CHRONIC DISEASE AMONG MIDDLE AND OLD-AGE PERSONS[1]

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THE chronic diseases, chiefly characteristic of middle and old-age persons who are increasing in our population, present a challenge which will increase in force during the next twenty to thirty years. There is need to extend knowledge of these diseases which are now the leading causes of disability and death. A special study of morbidity and particularly the chronic diseases is being conducted among a sample of white families in the Eastern Health District of Baltimore. A preliminary report of certain data of illness observed in the first year's study which ended June, 1939 has been published.[2] This paper presents a more detailed analysis of certain aspects of the problem of chronic disease as observed during that same period of time.

The seriousness of the problem of the chronic diseases characteristic of middle and old age has been judged by their rank as leading causes of death. The amount of and need for institutional and other community facilities for the treatment and care of cases of chronic illness, such as cancer, heart disease, mental disease, and tuberculosis, has been another measure of their importance. Both of these criteria imply an unusual risk of complete incapacity and death for the chronic-disease sufferer. Morbidity surveys have afforded an

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[2] Downes, Jean and Collins, Selwyn D.: A Study of Illness Among Families in the Eastern Health District of Baltimore. The Milbank Memorial Fund *Quarterly*, January, 1940, xviii, No. 1, pp. 5-26.

additional measure of the extent of the problem, namely, the prevalence of and rate of illness from diseases of a chronic nature. Although it might be inferred that persons suffering from chronic disease contributed greatly to morbidity, as expressed in attacks of illness and amount of disability, it is of interest to determine how much a specific group, such as the ambulatory cases, contributes to the average illness rate for the community. Furthermore, it is of practical importance to study the effect of the presence of chronic disease upon the individual in terms of incapacity and loss of time from usual activities. Since chronic disease is primarily a problem of middle and old age, this analysis is chiefly concerned with illness and disability among persons 40 years of age and older.

When the special study was initiated, the Eastern Health District of Baltimore consisted of two city wards containing 11,896 white families or households, including 43,377 persons, and 3,413 colored households, including 13,784 persons.[3] As far as the white population is concerned, the district is considered fairly representative of the localities in the City in which the wage-earning population live; that is, it contains some families in relatively poor economic circumstances, wage-earning families in moderate circumstances, relatively few families in the professional class, and no families that can be classed as wealthy. Consequently, the district cannot be considered as strictly representative of Baltimore as a whole, but it is probably representative of the population which forms the majority in the City.

There are three hospitals within the Eastern Health District and two adjacent to it. Each of these hospitals has an outpatient department. Approximately 150 private physicians practice regularly within the district. However, during the first year's study some 330 different private physicians served the observed population.

[3] A few months after the special study of illness was started the Eastern Health District was enlarged so that it now includes a population of approximately 100,000. Any reference to the Eastern Health District in this paper, however, is to the former district composed of Wards 6 and 7.

Data and Method of Study

The method of sampling in this particular study has been described in detail in a previous report.[2] It is sufficient here to say that the white families living in thirty-five city blocks formed the sample population. The plan of the study was to follow families that live in a group of houses in certain blocks rather than to follow a selected group of families. No attempt was made to continue visiting families that moved out of these houses during the period of the study, but the new families that moved into the houses vacated in the sample blocks were included in the study. It was considered important to secure illness records from the families at fairly frequent intervals. Past experience had led to the belief that monthly visits would yield more accurate reports of illness than would visits at longer intervals of time and that with this plan fewer of the minor cases of sickness would be missed. Consequently, monthly visiting was initiated in this study. The record of illness started with the first visit to the family; no attempt was made to secure a report of illnesses which had occurred during a period preceding the first visit except illness existing on the day of the visit.

In the studies of illness conducted by periodic canvasses of families, "illness" may be considered to include any affection or disturbance of health which persists for a considerable part of one or more days. In this study, as in other family surveys, no definition of illness is imposed or set up from without the study. The records of "illness" obtained in this study are of sicknesses reported by the household informant (usually the housewife), either as experienced by herself or as she observed them in her family. Physical defects or deformities, even though disabling, were excluded from this analysis. Illnesses present in the family at the time of the first visit were recorded but in this analysis are not considered as illnesses occurring within the period of the study.

