transfer, changes in the delivery of medical care, improvements in treatment, or environmental factors may be playing a part.

One important additional finding of this work is that during the change in information systems, for asthma admissions at least, there were up to six years of disruption which may affect other trend analyses for different diseases during this period. Rates of hospital admission attributed to asthma have been increasing for many years. No entirely satisfactory explanation has been put forward for the observed increases. The possibility that they may now be changing presents yet more interesting questions relating to the aetiology and epidemiology of this disease.

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Trends in prevalence and severity of childhood asthma

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Abstract

***Objective*—To test the null hypothesis that there has been no change in the prevalence or severity of childhood asthma over recent years.**

***Design*—Repeated population prevalence survey with questionnaires completed by parents followed by home interviews with parents.**

***Setting*—London borough of Croydon, 1978 and 1991.**

***Subjects*—All children in one year of state and private primary schools aged 7½ to 8½ years at screening survey.**

***Main outcome measures*—Trends in symptoms, acute severe attacks, and chronic disability.**

***Results*—For 1978 and 1991 respectively, the response rates were 4147/4763 and 3070/3786, and home interviews were obtained from 273/288 and 319/395 parents of currently wheezy children. Between 1978 and 1991 there were significant relative increases in prevalence ratios in the 12 month prevalence of attacks of wheezing or asthma (1·16; 95% confidence interval 1·02 to 1·31), the one month prevalence of wheezing episodes (1·78; 1·15 to 2·74), and the one month prevalence of night waking (1·81; 1·01 to 3·23) but not in frequent (≥5) attacks over the past year (1·05; 0·79 to 1·40). There were substantial and significant decreases in the 12 month prevalence of absence from school of more than 10 days due to wheezing (0·52; 0·30 to 0·90), any days in bed (0·67; 0·44 to 1·01), and restriction of activities at home (0·51; 0·31 to 0·83) and an equivalent but not significant fall in speech limiting attacks (0·51; 0·24 to 1·11).**

***Conclusion*—The small increase in the prevalence of wheezy children and relatively greater increase in persistent wheezing suggests a change in the environmental determinants of asthma. In contrast and paradoxically the frequency of wheezing attacks remains unchanged and there are indications that severe attacks and chronic disability have fallen by about half; this may be due to an improvement in treatment received by wheezy children.**

Introduction

Four prevalence studies which have been repeated over time with similar methods have all reported that among British school children the prevalence of symptoms of asthma has increased in recent years.[1-4] This trend in prevalence has been accompanied by an increase in children consulting their general practitioner with asthma[5 6] and in hospital admissions,[7] but opinions vary about the extent that this increase is due to epidemiological factors rather than to artefacts or changes in medical care.[1 8] The widespread acceptance that asthma is indeed on the increase has created considerable concern about what kinds of environmental factors might be responsible.

Hitherto, serial prevalence studies have relied mainly on a simple respiratory questionnaire which is completed by parents, though in one study there was corroboration with an exercise test for bronchial hyperreactivity.[1] So far, no study has used a detailed interview of parents to ascertain in a standard manner trends in clinical details or the impact of the disease in terms of severity and disability.

In 1978 all primary school children aged 7½ to 8½ years in the south London borough of Croydon were screened by a questionnaire completed by parents for symptoms of asthma followed by a detailed home interview which included a comprehensive assessment of the severity and impact of the disease, aetiological factors, and medical care.[9,10] The repetition of this survey in 1991 provided an opportunity to examine trends in morbidity in a more comprehensive way than has been possible in previous surveys based on self completed questionnaires. A comparison of results found that there had been an increase from 11·1% to 12·8% (16% relative increase) in the 12 month prevalence of wheezing but no increase in the prevalence of frequent attacks.[11] This paper describes trends in the prevalence of a wide range of morbidity measures and clinical features obtained by home interview.

Methods

In February 1978 and 1991 an identical one page self completed questionnaire designed to screen for symptoms of asthma was distributed to the parents of all children in one school year (aged 7½ to 8½ years) attending all state and private schools in the borough. The questions were: has your child ever had asthma? and, if the answer to this question was no, has he or she ever had attacks of wheezing in the chest? Those who replied yes to either question were asked to record the number of attacks of asthma or wheezing illness over the past 12 months. In 1978 home interviews were sought from all parents reporting five or more attacks in the past year and a 52% sample of those reporting one to four attacks in the past year. Those parents reporting wheeze in the past 12 months but who provided no information on the frequency of attacks were treated for the purposes of sampling and subsequent analysis as if they had reported one to four attacks. In 1991 the parents of all wheezy children were included in the interview sample. The home interview covered a wide range of questions about the symptoms experienced and the impact of these on everyday life at home and at school; drug treatments and use of services; social, family, and economic factors; and possible causes and precipitating factors. These are described fully in reports of the 1978 survey.[9,10]

TABLE I—*Samples and response in the two screening surveys*

Detail	Croydon 1978	Croydon 1991
Population targeted	4763	3786
Forms returned	4147	3070
Response rate	87%	81%
Wheeze in previous 12 months*	459	395

*Numbers differ slightly from those in earlier report[11] because of rediscovery of previously missing information on frequency of attacks in 1978 survey and addition of late responses in 1991 survey.

