

Chronic airway diseases in general practice

Prevalence and future development of the number of patients

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Abstract Chronic obstructive airway diseases play an important role in general practice. In this paper the prevalence of these diseases is studied with the aid of the Registration Network of Family Practice (RNF) of the University of Limburg, the Netherlands. An overall prevalence of 82 per 1000 was found and there were significant positive relationships with age and male gender. In a case-control study the relations between marital status, educational level, type of household, and chronic obstructive airway diseases were found not to be significant. In practices situated in former mining regions prevalence of chronic bronchitis and/or emphysema was higher than in other practices. An attempt is made to predict the prevalence of some chronic airway diseases in the coming 40 years. The predictions vary, depending on the disease and gender, between a decrease of a few percentages and an increase of maximal 60 per cent.

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Introduction

Chronic obstructive airway diseases are important health problems.¹ The contribution of COPD to the total number of deaths in the Netherlands in 1978 was 11,8 per cent for males and 4,7 per cent for females,² and there are indications that morbidity and mortality will increase in the future.¹ The influence of COPD on the quality of life is also of importance. In 1990 the Steering Committee on Future Health Scenarios (STG) described the influence of COPD on the quality of life as follows: 'The quality of life is influenced by the occurrence of complaints (...), exacerbations (...), and complications (...) COPD is often accompanied by feelings of depression, fear and loneliness. It is remarkable how little understanding comes from society, concerning COPD.'² These remarks gave us reason to study some chronic obstructive airway diseases, as they occur in Limburg, in the south of the Netherlands. Because of its suitability to study pointprevalences of chronic diseases, we used the Registration Network of Family practices (RNF) of the University of Limburg (RNF). With the aid of the RNF a good impression can be obtained of the burden of illness in general practice and its relation to several patient related variables.

The following questions were investigated in this study:

- What is the prevalence of chronic bronchitis, emphysema, asthma and hay-fever in general practice?
- What is the relationship between several personal characteristics (age, gender, marital status, educational level, and type of household) and the occurrence of registered psychosocial problems on the one hand, and the registration of one of the diseases mentioned above on the other?
- Are there differences in prevalence between practices inside and outside former mining regions?
- How will the number of patients with prevalent chronic airway diseases develop in the next 40 years, based on the observed prevalences?

Methods

In 1988 a morbidity registration was started in cooperation with 42 GPs in 13 general practices. All participants use a General Practice Information System to register the problem list of their patients, using all the information known to the GP. The diagnoses were recorded according to the International Classification of Primary Care,³ using the criteria derived from the International Classification of Health

Table 1 Age and gender distribution of the investigated population (RNF) and the Dutch population in 1990. Percentages

Age	RNF		Dutch pop. × 100	
	M n=15.458	F n=16.614	M n=73.580	F n=75.338
0- 4	6.9	5.8	6.4	6.0
5-14	12.3	11.4	12.4	11.6
15-24	13.8	14.2	16.4	15.4
25-34	17.1	18.3	17.4	16.3
35-44	16.8	15.0	16.2	15.0
45-54	11.8	10.0	11.6	10.9
55-64	9.8	10.1	9.2	9.5
65-74	7.8	9.0	6.6	8.2
75-84	3.2	5.0	3.1	5.4
85-94	0.5	1.4	0.7	1.6

Problems in Primary Care 2-defined.³ Every three months thus collected records are sent to the RNF, on an anonymous basis.^{5,6} At the time our investigation started we had a total of 32.072 collected cases. The distribution of age and gender in the investigated population corresponded well with the Dutch population (table 1).⁷

Of all the registered health problems we selected the following problems from the problem list:

- chronic bronchitis/bronchiectasis;
- emphysema/chronic obstructive respiratory diseases;
- asthma;
- hayfever.

The criteria defining these problems are listed below. First the number of registrations for each separate problem was studied. Next, using these problems, a new variable was defined: chronic airway problems, for which at least one of the above problems had to be present on the problem list as an active problem (with

actual relevance for patient and GP). The following background and problem list data were also included in our investigation:

- any psychological problem registered as active;
- any social problem registered as active;
- age;
- gender;
- marital status;
- educational level (lower, average, higher);
- type of household;
- registering general practice.