The problem of obtaining a more accurate and complete picture

[2] *Op. cit.*

of the extent of chronic disease or affections in an observed population has been one of the particular concerns of the study in the Eastern Health District. At the time of the first visit to the family a special effort was made to record all diseases of a chronic nature among the present members of each household, whether or not they were causing present disability. Careful inquiry was made also concerning members of the family at that time resident in institutions for the insane, for the feeble-minded, for the tuberculous, and for other chronic diseases requiring institutional care.[4]

Special information was sought for all diseases of a chronic nature. This special information included data concerning the onset of the first symptoms of the disease, their nature and date; the date first diagnosed, and whether or not the diagnosis was made by a private physician, at a clinic or at a hospital. Also, for each chronic disease present, data were secured concerning disabling attacks which occurred previous to the time of the special study of illness. Such a record has made it possible to observe the occurrence of new cases of chronic disease which were manifest by illness sufficiently severe to obtain a diagnosis.

For all cases of illness a record was made of the nature of medical service received and whether rendered by a private physician, clinic, or hospital. The causes of illness as reported by the family informants were submitted to the attending physicians for confirmation or correction. The causes of illness for clinic attendance and hospital admissions were also checked against the records of the clinic or hospital where the service was given.

Illness Among Cases of Chronic Disease

Cases of chronic disease in a population during a given period of time may be divided into three groups. These are cases in institutions, bed cases cared for in the home, and ambulatory cases with

[4] These records are considered as reasonably complete because for each family information was secured concerning all nonresident children of the head of the household; thus, those in institutions were recorded along with others not living at home.

varying periods of disability or no disability. The particular purpose of this study is to present the record of sickness over a period of time for the ambulatory cases of certain of the more serious chronic diseases. Since it is preferable to have a uniform period of observation for all ambulatory cases, the study will be limited to the experience of cases present in 1,243 families observed through twelve consecutive months.[5]

The sample population was found to be representative of the white population of the district from which it was drawn with respect to age constitution and size of household. The age distribution of the population in the 1,243 families compared with the age distribution of the total white population of the Eastern Health District is shown in Table 1. It is apparent that there are no important differences between the sample population and the total white population with respect to age content. The average size of white households in that year for the total district was 3.6 persons per household, compared with 4.0 persons per household in the sample population.

Persons with Chronic Disease. It is necessary to define what is meant by chronic disease. The term "chronic" disease usually includes those diseases or affections which have as a common characteristic a relatively long duration in time, in contrast to the term "acute" which denotes short duration. In this study the diseases or affections of a chronic nature which have been selected for special study are as follows: *heart disease, hypertension* or *high blood pressure, arthritis* or *rheumatism, tuberculosis, diabetes, chronic nephritis, pernicious anemia, gallbladder disease, ulcer of the stomach* or

[5] The previous report upon the study of illness in the Eastern Health District included 1,796 families observed two months or longer. It was pointed out that there were 492 families included in this total which were classified as "moving families"; that is, they either moved into or out of the study area during the year. An additional sixty-one families were dropped from the study during the first year because they did not wish to continue to be visited. The average period of observation for these moving and dropped families was six months. Since in the present analysis it is preferable to have as nearly as possible a uniform period of observation for all ambulatory cases if the full effect of chronic disease upon them is to be considered, the families observed less than a year have been excluded.

Age	Sample Population (White Families)	Total White Population in Eastern Health District 1939	Sample Population (White Families)	Total White Population in Eastern Health District 1939[1]
	per cent		number	
All Ages	100.0	100.0	4,998	43,377
0–4	7.1	6.5	353	2,833
5–9	6.8	6.8	342	2,965
10–14	8.7	8.5	435	3,666
15–19	9.7	9.9	486	4,272
20–24	9.0	10.2	446	4,419
25–29	8.7	9.4	436	4,088
30–34	8.8	8.2	439	3,573
35–44	14.7	14.3	735	6,164
45–54	12.7	12.7	635	5,508
55–64	7.8	7.7	391	3,314
65+	6.0	5.8	300	2,519
Unknown Age				56

[1] Obtained from preliminary tabulations of unpublished data collected and analyzed by the Department of Biostatistics of the Johns Hopkins School of Hygiene and Public Health with the assistance of the Baltimore City Health Department.

Table 1. Age distribution of the sample population in thirty-five blocks in the Eastern Health District of Baltimore, compared with the total white population in the district.

duodenum, hernia, varicose veins, prostatitis, rheumatic fever and *rheumatic heart disease, cancer, syphilis,* and *mental disease.*

During a given interval of time individuals in the population may be divided with respect to illness into three classes: (1) those who reported no illness; (2) those reporting the presence of chronic disease, and (3) those who experienced one or more illness of an acute nature only.[6] As a background for the discussion of the ambulatory cases of chronic disease, it is of interest to present a picture of the total population with respect to the three classes noted above.

