

Chronic Illness in the Community and the Concept of 'Social Prevalence'

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General practice is an important source of information on the occurrence and distribution of chronic disease in the population. In this study, the burden of chronic illness was expressed as different indices of prevalence. Data were provided by 42 general practitioners in 15 computerized practices, collaborating in the Registration Network Family Practices of the University of Limburg in the Netherlands. Morbidity data concerning the actual health status of 25,357 subjects, as recorded by their GPs, were classified following the International Classification of Primary Care using the diagnostic criteria of the International Classification of Health Problems in Primary Care-2-Defined. The most frequent single disease was asthma (3.5%), while locomotor problems represented the most prevalent category (8.3%). The overall prevalence of chronic disease was 29.4%, with a clear positive correlation with age and, to a lesser extent, with a lower educational level. The 'social prevalence' of chronic illness (including individuals related to chronically diseased patients via their households) could be measured in a subset of the database ($n = 4577$), and amounted to 56%. It is concluded that the role of the GP as a family doctor involved with chronic disease concerns the majority of the general population.

INTRODUCTION

As members of western societies live longer, chronic diseases become increasingly common and represent a substantial part of the burden of illness in the population. General practice, providing primary and longitudinal care, is an important source of basic information on the occurrence and sociodemographic distribution of chronic disease. In describing the relevant morbidity, however, epidemiological numbers do not always adequately reflect the impact of health problems in general practice. Severe and chronic diseases, for example, are often dealt with separately and these diseases may seem to be not very frequent: general practice is often said to be a low prevalence domain of medicine.

We must consider both the difference and the relationship between incidence and prevalence. Most severe and chronic diseases have a low incidence and a low prior probability as a new diagnostic finding in the GP's office. However, they may have a very long or even a lifelong duration, and thus, can reach a con-

siderable prevalence, since the prevalence equals the product of incidence and mean duration in a stable, dynamic population.¹ Furthermore, the doctor, particularly in general practice is confronted with any chronic disease, and therefore the prevalence of 'chronic disease' or better of 'chronically diseased patients' is a combination of all single disease prevalences (not merely the sum of them, since some patients may be affected by more than one disease, which can be designated as comorbidity). This represents the prevalence of being chronically diseased, that is, of having at least one chronic disease. The occurrence of disease is not only an epidemiological-nosological phenomenon (expressed in number of cases per 1000 inhabitants), but is embedded in a social context of families and households. More persons than just the patients themselves are concerned with the disease, and in this connection, we can speak about 'social prevalence', (as opposed to nosological prevalence) a concept, which is again especially relevant for family doctors.

We can relate these concepts to another in a four-fold table, which presents four types of chronic disease prevalence (Table 1): nosological prevalence of single diseases (cases per 1000); social prevalence of single diseases (number of persons directly involved, per 1000) nosological prevalence of 'chronic disease' as a combination or pooling of all single diseases (cases per

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TABLE 1 *Four types of prevalence, in relation to the distinction of disease as a nosological or social phenomenon, and the distinction between single diseases and being chronically diseased*

	Nosological	Social
Single disease	(1)	(2)
Combined disease	(3)	(4)

1000); and social prevalence of 'chronic disease' (number of persons directly involved, per 1000) The latter category can be considered as an indicator of the social burden of severe and chronic disease in families and households.

We investigated these types of prevalence, in order to estimate the epidemiological/nosological burden of chronic/severe diseases in a general practice population. We were also interested in the relationship between prevalence and age, gender, level of education, and type of insurance (private or sickfund). Moreover, we wanted to assess the social burden of illness, as indicated by the involvement of families and households. Since in the Netherlands members of households generally have the same family doctor, this aspect could be studied in the participating practices.

METHODS

Registration Network Family Practices

The investigation of these topics is greatly facilitated by our Computerized Registration Network Family practices.^{2,3} The network consists of 15 practices and 42 general practitioners in Limburg, with a registered population of 80 000 persons. Standardized patient data are collected and updated in a general practice health information system by the general practitioners and transferred on floppy disc to a central database at the university 4 times a year. These data encompass; firstly general personal characteristics such as gender, date and place of birth, marital status, type of insurance (private or sickfund), type of household, level of education (registered for persons of 25 years or above; three classes comparable with primary school, high school and academic level, respectively), dates of entry and exit. In addition three practices could provide household identification numbers, which in future will be also done by the other practices. Thus we could combine morbidity data of members of specific households. Secondly, health problems and diagnoses, coded following the International Classification of Primary Care (ICPC),⁴ using the diagnostic criteria of the International Classification of Health Problems in Primary Care (ICHPPC-2-defined).⁵ The diagnosed problems are registered by the GP only if they are permanent, chronic, (duration longer than 6 months) or recurrent (more than three recurrences within a 6-month period). Incidental problems of short duration with complete recovery such as common colds, are