Combining the first two variables, a new variable called (psycho)social problems was defined, having at least one problem registration in either one of these categories. The pointprevalences of the chronic airway problems were calculated for age, gender and marital status. To study the relationship between chronic airway diseases and psychosocial problems, and some background variables (age, gender, type of household and level of education)

respectively, we designed a patient-control study. For control population we used the cases where neither an active nor an inactive problem registration in one of the above airway categories was found on the problemlist. In the patient population all cases with any active chronic airway problem were included. Finally, we compared the number of older persons with chronic obstructive airway diseases in general practices in mining regions (Stein, Hoensbroek, Landgraaf, Heerlen, Voerendaal, Kerkrade) to general practices in non-mining regions (Maastricht, Venlo, Well). The following problemlist registrations were compared: 'chronic bronchitis/bronchiectasis', 'emphysema/chronic obstructive respiratory diseases', and a registration of at least one of those two (R91 and/or R95). With the use of the predictions for the increase of the Dutch population for age, gender and marital status, issued by the Central Bureau of Statistics (CBS),⁸ a prognosis for chronic airway problems was made. The assumption was made that the prevalence for age, gender and marital status would remain equal, but that changes in the population within these categories would cause similar proportional changes in the overall prevalence. Consequently the prognosis was calculated as the number of patients in an average general practice, with 2300 patients, comparable to the Dutch population.

Using SPSS-X, version 3.1, crosstables were made of the studied problemlist registrations and background variables. When relevant, p-values and 95 per cent confidence intervals were also calculated. The estimated prevalence is a point-prevalence. This is the number of patients with a certain active problem on their problemlist, divided by the total number of registered persons at one moment in time. We compared the control and the patient populations using a χ^2 -test and T-test, with a two tailed significance level of ≤ 5 per cent. The prognoses were calculated with the aid of a spreadsheet program (Lotus 1-2-3),⁹ using indirect standardisation.¹⁰ The RNF-population was the standard population. For index population we used the predicted Dutch population in respec-

Diagnostic criteria, derived from the ICHPPC 2 defined

R91: Chronic bronchitis/bronchiectasis

Both criteria are needed for this diagnosis:

- 1 Cough with purulent mucus on most days of at least three months in each of at least two years.
- 2 Scattered rhonchi at auscultation of the chest during these periods.

R95: Emphysema/COPD

One of these criteria must be found for this diagnose:

- 1 Radiologic indications for emphysema.
- 2 Airway obstruction which is not reversible with bronchodilators when testing lungfunction.
- 3 Shortness of breath during exercise and a barrel-shaped, hyperresonant, little expandable chest, with decreased breathing sounds during auscultation.

R96: Asthma

This diagnosis consists of recurrent episodes of acute broncho-obstruction combined with one of the following criteria:

- 1 Lungfunction tests showing variable obstruction, that can be reduced with bronchodilating medicine.
- 2 Two of the following items:
 - Wheezing
 - Dry cough
 - Elongated expiration.

R97: Hayfever/allergic rhinitis

Two of the following criteria are required for this diagnosis.

Chronic, or season-related:

- 1 Sneezing
- 2 Nose congestion
- 3 Rhinorrhea (clear liquid)
- 4 Tearing eyes
- 5 Oedema of the mucus membranes of the nose

tively 1990, 1995, 2000, 2010, 2020 and 2030, as they were predicted by the CBS.⁸

Results

Prevalence and development

The overall prevalence of the newly-defined variable 'chronic airway problems' is 82 per 1000. There is a difference in prevalence between men and women – relative risk is 1.4 (95 per cent-reliability range: 1.3-1.5) $p < 0.001$ – and a relation with age ($p < 0.001$, according to the Pearson χ^2 -test). Particularly for men the age-related prevalence follows a bimodal pattern. When the curve is split for the various problemlist registrations it illustrates that the first mode is caused in particular by the prevalence of the categories asthma and hayfever, and the second mode mainly by the categories chronic bronchitis/bronchiectasis and emphysema/chronic obstructive respiratory diseases. The prevalence of the various problemlist registrations is shown in *table 2*. The strong increase of the prevalence in men older than 60 years is remarkable.