Figure 1 shows for males and females, respectively, the proportion of the total population which each of these classes formed at various ages. It is apparent that the percentage of persons of both

[6] Chronic conditions such as chronic bronchitis, asthma, and hay fever have not been considered among the selected chronic diseases. Attacks of these illnesses have been included among those of an acute nature.

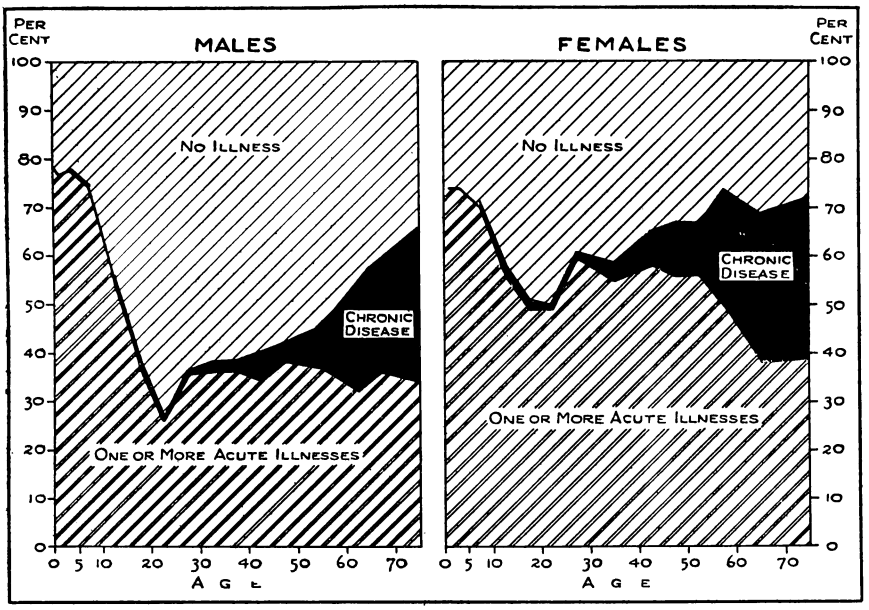

Fig. 1. Proportion of the total population by sex who (1) reported no illness, (2) reported the presence of chronic disease, and (3) those who reported only one or more acute illnesses in 1,243 canvassed white families. Eastern Health District of Baltimore, 1938-1939.

sexes reporting some illness during twelve consecutive months is relatively high at the two extremes of life, at the very young ages and in old age. Conversely, the proportion of persons reporting no illness is highest in young adult life and lowest among the very young and the old. It is apparent also that chronic disease is present among persons of both sexes under 20 years of age and that disease of a chronic nature plays an increasingly important part in the proportions sick after age 30 is reached. Among persons 60 years of age or older, from 40 to 50 per cent of those reporting illness have chronic disease.

The increase of chronic disease with age is brought out more clearly for each sex in Figure 2 which shows the proportion of persons with chronic disease among the total population. Under 10 years of age approximately 1 per cent had chronic disease. At ages 10 to 29 the proportion with chronic disease in both sex groups

varied from less than 1 per cent to 2 per cent. After age 30, both among males and females, the proportions with chronic disease increased in each succeeding decade, with the sharpest increases after age 40. In other words, the increase for both sexes was greatest during middle and old age. From age 40 to age 69 a higher proportion of females than males reported the presence of chronic disease. At age 70 and over, 31 per cent of each sex group were chronic-disease patients.

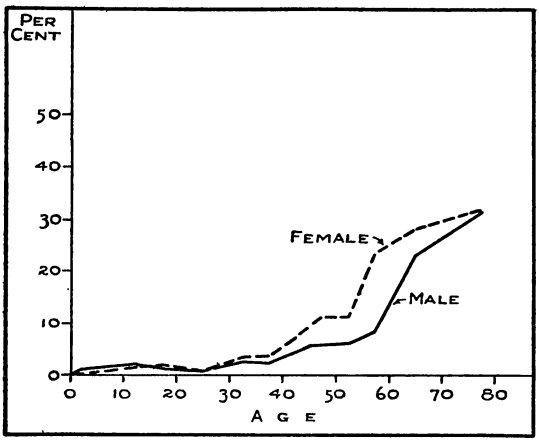

Fig. 2. Proportion of the total males and females who reported the presence of chronic disease in 1,243 canvassed white families. Eastern Health District of Baltimore, 1938-1939.