not listed. The problems can be indicated as active (relevant for actual care) or inactive. Thus, for every patient each of whom has a unique identification number) a record of general personal characteristics and a complete and up-to-date problem-list, with its historical development, is available in the database.⁶ This database can be used as a sampling frame, and as a source of descriptive and longitudinal research. Several quality control procedures have been developed, including special software for data control, repeated data checks for representativeness, peer review of general practitioners in five consensus groups, feedback from the Medical and Social Information Center on the data provided by the practitioners, and ongoing refinement of instructions and guidelines.

The database is being built up by reviewing and entering randomly three to five patient records per day per GP. After patients have been entered, their medical data and problem list are checked and updated whenever they visit the GP's office. Patients who have not contacted the doctor within 2 years (an estimated 10% of all registered patients) will receive a short questionnaire concerning their recent and actual health status. There is a complete listing and referral system in the Netherlands: each individual has his own GP, and all referrals and relevant medical information can be recorded by the GP.

At the moment of reporting, 25 357 patients have been entered, and repeated data checks indicate that the sex- and age-distribution of the entered group of patients has been stabilized and is quite comparable with the whole Dutch population (Table 2). The prevalence distribution of disease categories has also been stabilized.

The Analysis

We analysed the actual contents of the database cross-sectionally, in order to study point prevalences of active chronic problems in our population on March 1st, 1990. We related patient characteristics to problem list data, for which we used certain disease-specific codes concerning severe and chronic problems such as breast cancer, ischaemic heart disease and diabetes. In order to assess the impact of disease categories, we defined categories such as cancer, cardiovascular and endocrine problems. A patient was classified in a category if he had at least one specific disease in that category. Finally, we defined being 'chronically diseased' as having at least one disease in a specified category. In the appendix the selected ICPC-codes with their point prevalences in the basic populations are listed according to the defined categories.

In the three practices which also provided household numbers, we combined all subjects with the same household numbers in one household, studying the clustering of health problems over the households. For statistical testing, Pearson's χ^2 test for independent proportions was used, with a two-sided significance

TABLE 2 Age- and sex-distribution of the registered study population in March 1990, compared with the total Dutch population (column percentages)

Age (years)	Study population		Total Dutch population (× 1000)	
	Men (n = 12 167)	Women (n = 13 190)	Men (n = 7 358)	Women (n = 7 536)
0-24	33.7	32.5	35.2	33.0
25-44	33.6	33.2	33.6	31.3
45-64	21.2	19.5	20.9	20.4
65+	11.5	14.9	10.4	15.3

level of 5%. For the analysis of the relationship between a high number (≥3) of chronic problems and the probability of having at least one other chronic disease, we calculated the odds ratio with Cornfield's 95% confidence interval.

RESULTS

A total of 11 144 chronic health problems within the specified categories was found among the 25 357 subjects. Since a number of patients had more than one problem per category, the total number of positive scores on the categories was lower: 10 147.

The most prevalent category of listed active chronic problems (Table 3) involved the locomotor system (point prevalence 8.3%), arthritis, especially of the spine, being the most prevalent chronic disorder within this category. Chronic respiratory disease was also quite prevalent (6.4%), with asthma even having the highest single disease prevalence of all categories (3.5%). Chronic psychological problems were less prevalent than we expected, but still they were not infrequent (3.4%), depression being the highest scoring specific disorder (1.1%). The 11 144 chronic health

problems were found in 7443 patients. Considering the 'combined' prevalence of being a chronically diseased patient, we can conclude that this is considerably high: 7443/25 357, which is about 30% of the registered population (which is of course lower than the sum of the category specific prevalences, being 40.0%).

As expected, the prevalence of being chronically diseased was highly correlated with age, for both sexes (Fig. 1). On the basis of our problem-list registration, we found overall that men and women were affected about equally at all ages. Very high prevalences (70-80%) were found from about 75 years of age. Not all registered health problems were serious, of course, but the picture is impressive.

