of nurses and 81% of the physicians' were within this framework. Thus it can be seen that the level of integration is very high and that most of the program is actually carried out within the primary health services.

Table 8.7 compares the distribution of care units by their nature, among clients with various risk profiles, and between those with or without CHAD-related diseases.

Table 8.7 Distribution of care units provided to participants in the CHAD program by their nature and risk profiles of the client

<u>Nurses</u>						
Risk profile	CHAD-1	CHAD-2	Integra- tion	Non- CHAD	Total	% Non- CHAD
1	4	5	1	42	52	81
2	7	12	4	69	92	75
3	4	12	11	30	57	53
4	7	36	18	53	114	46
5	8	45	20	71	144	49
Total	30	110	54	265	459	58

<u>Physicians</u>						
1	0	1	8	24	33	73
2	3	6	2	39	50	78
3	5	5	7	12	29	41
4	5	4	11	24	44	54
5	5	22	9	14	50	28
Total	18	38	37	113	206	55

The proportion of care units which are not related to the program decreases as the risk profile increases. This is clearly seen among nurses and is somewhat less obvious among

physicians. A more detailed examination of the link between the level of risk profile of clients and the nature of the care unit (an ordinal variable, according to the degree of program integration into the service) indicates that a correlation exists; as the risk increases, the care units are more CHAD-related. (Nurses $\tau = 17$, $p < .001$; Physicians $\tau = 30$, $p < .001$)*.

Table 8.8 Distribution of care units provided to participants in the CHAD program by their nature and the presence of any CHAD-related diseases

Presence of CHAD-disease	CHAD-1	CHAD-2	Integra- tion	Non- CHAD	Total
<u>Nurses</u>					
+	4.6	30.1	16.2	49.0	259
-	9.0	16.0	6.0	69.0	200
Total	6.5	24.0	11.8	57.7	459

<u>Physicians</u>					
+	12.8	33.7	19.8	33.7	101
-	4.8	3.8	16.2	75.2	105
Total	8.7	18.4	18.0	54.9	206

Only half of the care units of the nurses involving clients who were ill with CHAD-related diseases were not program-relevant and those involving clients who were not

* τ indicates Kendall's rank correlation

ill constituted almost three-quarters of all care units. Moreover, most of the nurses' care units were of nature belonging to the program and involving ill clients, were carried out within the framework of the clinic (CHAD-2 and "integration"). The care units involving clients who were not ill were carried out for the most part within the special framework of the program. This is not surprising, as those who are not ill do not come to the nurse concerning CHAD illnesses, but are invited to the special CHAD clinic according to the rules of the program.

The picture is similar with physicians: two-thirds of the care units involving ill clients were of a CHAD-related nature, as opposed to one-quarter of the care units involving clients who were not ill. Likewise, the proportion of CHAD-related physicians' care units is greater within the integrated part of the program. However, we do not see the phenomenon of a relatively higher representation of patients without CHAD diseases in the special CHAD clinics than what might be expected, as is the case for the nurses, possibly because of an incomplete representation of CHAD clinics on the part of the physicians in the observation of the team.

8.5 Discussion

There seems to be a consensus that, in the future, primary health care will be largely practiced in health centers. An experimental health center in Peckham, England,⁴ started in the 1920s, has produced conditions which "appear

to lead towards the creation of an environment where real health education becomes a possibility, namely when ordinary people become interested in their bodies and their environment and actively seek to look after themselves. This is in contrast to the sterile didactic approach to health education which has been so largely unsuccessful to date."

Winklestein²⁰ maintains that "medical care is unrelated in a causal sense to the health status of the population." By utilizing his model of a continuous spectrum from optimal health through preclinical disease to clinical disease, he contends that a person found in a condition of pre-clinical illness should already be considered a patient. Therefore, "from an epidemiological viewpoint, allocation of resources to disease care is unlikely to yield very much in the way of health benefit to a nation." This helps us understand the importance of prevention of disease as compared to the cure of disease.

As mentioned above, the Community Health Center is guided by the Community Medicine approach, which leads to the introduction of community programs into primary-care service. The community program permits surveillance and evaluation of various aspects of the health of the community and creates standard procedures for preventive and curative care. A major prevention tool is health education concerning topics relevant to the program.