Since the more serious chronic diseases are more frequent in the middle and old-age period of life, the remainder of the discussion of the problem in this paper will be confined to the population 40 years of age and older. In this group there were 86 males and 153 females who reported the presence of chronic disease at the beginning of the year's study and were ambulatory at the time. The chronic diseases or affections included were as follows: heart disease, hypertension, arthritis, diabetes, chronic nephritis, ulcer of the stomach or duodenum, hernia, gall-bladder disease, varicose veins, pernicious anemia, prostatitis, Parkinson's disease, and syphilis.[7]

Table 2 shows for each case the duration of the disease from the

[7] Cases of active tuberculosis are usually nonambulatory. Experience in this and other studies has shown that probably cancer is incompletely reported as an illness and when reported the cases were generally bed cases. Consequently, these two diseases were excluded from the following analysis. In addition, cases of mental disease cared for in the home and all cases of chronic disease confined to bed or hospital throughout the period of observation were nonambulatory and were excluded.

It is recognized that syphilis is incompletely reported as illness; however, those cases that were reported have been included.

time the first diagnosis was made to the beginning of observation in the morbidity study. It will be noted that for some of the chronic

Table 2. Duration of cases of chronic disease from diagnosis to the beginning of the morbidity study. Eastern Health District of Baltimore, 1938-1939.[1]

Type of Chronic Disease and Sex	Total Persons	Duration of Disease from Diagnosis to First Observation						
		Less Than 1 Year	1–1.9 Years	2–2.9 Years	3–3.9 Years	4–4.9 Years	5 Years or Longer	Unknown
Total Males	86	14	7	9	9	4	39	4
Total Females	153	21	16	15	12	11	63	15
Heart Disease								
Males	16	2	2	2	1	0	8	1
Females	30	2	5	3	2	2	11	5
Hypertension								
Males	16	3	2	3	2	1	5	0
Females	45	8	6	6	2	3	16	4
Arthritis								
Males	17	3	0	1	1	2	10	0
Females	29	4	3	4	4	0	10	4
Diabetes								
Males	4	3	1	0	0	0	0	0
Females	20	5	1	0	2	3	9	0
Nephritis								
Males	8	2	0	1	0	0	4	1
Females	6	1	0	0	0	1	4	0
Ulcer of Stomach or Duodenum								
Males	4	0	0	0	3	0	1	0
Hernia								
Males	12	0	0	1	1	0	10	0
Females	2	0	0	0	0	0	1	1
Gallbladder Disease								
Females	11	1	1	0	1	2	5	1
Varicose Veins								
Females	8	0	0	2	1	0	5	0
Pernicious Anemia								
Males	1	0	0	0	0	0	1	0
Females	2	0	0	0	0	0	2	0
Prostatitis								
Males	3	0	2	1	0	0	0	0
Parkinson's Disease								
Males	1	0	0	0	1	0	0	0
Syphilis								
Males	4	1	0	0	0	1	0	2

[1] Based on persons 40 years of age and older.

diseases the number of cases was very small. Heart disease, hypertension, arthritis, and diabetes were the most frequent. About 40 per cent of these cases had been diagnosed five or more years before

Table 3. Cases of chronic disease classified according to type of disease and by whom the diagnosis was made. Eastern Health District of Baltimore, 1938-1939.[1]

Type of Chronic Disease and Sex	Total Persons	Chronic Disease Diagnosed By:		
		Private Physician	Physician at Hospital Clinic	Unknown
Total Males	86	62	13	11
Total Females	153	106	29	18
Heart Disease				
Males	16	12	2	2
Females	30	24	2	4
Hypertension				
Males	16	14	0	2
Females	45	33	9	3
Arthritis				
Males	17	13	2	2
Females	29	18	4	7
Diabetes				
Males	4	2	2	0
Females	20	15	5	0
Nephritis				
Males	8	7	1	0
Females	6	3	3	0
Ulcer of Stomach or Duodenum				
Males	4	1	2	1
Hernia				
Males	12	8	0	4
Females	2	0	2	0
Gallbladder Disease				
Females	11	7	3	1
Varicose Veins				
Females	8	4	1	3
Pernicious Anemia				
Males	1	0	1	0
Females	2	2	0	0
Prostatitis				
Males	3	1	2	0
Parkinson's Disease				
Males	1	1	0	0
Syphilis				
Males	4	3	1	0

[1] Based on persons 40 years of age and older.

the beginning of observation and approximately 17 per cent had been diagnosed within a year previous to the period of special study. Slightly more than 50 per cent of the remaining cases of chronic disease had been diagnosed five years or more before the special study and less than 10 per cent had their onset and diagnosis within a year before the beginning of observation.[8]

Table 3 shows for the same groups of cases, whether the diagnosis was made by a private physician or by a physician at a hospital clinic or dispensary. It is apparent that the majority of these cases of chronic disease had been diagnosed by a physician. The category "unknown" may contain some cases of self-diagnosis, but in most instances cases had to be classified as unknown because the informant was not always the individual with the chronic disease and lacked information as to who made the diagnosis.