The patient-control study

The patient and control populations were compared, regarding age, gender, marital status, type of household and educational level. The patient population consists of 2,997 persons, the control population of 28,699 persons. There are differences in age distribution between the two populations. In the patient group the mean age is 38.6 years (standard deviation = 22.9), in the control population it is 36.5 years (standard deviation = 21.7). Using a T-test, the difference appeared to be significant ($p < 0.001$). As expected there were more men in the patient group than in the control group (p -value according to the Pearson χ^2 -test < 0.001). Though expected otherwise, the differences in occurrence of (psycho)social problems were not significantly different. For men as well as women in both the control and patient group, the percentages of those having psychological and/or social problems appeared to be approximately 20 per cent ($p = 0.29$, 2-tailed T-test). Also there were no relevant dif-

Table 2 Prevalence per 1000 of the separate problemlist registrations by age and gender

Age	R91		R95		R96		R97	
	M	F	M	F	M	F	M	F
0- 4	7	8	1	3	40	30	1	0
5-14	18	11	5	1	81	66	29	16
15-24	7	8	4	3	59	40	80	69
25-34	7	8	3	2	29	24	53	50
35-44	8	7	3	4	27	29	42	45
45-54	21	11	12	5	32	25	30	28
55-64	36	20	36	17	35	31	14	21
65-74	57	25	99	20	32	29	15	9
75-84	88	43	174	18	24	22	2	4
85+	61	43	195	9	24	4	0	0

R91 chronic bronchitis/bronchiectasis; R95 emphysema/chronic obstructive airway diseases; R96 asthma; R97 hayfever

Table 3 Prognosis of the number of patients in a standard general practice with chronic (obstructive) airway problems.

	1990	1995	2000	2010	2020	2030
Chronic obstructive airway disease						
M	108	107	106	108	115	117
F	80	80	79	80	83	82
Total	188	187	185	188	198	199
R91						
M	22	22	23	25	27	29
F	16	16	17	18	18	20
Total	38	38	40	43	45	49
R95						
M	23	24	25	29	33	37
F	8	8	8	9	10	10
Total	34	32	33	38	43	47
R96						
M	47	46	46	46	45	44
F	38	38	38	38	37	37
Total	85	84	84	84	82	81
R97						
M	44	42	40	39	38	36
F	39	37	36	36	34	33
Total	83	79	76	75	72	69

R91 chronic bronchitis/bronchiectasis; R95 emphysema/chronic obstructive airway diseases; R96 asthma; R97 hayfever.

Figure 1 Prevalence of R91 and/or R95 in men. Mining region versus non mining region

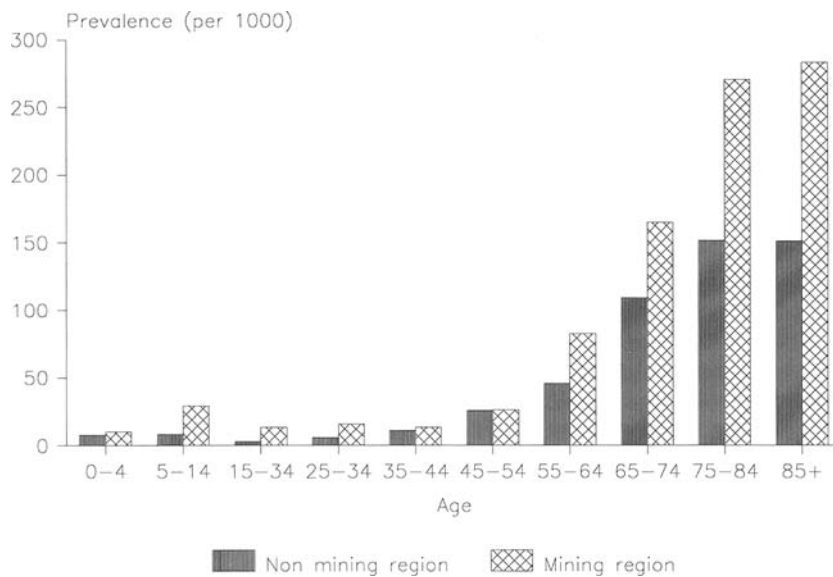
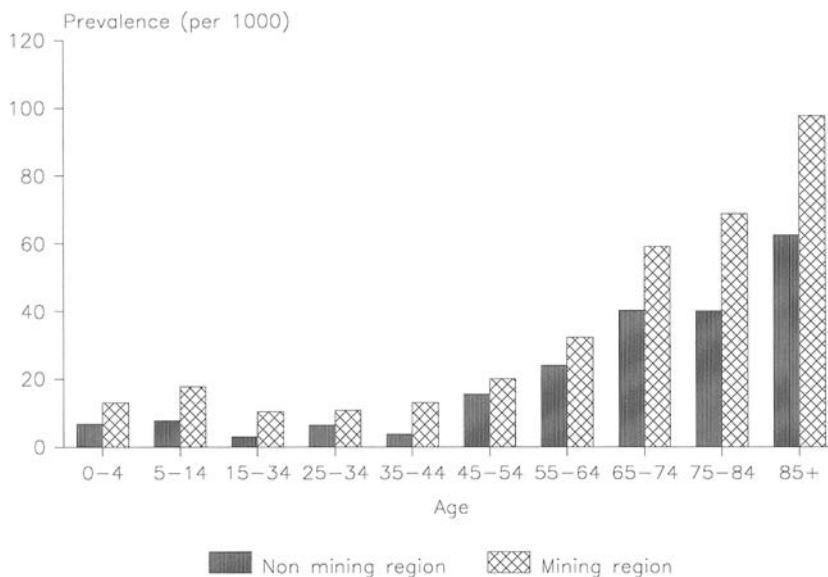