The CHAD program which is the focus of this study has

been described and justified elsewhere.^{1,2,9,10}

Other specific health programs exist, not necessarily within a primary health facility. In a California special clinic for diabetics⁶ where physicians and nurses work separately, several characteristics were found: the duration of the nurses' contacts with clients was longer than those of the physicians', and the nurses spent more time relating to social problems. The physician was disease-oriented and his purpose was to cure, while the nurse focused on psycho-social needs and her purpose was to care. No difference was found in the health states of clients cared for by the physicians and those cared for by the nurses. One problem that was noted was the high turnover among the nurses, which is detrimental to this type of program.

In Stanford, California there is a program for the prevention of cardio-vascular disease similar to the CHAD program in that it addresses itself to a number of risk factors.¹³ Health education is stressed in attempting to change the behavior of those who have not yet developed risks for the disease. The findings of the preliminary research indicate that health education is a more effective concept when it operated by means of "behavior modification strategies," including various techniques within a group framework, as opposed to a framework of individual contacts between a physician and a client.

9. A model for estimating manpower input in a community health program

9.1 The model.

In building a community health program it is necessary to construct a schedule for procedures, according to rules, for a defined population.

In order to determine the target population, a survey should be conducted, according to the results of which candidates for participation can be chosen by geographic or demographic criteria, not necessarily medical ones. Also, an initial profile of characteristics for each candidate can be obtained by the survey.

The team that plans the program has to decide upon a schedule of procedures for each of the profiles of characteristics, using medical, social and economic considerations. It should construct a framework in which activities will be systematically carried out. The staff must be trained to comply with the rules of the program, which are not necessarily identical with the ordinary procedures of the existing service. An integral part of a program is evaluation - of the processes as well as the outcome of the program.

In order to estimate the manpower input needed for carrying out such a program, it is necessary to measure or estimate various components.

(1) actions carried out in direct contact with a client, according to his profile of characteristics;

(2) actions that depend on size of population or its

characteristics profile but which are carried out without client contact (e.g. preparation of clinic sessions, recording after contacts, sending out appointments);

(3) actions which do not depend on the population size (e.g. planning, discussion and decision-making, staff training).

The estimate of the general input of manpower in a program, T , is expressed as

$$T = T_1 + T_2 + T_3$$

T_1 , the estimate of the time invested in contacts with patients can be made using three components

- a) t_{ij} estimate of time necessary for carrying out action i with client with profile j ($i=1, \dots, r$ different actions; $j=1, \dots, s$ different profiles).
- b) p_j size of the group of clients with profile j
- c) a_{ij} number of times a task i should be performed on a client of profile j

$$T_1 = \sum_{i=1}^r \sum_{j=1}^s p_j a_{ij} t_{ij}$$

p_j is found out by the basic survey ($\sum_{j=1}^s p_j = N$ size of the total population)

a_{ij} is decided upon by the planning team

t_{ij} to be measured by a special study

If it is possible to assume (a) that there is no difference in time when a task is performed on clients of various profiles, then for every j $t_{ij} = t_i$ and

$$T_1 = \sum_{i=1}^r \sum_{j=1}^s p_j a_{ij} t_i$$

T_2 , the time depending on the structure of the population, but not spent within contacts with clients, should be estimated by measurements of l_j , the time needed for performing tasks with relation to clients with profile j , as follows:

$$T_2 = \sum_{j=1}^s p_j l_j$$

If it is possible to assume (b) that the l_j are the same for all profiles, then for every j $l_j = l$ and $T_2 = Nl$. This can be measured directly from the actual input of the program.

T_3 , the time spent independently of size and structure of population can be estimated by measuring the time invested by the team, within the program, in the relevant activities.

It follows, then, that under assumption (b) the estimate of $T_2 + T_3$ results directly from measuring the total time actually invested in the program outside contacts with clients.

If it is possible to assume (c) that input outside contacts with clients is proportional to input within contacts, with proportion coefficient F_j different for each profile, then

$$T_2 + T_3 = \sum_{i=1}^r \sum_{j=1}^s p_j a_{ij} t_{ij} F_j$$

$$T = \sum_{i=1}^r \sum_{j=1}^s p_j a_{ij} t_{ij} (1 + F_j)$$

Under assumption (a) this may be simplified as

$$T = \sum_{i=1}^r \sum_{j=1}^s p_j a_{ij} t_i (1 + F_j)$$

If it is possible to assume (d) that input outside of contact with clients is proportional to input within such contacts but with a uniform coefficient, that is, for every j $F_j = F$ then $T = (1 + F)T_1$.