Illness Among Ambulatory Persons With Chronic Disease. It is of interest to investigate whether ambulatory persons with chronic disease are more liable to illness other than the chronic disease from which they suffer than persons of similar age in the "nonchronic" population. Since the number of persons with a specific chronic disease was few, the annual amount of illness among the group as a whole is presented. There were almost twice as many females as males with chronic disease and for this reason the sex groups are dealt with separately.

Table 4 shows the annual incidence of illness among the 86 males and the 153 females who constitute the chronic-disease population, compared with the incidence of illness among persons with no chronic disease. In this analysis the chronic disease which the ambulatory patient has is not counted as an illness. Acute manifestations or attacks of chronic disease suffered by the 86 males and the

[8] Each individual with chronic disease was counted once only, though he may have had more than one chronic disease. For example, the diabetic case may have had arthritis as well as diabetes, or in another diabetic there may have been evidence of some breakdown of the circulatory system. In both instances the case was counted as one of diabetes, since from the history the presence of diabetes antedated either of the other conditions.

153 females are also excluded from the total number of attacks of illness shown in this table. The annual rate from all causes of illness was 1,197 per 1,000 among the 86 males, contrasted with the rate of 674 per 1,000 among the 726 males with no known chronic disease. The ratio of the illness rate among chronic-disease sufferers to the rate among the rest of the male population was 1.77, or 77 per cent higher. Excess illness rates were noted for the chief causes of illness, namely, the respiratory diseases and accidents. For respiratory diseases, accidents, and all other causes of illness, the ratios of the rate in the chronic-disease population to that in the "nonchronic" population were 1.20, 1.36, and 2.56, respectively.

A comparison of the illness rate among the 153 females with chronic disease with the 715 females with no chronic disease in the

Table 4. Annual incidence of illness of a nonchronic nature among ambulatory persons with chronic disease when first observed and among persons with no chronic disease when first observed. Eastern Health District of Baltimore, 1938-1939.[1]

Causes of Illness	86 Males With Chronic Disease at First Observation	726 Males With No Chronic Disease at First Observation	153 Females With Chronic Disease at First Observation	715 Females With No Chronic Disease at First Observation	Ratio of the Rate Among Persons With Chronic Disease to that Among Those With No Chronic Disease	
					Males	Females
	Rate per 1,000 population					
All Causes of Illness[2]	1,197	674	1,745	1,242	1.77	1.40
Respiratory Diseases	384	320	719	534	1.20	1.35
Accidental Injuries	105	77	144	124	1.36	1.16
All Other Illness	709	277	882	584	2.56	1.51
	Number of cases of illness					
All Causes of Illness	103	489	267	888		
Respiratory Diseases	33	232	110	382		
Accidental Injuries	9	56	22	89		
All Other Illness	61	201	135	417		

[1] Based on persons 40 years of age and older.
[2] Acute manifestations of chronic disease suffered by the chronic-disease population, the 86 males and the 153 females, are excluded from the total number of attacks of illness.

Age	Rate per 1,000 Population		Number of Illnesses		Number of Persons	
	Male	Female	Male	Female	Male	Female
40–44	619	1,396	112	229	181	164
45–49	603	1,315	91	196	151	149
50–54	693	1,265	104	172	150	136
55–59	771	1,411	74	127	96	90
60–69	724	963	76	103	105	107
70 and Over	744	884	32	61	43	69

Table 5. Annual incidence of illness at specific ages for males and females with no chronic disease when first observed for illness. Eastern Health District of Baltimore, 1938-1939.

middle-age and old-age group showed differences generally similar to those noted among males. The ratios of the rates in the chronic-disease group to those in the "nonchronic" population were as follows: all causes of illness, 1.40; respiratory diseases, 1.35; accidental injuries, 1.16; and all other illnesses, 1.51.

Even though these data are based upon very small numbers, the consistency in the results for both males and females leads to the conclusion that ambulatory cases of chronic disease in the middle and old-age group suffer a greater frequency of illness than do persons at the same ages who do not have chronic disease.