TABLE 3 Prevalence of active chronic health problems

Category	Prevalence of category	Prevalence of most frequent disorder per category	
Locomotor	8.3%	Arthritis (spine)	1.9%
Respiratory	6.4	Asthma	3.5
Cardiovascular	5.4	IHD	1.3
Endocrine	5.3	DM	2.8
Psychological	3.4	Depression	1.1
Skin	3.4	Eczema	2.0
Sensory	2.7	Deafness	1.6
Cancer	1.7	Breast cancer	0.4
Urogenital	1.2	Incontinence	0.7
Neurological			
Pain	1.2	Migraine	1.1
Disability	1.0	Epilepsy	0.6
Combined prevalence	29.4		

PREVALENCE OF ACTIVE CHRONIC DISEASE

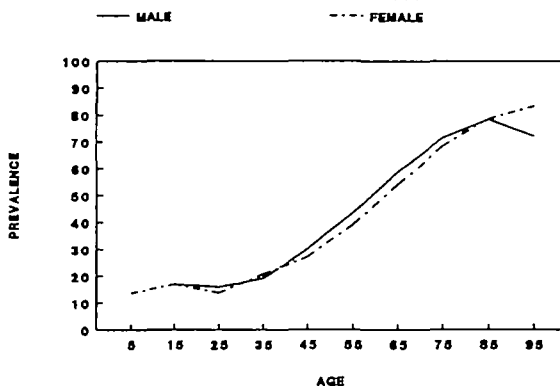


FIGURE 1. Prevalence of being chronically diseased in relation to age, for men and women.

Table 4 shows that those who have most problems, in general, have a somewhat higher probability of having at least one other chronic problem: 40% as opposed to 30% in the general population. Comparing subjects with more than three disorders with those having two or less disorders the odds ratio is 1.68 (P < 0.001). A moderate but clear correlation is found between level of education and the prevalence of chronic health problems; this remained after strati-

TABLE 4 Relationship between number of problems per patient and the probability of having at least one other chronic disease

(Sub)population	Number of patients	Probability
All	25,357	29.4
≥ 1 disorder	7,443	31.7
≥ 2	2,360	34.6
≥ 3*	817	40.6
≥ 4	332	40.7

*Comparing the probability of at least one other chronic disease in subjects with ≥ 3 disorders as opposed to those with ≥ 2 disorders, the odds ratio is 1.68 (95% confidence interval: 1.45, 1.94; $P < 0.001$).

fication for age (Table 5). This is especially the case in younger men. After stratification for age, no relationship was found between overall prevalence and type of insurance.

Clustering of chronic disease over households was studied in the three practices for which household

identification numbers were available, including 4577 registered subjects (Table 6). In 45.6% of the households there is no chronic health problem listed. Most of the problems were concentrated in a minor part of the household: 76.7% of the problems were found in 29% of the households and 45.5% of the chronically diseased patients were found in 15.1% of the households (Table 6). Our analysis revealed, not unexpectedly, that small households (couples or single) including relatively many elderly patients had a higher prevalence of chronic problems (0.8 problem per subject) than larger households (0.3 problem per subject). Most ($2620/4677 = 56\%$) of the registered subjects are involved via their households with the 1523 chronically diseased patients. This 'social prevalence' almost doubles the overall nosological prevalence in these practices ($1523/4677 = 32.6\%$) which is about equivalent to the nosological prevalence in the total database: 29.4%. Specific morbidity figures for these practices did not substantially differ from those for all practices (Table 3).

Returning to our fourfold table, we can give the following general description (Table 7). There is a

TABLE 5 Prevalence of chronic disease (percentages) in relation to level of education and age, for men and women*

Age	Men						Women					
	Level of education						Level of education					
	1		2		3		1		2		3	
	n	%	n	%	n	%	n	%	n	%	n	%
25-44	1700	22.0	1610	19.4	630	16.3 ^a	1794	23.3	2008	17.3	430	18.1 ^b
45-64	1467	45.9	755	40.3	296	30.7 ^b	1731	40.6	661	36.5	87	35.6
65+	888	69.6	366	67.8	112	70.5	1520	68.9	344	71.5	50	56.0
Total	4055	41.1	2731	31.6	1038	26.3 ^b	5045	43.0	3013	27.7	567	24.2 ^b

*Data only registered for subjects ≥ 25 years ($n = 16\ 975$); missing data for 526 subjects. Comparing the prevalences in the horizontal strata using Pearson's χ^2 test:

^a $0.01 < P < 0.05$

^b $P < 0.01$

TABLE 6 Clustering of chronic health problems and, since patients may have more than one problem, of chronic diseased patients over 2112 households in three practices with 4677 registered subjects.