For a program planned to operate independently, this should give a complete estimate. When a program is planned to be integrated with an existing primary health care setting, there are additional problems in estimating.

a) Part of the tasks of the program would be carried out in the absence of a program just the same. Therefore the net addition contributed by the program would be smaller than the estimate from the model. In order to check this, it is necessary to measure input into an existing service before a program is imposed on it, according to the criteria of the future program.

b) As a result of the program's operation, the staff accustoms itself to certain norms and procedures to such an extent that they perform the same on clients who don't participate in the program. This contributes an unplanned excess of input which is very difficult to measure.

9.2 An estimate based on the model

An estimate of manpower input needed for operation of the CHAD program within the Family Practice Unit is presented in Table 9.1. It is based on data of time spent in carrying out various tasks and procedures of the program, with assumptions (a) and (b).

Table 9.1 Estimate of manpower input in the CHAD program
in terms of annual productive work hours, by
profession

Components of input	Physician	Nurse	Secretarial
T_1	272	634	-
T_2+T_3	225	360	806
Total	497	994	806

9.3 Comparison with the actual input

According to the findings of this study, the actual input (comparable to T_1 only) was 310 physician hours and 311 nurse hours (estimate of T_2+T_3 does not render itself to checking since it is calculated from the actual input).

The actual input of nurses is smaller than predicted by the model. This stems from the fact that the input study was conducted during a period in which CHAD activities were reduced due to the community health study being conducted at the same time.

The estimate of physicians' input is not less than expected by the model, since their work was not affected by the community health study to a great extent.

It may be worthwhile to check the hypothesis that although physicians invested the predicted amount of time in the program they may not have allocated it to the various risk profiles as planned, and devoted more to the higher

profiles than their share.

It may be concluded that the model reasonably estimates the needed input, considering that the data was collected during an atypical period of the program. The model could be used in planning, both for the construction of estimates and as a basis for decision-making on the relative importance of various program components.

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Appendix 1One page of Tasks List, including results

Physicians' tasks

Task number	Number of repetitions during observation	Average duration in minutes	CHAD relevance of task
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Medical tasks in direct contact with client, without nurse's assistanceIdentifying problems

311	history-taking	68	1.6	*
312	perusal of file	220	1.8	*

Clinical examination

321	physical	502	1.8	*
322	weighing	4	1.2	+
323	blood pressure measuring	115	1.4	+
324	other (e.g. gynecological)	3	4.0	-

Recording

331	forms for examinations	139	1.9	*
332	letters of referral or consultation	90	2.8	*
333	in file, including physician's contact sheet	566	1.9	*
334	prescription of medication (and instructions)	548	1.4	*
335	certificates of illness	94	1.4	-
340	request of CHAD check card, perusal of card	4	3.0	+

Appendix 1 (cont'd)

Task number		Number of repetitions during observation	Average duration in minutes	CHAD relevance of task
<u>Communication</u>				
351	about medical matters	655	2.7	*
352	about other matters related to care	35	1.8	-
353	about other matters unrelated to care	63	1.9	-
360	handing out medication in the absence of the pharmacist	9	2.1	*
<u>Medical tasks in direct contact with client, with nurse's assistance</u>				
410	opening abscess	-		-
420	stitching wounds	-		-
430	gynecological treatment	5	6.2	-
440	IUD insertion, checking, removal	3	17.3	-
+ CHAD - Not-CHAD * Mixed				

Appendix 2

Key words identifying tasks as CHAD-related

Prevention

Cardio-vascular disease

Blood pressure

Height-weight index

Cholesterol

ECG

Saturated and unsaturated fats

Smoking

Physical activity

Diet

Diabetes

Uric acid

Appendix 3: Qualitative role profiles

The qualitative aspect of the role performance of each nurse or physician is defined by the dimensions of both extension and diversity. Extension refers to the percentage of activities performed of all activities. Diversity refers to the percentage of tasks performed of all tasks within each activity. Tables No. 1 and 2 detail the role profiles of the nurses and physicians respectively. To the extent that any nurse or physician performed more activities and a larger percentage of tasks within the various activities, their role is broader. For example, Nurse 1 had an especially broad role, and Nurses 2 and 8 had extremely limited roles.