That the differences in the incidence of illness in the two groups are not due to an unusual number of the aged in the chronic-disease group is shown by Tables 5 and 6. Table 5 shows the age-specific illness rates for the population composed of persons without known chronic disease. When these rates are applied to the population with chronic disease, as shown in Table 6, the expected number of illnesses among males was 61 compared with the observed number of 103, or an excess of observed over expected of 69 per cent. Among females, the expected number was 174 compared with the 267 observed illnesses, or an excess of 53 per cent. Obviously, age was not a determining factor in the higher incidence of illness suffered by the chronic-disease population.

Had acute manifestations of the particular chronic disease suf-

Age	Illnesses Among Males		Illnesses Among Females		Number of Males	Number of Females
	Observed	Expected	Observed	Expected		
All Ages	103	60.7	267	174.1	86	153
40–44	21	7.4	16	18.1	12	13
45–49	4	3.6	44	23.7	6	18
50–54	10	5.5	31	21.5	8	17
55–59	9	6.9	59	39.5	9	28
60–69	33	23.2	79	40.4	32	42
70 and Over	26	14.1	38	30.9	19	35

Table 6. Observed number of illnesses other than chronic, by sex, in a population composed of persons who had a chronic disease when first observed, contrasted with the expected number of illnesses in the same population if the rate for persons with no chronic disease is applied to this population. Eastern Health District of Baltimore, 1938-1939.

fered by the patient been included in the total attacks of illness for the chronic-disease population, the differences in the illness rates would have been even greater. There were 27 such attacks of illness among the 86 males and 77 attacks among the 153 females.[9]

Disability Among Ambulatory Chronic-Disease Patients

In the study of morbidity, one measure of the severity of an illness is the amount of disability it causes. Does the presence of chronic disease impose a greater risk of disabling illness upon the ambulatory patient than is the risk of disabling illness for the general population? The answer is obviously in the affirmative. But the extent of this risk is of considerable interest. Table 7 shows the disabled days, bed days, and hospital days per person for the individuals with chronic disease observed during twelve consecutive

[9] By acute manifestations of chronic disease is meant attacks of illness attributed solely to the chronic disease from which the patient suffered and which were sufficiently severe to cause disability and usually to require medical attendance. The patient may have reported these acute illnesses in terms of symptoms, but if the attending physician checked the particular attack as due to the chronic disease which the patient had, it was classed as an acute manifestation of the chronic disease. For example, a patient with chronic heart disease may report a disabling attack of indigestion or of abdominal and chest pain. If the physician checks this attack as one of heart disease, it was considered in this study as an acute manifestation of chronic heart disease. The only rule for counting these acute manifestations as attacks was that there must have been an interval of at least ten to fourteen days between attacks, during which time the patient was able to be up and engaged in his usual activities.

months, compared with the average for those with no chronic disease observed during the same period. These data for the chronic-disease population include all disabled days, whether caused by the chronic disease itself or by attacks of illness of a nonchronic nature. The males with chronic disease, but who were ambulatory cases, had 30 disabled days, 13.8 bed days, and 6 hospital days per person per year. This was from nine to ten times the amount of disability, expressed in days, suffered by the "nonchronic" male population, where the days per person were: disabled 3, bed 1, and less than 1 hospital day per year.

The females with chronic disease had an average of 34 disabled days per person per year; bed days averaged approximately 8 per person and hospital days 3 per person per year. This was from six to seven times the average amount of disability recorded for females with no chronic disease, among whom there were 5 disabled days, 1 bed day, and less than 1 hospital day per person per year.

Severity of Disabling Attacks of Illness. It is of interest to know whether attacks of illness of a nonchronic nature were more severe among persons with chronic disease than was true for the "nonchronic" population. This may be shown by presenting disabled

Table 7. Annual days of disability among persons with chronic disease and among those with no chronic disease. Eastern Health District of Baltimore, 1938-1939.[1]

Population, Class and Sex	Annual Days per Person Observed			Number of Days			Number of Persons
	Disabled Days	Bed Days	Hospital Days	Disabled Days	Bed Days	Hospital Days	
Persons with Chronic Disease							
Males	30.4	13.8	6.2	2,611	1,186	535	86
Females	34.4	7.8	2.8	5,257	1,201	431	153
Persons with No Chronic Disease							
Males	3.4	1.3	0.7	2,412	949	479	704
Females	5.5	1.3	0.4	3,781	918	278	682

[1] Based on persons 40 years of age and older.

days, bed days, and hospital days in relation to disabling attacks of illness. During the course of the year's study new cases of chronic disease were diagnosed in the population under observation. There were thirty-two of these cases among males and forty-two among females 40 years of age or older. In a consideration of disabling attacks of illness within the year studied these individuals may be added to the chronic-disease population.