Figure 2 Prevalence of R91 and/or R95 in women. Mining region versus non mining region



ferences between both groups with regard to type of household and marital status. With regard to educational level, there were no differences for women. In men the percentage of subjects with a lower educational level was somewhat higher in the patient group than in the control group (56,4 per cent versus 51,6 per cent, $p=0.027$)

Regional comparison

'Chronic bronchitis/bronchiectasis', 'emphysema/chronic obstructive respiratory diseases', and at least one of those two (R91 and/or R95), were significantly more frequently recorded in the general practices in mining regions, than in non-mining regions. Especially for men over 55 these differences were remarkable (figures 1 and 2).

Prognosis

The predictions until 2030 were calculated, using the data provided by the CBS. Initially the prognosis was calculated, using a low, middle and high variant, as in the original CBS data. As the prognosis showed just minor differences, only the middle variant is used for publication. The prognosis is calculated as the number of patients in a standard general practice and is displayed in table 3. Initially there is a small decrease in the number of patients with a chronic airway disease, later there is a slight increase. Considering the various chronic airway diseases separately, the prognosis is that the number of younger men and women with asthma and hayfever will decrease in the coming years, whilst mainly the number of older men with emphysema/chronic obstructive airway diseases and bronchitis/bronchiectasis will increase.

Discussion

The observed pattern of the prevalence of 'chronic bronchitis/bronchiectasis and emphysema/chronic obstructive respiratory diseases' related to age and gender, correlates well with other studies,¹¹⁻¹⁷ but it must be noted that there is a relatively strong increase in prevalence among older

men. When comparing various studies, there are considerable differences in absolute prevalences. In the investigated literature the prevalences varied from approximately 2 per cent to 13 per cent for adults, and from approximately 3 per cent to 21 per cent for younger people (under 25), depending on the definitions used for the investigated airway diseases and the methods of registration.¹¹⁻¹⁶ Especially between the prevalences of 'asthma' and 'hayfever', there are large differences between the various studies. These differences could possibly be caused by differences in definitions. The Steering Committee on Future Health Scenarios estimates that the percentage of patients with COPD lies around 8 per cent for people younger than 65 years.² This corresponds well with the overall prevalence in our study.

When defining the variable 'chronic airway diseases' we used a 'two-track' model as the basis for the development of a chronic airway disease.¹⁷⁻²⁰ At a younger age the disease will begin mostly with asthma and, when accompanied by an allergic component, hayfever. Apart from the development of a chronic obstructive airway disease caused by asthma and/or hayfever, one can develop, within this model, a chronic airway disease as a consequence of exposure to extrinsic factors like smoking, air pollution and professional exposures. A certain predisposition does not need to be present. Elements of both restrictive and obstructive airway diseases are united in this model.

In a British study various methods to register the occurrence of asthma are compared.¹² It is concluded that the systematic research of patient files should be used as the standard. This method of morbidity registration has a lot in common with our method.

Compared with the figures from the Continuing Morbidity Registration (CMR) our observed prevalences are higher.^{17,18} This corresponds with differences found in an earlier study,⁹ and is probably partially based on differences in the epidemiological fractions that were used, where the main difference lies particularly in the period of time over which the

presence of (known c.q. chronic) diseases is registered.⁹ The figures of the RNF are also higher than those that came from the data of the Monitoring project analyzed by *Van Weel*,²⁰ but in this case too the definitions that were used are not properly comparable.

The strong absolute increase in prevalence among older men is striking. Other sources support the finding that there is an increase in the occurrence of airway diseases among older men,¹³⁻¹⁷ but these increases are not as great as our findings suggest. Partly this might be explained as a consequence of a higher professional exposure due to the fact that a lot of older men in Limburg used to work in the coalmines in the past. The results of the regional comparison support this hypothesis, but it need not be the only explaining factor. The fact that prevalences among women in the mining regions are also higher cannot be explained with the above hypothesis only. A more patient oriented study at a lower aggregational level might explain these phenomena. Anyhow, the above findings indicate that our estimated prevalence might be too high for extrapolation to the rest of the Netherlands. Considering the prevalences in the mining and non-mining regions, the difference might be a factor 1,3-1,4.