Table No. 1 Percentage of tasks performed by nurses (of the tasks in each activity) by individual nurse

Activity	Individual Nurse								
	1	2	3	4	5	6	7	8	9
Administrative	75	79	50	46	75	63	88	54	75
Nursing/ (outside a contact	71	71	57	57	71	71	86	57	100
Medical { in a contact	85	95	25	50	65	40	75	*	75
Teaching	67	-	33	33	67	100	67	-	67
Meetings	43	7	7	29	7	29	36	29	21
Home visits	68	*	21	47	47	21	47	*	79
Mother & child health	68	*	68	-	-	95	84	*	79
CHAD	79	*	-	-	21	*	21	71	-

* Activities not within the defined nurse's role

- Not performed

The role performance of Physicians 1 and 2 were the broadest: both performed all of the activities (extension) and a high percentage of the tasks within each activity (diversity). On the other hand, the most limited role performance, in terms of the range of activities, was that of Physician 4. In terms of the range of tasks, it is possible to divide the physicians into two groups: Physicians 1, 2 & 3 who had a wide range, and Physicians 4, 5 & 6 who had a narrow range.

Table No. 2 Percentage of tasks performed by physicians (of the tasks in each activity) by individual physician

Activity	Individual Physician					
	1	2	3	4	5	6
Administrative	92	92	100	50	67	75
Nursing/ (Outside a contact	100	100	100	80	90	70
Medical (In a contact	83	100	72	78	72	83
Teaching	50	100	100	*	*	*
Meeting	90	50	50	-	10	10
Home-visits	89	78	89	*	56	56
Mother & child health	85	69	*	*	*	*
CHAD	-	100	33	*	*	*

* Activities not within the defined physicians role

- Not performed

Appendix 4Quantitative role profiles

The quantitative role performance profile of each nurse or physician is defined by the distribution of his or her productive work time by activities. Tables No. 1 and 2 present the profiles of the quantitative role performance of the nurses and physicians respectively.

Table No. 1 Distribution of the productive time of nurses by activities (percentage)

Activity	Individual Nurse									
	1	2	3	4	5	6	7	8	9	Total
Administrative	35	28	37	23	37	16	27	16	32	28
Nursing/ (Outside of contacts	22	26	20	29	19	19	27	12	19	23
Medical { Including contacts (with clients	18	45	4	18	19	3	19	*	19	19
Teaching	3	-	2	5	7	34	6	*	2	7
Meeting	7	1	10	18	0	12	6	63	4	9
Home visits	7	*	1	7	15	4	6	*	10	6
Mother & child health	6	*	26	-	-	12	8	*	14	7
CHAD	2	*	0	-	3	*	1	9	-	1
Total	100	100	100	100	100	100	100	100	100	100

* Activities not within role

0 Percentage of time spent was less than 0.5

- Not performed

Table No. 2 Distribution of the productive time of physicians by activities (percentage)

Activity	Individual Physician						Total
	1	2	3	4	5	6	
Administrative	7	12	12	6	6	4	9
Nursing/ (Outside a contact	21	30	20	30	8	10	22
Medical (In a contact	32	27	32	64	80	81	41
Teaching	0	4	6	*	*	*	3
Meetings	25	11	19	-	-	2	14
Home visits	7	6	10	*	7	3	5
Mother & child health	8	5	*	*	*	*	4
CHAD	-	5	1	*	*	*	2
Total	100	100	100	100	100	100	100

* Activities not within role

0 Percentage of time spent was less than 0.5

- Not performed

One can note that the administrative and nursing activities outside of contacts with a client differentiate the roles of the various nurses from each other only slightly, though their other activities are very different. For example, Nurse 2 devoted 45% of her time to direct contacts with clients in the clinic, which was much more than any other nurse. Nurse 6 is exceptional in that she devoted 1/3 of her time to teaching. Nurse 8, who entered her role in the CHAD program during the period of observation, spent 73% of her time in the CHAD clinic and in meetings which, for the most part, dealt with the CHAD program.

Activities involving direct contact with the patients in the clinics comprise a sizeable portion of the roles performance of all of the physicians. In the case of Physicians 4, 5 & 6, this activity was the major part of their roles, whereas Physicians 1, 2 & 3 performed the entire range of activities.

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