Table 8 shows the disabled days, bed days, and hospital days per disabling attack for the population 40 years of age and over with chronic disease and for those with no chronic disease. Disabling attacks of illness for the chronic-disease population are shown according to attacks which were acute manifestations of the particular chronic disease from which the individual was suffering and attacks of illness of a nonchronic nature.

Among males with chronic disease there were 48 disabled days, 17 bed days, and 7 hospital days per disabling attack of all disabling illness. These rates were approximately twice as high as for the rest of the male population where the disabled days, bed days, and hospital days per disabling attack were 18, 7, and 4, respectively. However, when disabling attacks of illness of a nonchronic nature among the chronic-disease population are considered there is very little difference in the two population groups in the amount of disability per disabling attack.

Females with chronic disease had on the average 30 disabled days, approximately 7 bed days, and 2 hospital days per disabling attack of all disabling illness. This was approximately twice the disability per disabling attack suffered by the females in the population with no chronic disease where there were 14 disabled days, approximately 4 bed days, and 1 hospital day per disabling attack of illness. Disabling attacks of illness of a nonchronic nature among females with chronic disease were fairly similar to those for the "nonchronic-disease" population in respect to disabled days, bed days, and hospital days per disabling attack.

From these data there is no evidence that the presence of chronic disease in individuals causes disabling attacks of illness of a nonchronic nature suffered by them to be more severe when severity is measured in terms of disabling days, bed days, and hospital days per disabling attack. However, the data presented in this study are small in number and represent the average experience of persons with chronic diseases which in themselves vary widely in severity. The results can be interpreted only as suggestive. Larger groups of ambulatory patients with the various chronic diseases are needed for study so that those with specific diseases can be dealt with separately.

Table 8 does indicate the important part that disabling attacks

Table 8. Disabled days, bed days, and hospital days per disabling attack of illness among ambulatory chronic-disease patients and among persons with no chronic disease. Eastern Health District of Baltimore, 1938-1939.[1]

Class	Number of Attacks of Illness Causing Disability	Days per Disabling Attack			Number		
		Disabled Days	Bed Days	Hospital Days	Disabled Days	Bed Days	Hospital Days
Ambulatory Cases of Certain Chronic Diseases							
118 Males							
Disabling Illness	92	48.0	16.7	7.0	4,412	1,537	642
Chronic[2]	51	69.4	25.0	10.7	3,537	1,276	548
Nonchronic	41	21.3	6.4	2.5	875	261	104
195 Females							
Disabling Illness	229	30.1	6.6	1.9	6,898	1,512	436
Chronic[2]	110	38.6	8.5	2.8	4,241	933	306
Nonchronic	119	22.5	4.9	1.1	2,657	579	130
Persons Reporting One or More Illnesses of a Nonchronic Nature							
276 Males	132	18.3	7.2	3.6	2,412	949	479
412 Females	262	14.4	3.5	1.1	3,781	918	278

[1] Based on persons 40 years of age and older.

[2] Disabling illnesses from chronic disease are acute manifestations of the particular chronic disease from which the individual was suffering.

Disabling illnesses from the minor chronic diseases are treated identically in all population groups.

of chronic disease play in the amount of disability suffered by the ambulatory case. Among males there were 69 disabled days, 25 bed days, and 11 hospital days per disabling attack of chronic disease. Among females there were 38 disabled days, 8 bed days, and 3 hospital days per disabling attack. On the whole, disabling attacks of chronic disease were more severe among males than among females when severity is measured in the terms indicated above. This is of interest in the light of the fact that mortality at these ages among males is higher than among females; yet illness occurs more frequently among females than among males.