Number per household	Problems		Patients	
	Proportion of problems ($n = 2365$)	Proportion of households ($n = 2112$)	Proportion of diseased patients ($n = 1523$)	Proportion of households ($n = 2112$)
0	0%	45.6%	0%	45.6%
≥ 1	100	54.4	100	54.4
≥ 2	76.7	28.6	45.5	15.1
≥ 3	52.2	15.2	9.9	2.2

Example: 76.7% of the problems are combined in the same household with at least one other problem, and are concentrated within 28.6% of the households; 45.5% of the patients are in households with at least one other patient, and are concentrated in 15.1% of the households.

TABLE 7 *Prevalence of active chronic disease following the different definitions of Table 1.*

	Nosological	Social
Single disease	< 5%	< 10%
Combined disease	30%	56%

clearly increasing prevalence of chronic health problems, starting from single disease (lower than 5%, with asthma having the highest prevalence) and its 'social prevalence', (< 10%, the average number of subjects per household being 2.2), to being chronically diseased (about 30%) and its 'social prevalence' (56%).

DISCUSSION

On the basis of the data from the Registration Network Family Practices, we had the opportunity to study the prevalent burden of chronic illness in a general practice population at March 1st, 1990. We found about 30% of the registered population were 'chronically diseased'. Taking families and households of patients into consideration, it appears that most people are directly involved: 'social prevalence' was 56%. There was a pattern of clustering of problems among a minority of (high risk) patients and households. We found, not unexpectedly, a strong relationship with age, and some correlation with the level of education. Small, couple or single households of aged people often have a heavy burden of illness. Considering the ICPC-codes we selected for our analysis, one might disagree in some respects about the choices made in defining chronic disease. Indeed we could have added more registered problems, and this would have enlarged prevalence. However, we deliberately focused on the more serious problems.

With respect to the merits of the methods used, we must face the possibility of iatrotropic bias: patients do not present all health problems to doctors, and, in addition, patients may differ in their decision making about this. Furthermore the registration process may be influenced by the doctor themselves, in order to legitimate their management decisions retrospectively, for instance. There may be relevant inter-doctor variability in several aspects, and definitions of diagnoses and chronic problems are not definitive. In studying morbidity patterns in a general practice and social context, these aspects indeed play an important role, but we think that in the morbidity sector under study here we obtained a reasonable picture: we focused on permanent, recurrent, or chronic (≥ 6 months) problems significantly affecting patients' well-being, which may be assumed to be reported to or detected by GPs in most cases. Moreover, we used widely accepted classifications and diagnostic criteria³⁻⁵ and the general practitioners are experienced in applying these. There is an intensive communication

and feedback between the GPs about the coding and classification activities.

Another comment might be that patients who are diagnosed as having an active problem may not always come back when a problem has passed or become inactive. This could hinder the updating of the problem list, and therefore artificially enlarge prevalence. On the average, Dutch patients contact their GP three times a year and about 75% will do this at least once a year.⁷ Facing the type of chronic problems we studied, these numbers will even be much higher, since the duration of the problems is long and often lifelong. In conclusion, we do not think it is likely that our prevalences are significantly overestimated.

From our results based on standardized problem lists of general practitioners, it is evident that the role of the GP as a family doctor involved with chronic disease is intensive, concerning the majority of the registered general population. Clearly this role will become even more important, since the proportion of people aged 65 years or above will increase. In the Netherlands, for example, an increase from 12.8% to about 23% in the next four decades is expected.⁸ In the debate about the compression or decompression of morbidity at advanced age^{9,10} for the time being, we find, from our cross-sectional data, more support for the 'decompression' theory: ageing is correlated with a constantly increasing rate of chronic morbidity. This is of course important for the planning of professional and informal health care for the next decades.^{11,12} The same is true for the relationship between educational level, probably an appropriate indicator of socio-economic status,¹³ and the prevalence of chronic morbidity. Until now, such a relationship has been documented quite well with respect to mortality.^{13,14} Morbidity studies also focused on specific diagnosis groups might yield a more complete insight in the processes going on, as a basis for health policy.

Prospective general practice studies will make essential contributions to the analysis and monitoring of these processes. In order to perform these studies efficiently and in a natural connection with modern GP care, computerized networks can be extremely valuable.