A significant relationship between (psycho)social problems and active chronic (obstructive) airway problems could not be found. The criteria for the registration of psychosocial problems are not yet well-defined in connection with the ICHPPC-2-defined. Because of this lack of accuracy one has to be careful with the interpretation of these results. At the same time it must be taken into consideration that the presence of psychosocial problems in people with chronic airway diseases might be underestimated.²

For type of household, and marital status, there were no significant differences between the patient and the control group. Only in the male group the percentage with a lower educational level was slightly higher, which might be explained by a higher percentage of former miners. Recent reports by *Bottema et al.*, based on

the CMR from Nijmegen, that chronic bronchitis and/or emphysema occur much more often in the lower social economic populations,¹ could not be confirmed in our study. It must be noted that we used the individual educational level in our investigations, while Nijmegen used the profession (which is, at family level, mostly the male's profession). This may partly explain the difference, but further analysis seems necessary.

We could not properly assess the relationship between smoking and chronic airway diseases. This is due to the fact that the 'abuse of tobacco' is registered only by the general practitioner when it is presented as a health problem.⁶ There is no active tracing of smoking as a risk factor in the population. Underregistration of smoking behaviour is therefore unavoidable. Although an orientating analysis of our data showed significant differences at the expense of the group with airway diseases, the data were not reliable enough for publication.

Because of the short period of registration within the registration project it makes no sense to study trends in time. Not so long ago *Bottema et al.* quoted in this journal¹ various authors who reported an increased incidence and prevalence of asthma and chronic bronchitis in various age categories *Bottema et al.* confirmed this themselves for asthma, while the occurrence of chronic bronchitis and/or emphysema remained extremely stable in the past two decades.¹ It is possible that the increasing trend with regard to asthma will continue. On the other hand, according to our prognosis, with the presumption that the situation remains stable for each age category, there could be an initial decrease in the total number of patients with chronic airway diseases in a standard general practice. This is due to a combination of a bimodal curve for the prevalence and the expected shifts in mean age of the population. When looking at the prognosis for each separate problem list registration, these changes become clearer. Diseases with a high prevalence at a relatively young age show a (slight) decrease, while

the problemlist registrations with the highest prevalence at an older age increase.

We based our prognoses on CBS-prognoses until 2030, published in 1989. At the end of 1990 a revised prognosis until 2020 was issued.²² When we compare these two the differences prove to be very little. Therefore we used the initial prognosis until 2030 (from 1989) in this publication.

Earlier we mentioned that the observed prevalence for chronic bronchitis and/or emphysema could possibly be too high for a reliable extrapolation to The Netherlands. Of course this also has its consequences for the prognosis which was based on these figures. In our prognosis we only took into account the variables age and marital status. Perhaps there are also other factors, like environment, changes in professional exposure and changes in smoking behaviour, that influence the future prevalence. Our analysis, however, emphasises that future changes in age distribution of the Dutch population (more older, less younger people) will cause a relative reduction of the prevalences of lower age-related diseases like asthma and hayfever. Furthermore it is likely that those diseases that occur at an older age will increase both absolutely and relatively. All kinds of related needs, like visiting the general practitioner, home care, and hospitalisation caused by exacerbations and infections, might probably become of greater interest in the future.

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Samenvatting

Chronische luchtwegaandoeningen worden in de huisartspraktijk vaak gepresenteerd. In het kader van het Registratienet Huisartspraktijken (RNH) werd onderzoek gedaan naar de prevalentie van deze aandoeningen. De overall-prevalentie is 82 per 1000 en de prevalentie bleek sterk toe te nemen met de leeftijd en was hoger bij mannen dan vrouwen. In een patiënt-controle onderzoek konden geen significante relaties worden aangetoond tussen burgerlijke staat, opleidingsniveau, woonverband enerzijds en chronische luchtwegaandoeningen anderzijds. In praktijken gelegen in voormalige mijngebieden was de prevalentie van chronische bronchitis en/of emfyseem hoger dan in de overige praktijken. Er is een voorspelling gedaan van het verloop van de prevalentie van een aantal chronische luchtwegaandoeningen in de komende 40 jaar. De voorspellingen variëren, afhankelijk van aandoening en geslacht van een daling van enige procenten tot een stijging van maximaal 60 procent.