The influence of the ambulatory case of chronic disease on the amount of disability suffered by the population 40 years of age and older is summarized in Table 9. Males who were ambulatory cases of chronic disease formed approximately 15 per cent of the total male population in the middle and old-age group. They were responsible for 65 per cent of the total disabled days, 62 per cent of the bed days, and 57 per cent of the hospital days suffered by the middle and old aged during the twelve consecutive months studied. Females who were ambulatory cases of chronic disease formed 22 per cent of the total females 40 years of age and older. They were responsible for 62 per cent of the disabled and bed days and 61 per

Table 9. Proportion of population and of disabled days contributed by ambulatory persons with certain chronic diseases during twelve consecutive months. Eastern Health District of Baltimore, 1938-1939.[1]

Type of Disability	Per Cent Persons With Chronic Disease Formed of Total		Number With Chronic Disease		Total Population	
	Males	Females	Males	Females	Males	Females
Population	14.5	22.2	118	195	812	878
Disabled Days	64.7	62.2	4,412	6,898	6,824	11,086
Bed Days	61.8	62.2	1,537	1,512	2,486	2,430
Hospital Days	57.3	61.1	642	436	1,121	714

[1] Based on persons 40 years of age and older.

cent of the hospital days of illness suffered by the total female population during the year studied.

Effect of Ambulatory and Nonambulatory Cases of Chronic Disease. To show the full effect of chronic disease in terms of disabled days in the population 40 years of age and older, it is necessary to include also the nonambulatory cases of the chronic diseases referred to on page 12; that is, cases of cancer, active tuberculosis, other bed cases, and all institutional cases which have been excluded from comparisons of ambulatory and nonchronic persons. Table 10 shows for males and females combined the proportion of the total disabled days, bed days, and hospital days which were due (1) to ambulatory cases; (2) to nonambulatory cases of chronic disease; and (3) to persons with no chronic disease. Persons with no chronic disease formed 80 per cent of the population and were responsible for approximately one-fourth of the disabled days, 21 per cent of the bed days, and 17 per cent of the hospital days recorded during the year. On the other hand, nonambulatory cases

Table 10. Proportion of disabled days contributed by ambulatory cases of chronic disease, nonambulatory cases and persons with no chronic disease during twelve consecutive months. Eastern Health District of Baltimore, 1938-1939.[1]

Classification of Persons	Per Cent				Number			
	Disabled Days	Bed Days	Hospital Days	Population	Disabled Days	Bed Days	Hospital Days	Population
Total	100.0	100.0	100.0	100.0	23,832	8,892	4,536	1,727
Ambulatory Chronic Cases	47.5	34.3	26.0	18.1	11,310	3,049	1,178	312
Nonambulatory Chronic Cases[2]	24.8	44.7	57.3	1.7	5,922	3,976	2,601	29
Persons with No Known Chronic Disease	27.7	21.0	16.7	80.2	6,600	1,867	757	1,386

[1] Based on persons 40 years of age and older.
[2] Nonambulatory chronic cases include all institutional cases, all cases of active tuberculosis, cancer, and cases of other chronic diseases confined to bed throughout the year.

of chronic disease constituted only about 2 per cent of the population and were also responsible for one-fourth of the disabled days, 45 per cent of the bed days, and 57 per cent of the hospital days for the total year. Ambulatory cases of chronic disease formed 18 per cent of the population and were responsible for 47 per cent of the total disabled days, 34 per cent of the bed days, and approximately one-fourth of the total hospital days.

Distribution of Individuals With Chronic Disease Among Employed Middle and Old-Age Persons and Among Families

There was a total of 812 male persons in the population 40 years of age or older; 628 of these were employed during the year of study. The majority of the employed were in the age group 40-59; only 100 of them being 60 years of age or older. In the middle-aged group, forty individuals, or approximately 8 per cent of the employed, were ambulatory cases of chronic disease; in the old-age group, those employed at ages 60 or over, twenty-seven of the total of 100 were ambulatory cases of chronic disease. When the average annual amount of disability suffered by these chronic-disease patients shown in the previous discussion is recalled, its social implications in relation to employment may be inferred.

It is also of interest to know how many families are affected by the presence of the more serious chronic diseases, nonambulatory and ambulatory cases of all ages, among their members. Among the 1,243 families observed twelve months there were 251 families, or 20 per cent of the total, in which there was one case of chronic disease. In an additional 64 families, or 5 per cent of the total, there were two or more cases of chronic disease. This means that chronic disease was present in 25 per cent of the total families studied.

In brief summary, the data presented in this paper have indicated that persons with serious chronic disease carry the main burden of

illness in the population after age 40 is reached. Ambulatory cases not only had a higher frequency of attacks of illness but also suffered an excessive amount of disability in comparison with disability from illness in the "nonchronic" population. They formed only 18 per cent of the total population and may indeed be characterized as a sickly group. In conclusion, the illness experience of the ambulatory cases of chronic disease suggests that preventive medicine may in the future play an important supplementary role in methods of treatment. Specific therapeutic measures, which do not help to increase the patient's resistance to intercurrent infections, will be considered insufficient.