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Appendix

Chronic disease and health problems, as classified by the International Classification of Primary Care (4), selected and grouped in categories for the study.

Category ICPC

code	circumscription	codespecific prevalence %
Locomotor		
L84	Osteoarthritis of spine	1.9
L85	Acquired deformities of spine	1.2
L88	Rheumatoid arthritis/allied conditions	0.7
L89	Osteoarthritis of hip	0.9
L90	Osteoarthritis of knee	1.6
L91	Other osteoarthritis	0.9
L95	Osteoporosis	0.5
L98	Acquired deformities of limbs	1.6
Respiratory		
R91	Chronic bronchitis/bronchiectasis	1.7
R95	Emphysema/COPD	1.4
R96	Asthma	3.5
Cardiovascular		
K74	Angina pectoris	1.2
K75	Acute myocardial infarction	1.0
K76	Other and chronic ischemic heart disease	1.3

K77	Heart failure	0.5
K82	Pulmonary heart disease	0.02
K87	Hypertension with involvement of target organs	0.8
K90	Stroke/cerebrovascular accident	0.4
K91	Atherosclerosis excl. heart/brain	0.6
K92	Other arterial obstructive/peripheral vascular disease	0.8
K93	Pulmonary embolism	0.2
K94	Phlebitis and thrombophlebitis	0.3

Endocrine

T85	Hyperthyroidism/thyrototoxicosis	0.5
T86	Hypothyroidism/myxedema	0.3
T90	Diabetes mellitus	2.8
T92	Gout	0.5
T93	Lipid metabolism disorder	1.3
T99	Other endocrine/metabolic nutritional disease	0.3

Psychological

P28	Disability/impairment	0.1
P70	Dementia/senile, Alzheimer	0.2
P71	Other organic psychosis	0.04
P72	Schizophrenia	0.1
P73	Affective psychosis	0.1
P74	Anxiety disorder	0.3
P75	Hysterical/hypochondriacal disease	0.5
P76	Depressive disorder	1.1
P77	Suicide attempt	0.1
P79	Other neurotic disorder	0.3
P80	Personality disorder	0.2
P85	Mental retardation	0.4
P98	Other/unspecified psychosis	0.1

Skin

S87	Atopic dermatitis/eczema	2.0
S91	Psoriasis w/wo arthropathy	1.3
S97	Chronic ulcer skin/including varicosis	0.2

Sensory			U76	Malignant neoplasms bladder	0.1	
F83	Retinopathy	0.3	U77	Other malignant neoplasms urinary tract	0.01	
F84	Macular degeneration	0.1	W72	Malignant neoplasms in pregnancy	0.01	
F94	Blindness, all types	0.6	X75	Malignant neoplasms cervix	0.1	
H83	Otosclerosis	0.2	X76	Malignant neoplasms breast	0.4	
H86	Deafness/partial or complete	1.6	X77	Other gynaecological malignancies	0.1	
Cancer			Y77	Malignant neoplasms prostate	0.1	
A79	Carcinomatosis (unknown primary site)	0.00	Y78	Other male genital malignancies	0.01	
B72	Hodgkin's disease	0.1	Urogenital			
B73	Leukemia	0.02	U04	Incontinence	0.7	
B74	Other malignant neoplasms blood/lymphatics	0.02	U85	Congenital anomalies urinary tract	0.2	
D74	Malignant neoplasm stomach	0.05	U88	Glomerulonephritis/nephrosis	0.1	
D75	Malignant neoplasm colon, rectum	0.2	Y85	Benign prostatic hypertrophy	0.3	
D76	Malignant neoplasm pancreas	0.01	Neurological			
D77	Other gastrointestinal malignant neoplasm	0.1	pain	N89	Migraine	1.1
N74	Neurological malignant neoplasm	0.02	disabling	N90	Cluster headache	0.02
R84	Malignant neoplasm bronchus/lung	0.1	N92	Trigeminal neuralgia	0.1	
R85	Other malignant neoplasms respiratory system	0.1	N70	Poliomyelitis/enterovirus	0.1	
S77	Malignancies skin	0.3	N85	Congenital anomalies	0.2	
T71	Malignant neoplasms thyroid	0.03	N86	Multiple sclerosis	0.1	
U75	Malignant neoplasms kidney	0.04	N87	Parkinsonism	0.2	
			N88	Epilepsy, all types	0.6	