TABLE II—*Samples and response in the two interview surveys*

	Croydon 1978*			Croydon 1991		
Detail	One to four attacks (including seven missing)	Five and more attacks	Total	One to four attacks (including six missing)	Five and more attacks	Total
Current wheezers identified at screen†	356	103	459	316	79	395
Sought for home interview	185‡	103	288	316	79	395
Interview obtained	178	95	273	253	66	319
Response rate		95%			81%	
After exclusions§	173	94	267	238	64	302

*Previous reports of interview data from 1978 survey[9,10,16] included some children from class above who were screened accidentally. For comparability with 1991 survey these older children have been excluded from this analysis.
†Numbers differ slightly from those in earlier report[11] because of rediscovery of previously missing information on frequency of attacks in 1978 survey and addition of late responses in 1991 survey.
‡52% Sample.
§1978 Study: five false positives, one unusable interview.
1991 Study: seven false positives, 10 stopped wheezing at interview (interviewed as former wheezers).

Tables I and II show the samples and response at both stages of the survey. The final analysis was based on 267 interviews for 1978 and 302 for 1991. Proportions of wheezy children with various symptoms were calculated and when appropriate extrapolated to provide estimates of population prevalence. Figures for 1978 were weighted to take account of differences in sampling fraction between frequent wheezers (100%) and infrequent wheezers (52%) (table II).

There were clearly differences in the two studies with respect to month of interview and lag time between screen and interview, which could bias the comparison (see table III). To adjust for these factors proportions among current wheezers were obtained by weighting the fitted values of logistic regression models containing month of interview as a 12 level factor, lag time as a linear trend, and a three level factor differentiating between 1991, 1978 infrequent wheeze, and 1978 frequent wheeze. Weights were used to take account of the differences in sampling fraction. Large sample 95% confidence intervals were calculated for the ratio of the adjusted proportions by using a method outlined by Flanders and Rhodes.[12]

Adjusted population prevalence ratios and their 95% confidence intervals were obtained by fitting Poisson regression models. As well as a term for year of study these models contained month of interview as a 12 level factor, lag time as a linear trend, and a two level factor for frequency of wheeze at screening. In fitting the Poisson regression models we assumed that among subjects with a disability or symptom of interest the probability of frequent wheeze was the same in 1978 as in 1991.

All models were fitted by using the LOGISTIC procedure of SAS.[13] When adjusted population prevalence estimates are quoted these are standardised to a November interview nine months after each screening survey.

Results

Although both screening surveys were carried out at the same time of the year, there was a clear difference in the seasonal distribution of the home interviews (table III). The prevalence of wheezing over the past month differed with season, especially in 1978 when

TABLE III—*Proportions (percentages of those currently wheezy at screen) reported to have wheezed in month or 12 months before interview, according to season of interview and time lag between screen and interview*

		Season of interview*				Time lag in months					
Detail	Study year	Spring	Summer	Autumn	Winter	1-4	5-7	8-10	11-13	≥14	Total
No of subjects	1978	99	12	79	77	0	27	74	83	83	267
	1991	85	93	111	13	112	102	86	2	0	302
Percentage of total	1978	37	4	30	29	0	10	28	31	31	100
	1991	28	31	37	4	37	34	28	1	0	100
Percentage reported to have wheezed in month before interview	1978	13	40	43	42	†	41	39	40	12	31
	1991	59	66	57	67	62	57	64	†	†	61
Percentage reported to have wheezed in 12 months before interview	1978	89	80	90	86	†	91	88	89	85	88
	1991	95	100	92	100	96	98	92	†	†	96

*Spring=March, April, May; summer=June, July, August; autumn=September, October, November; winter=December, January, February.
†Estimates could not be calculated or were unreliable because of small numbers.

TABLE IV—*Population prevalences (percentages) of symptoms and prevalence ratios (1991:1978) before and after adjustment for month of interview and time lag*

Detail	Population prevalence estimates		Unadjusted estimated ratio of prevalences 1991:1978 (95% confidence interval for ratio)	Analysis adjusted for month of interview and time lag: Population prevalence estimates†		Analysis adjusted for month of interview and time lag: Estimated ratio of prevalences 1991:1978 (95% confidence interval for ratio)
	1978	1991		1978	1991	
Past 12 months:						
Episodes of wheeze	8·81	11·63	1·32** (1·11 to 1·57)	9·58	10·99	1·15 (0·87 to 1·51)
Wheeze but no episodes	0·92	0·62	0·67 (0·34 to 1·33)	‡	‡	‡
All wheeze	9·73	12·31	1·27** (1·07 to 1·50)	9·58	11·43	1·19 (0·91 to 1·56)
Waking at night with wheeze	4·53	7·56	1·67*** (1·32 to 2·11)	3·49	4·77	1·37 (0·94 to 1·98)
Speech limiting attack	1·37	1·20	0·88 (0·53 to 1·45)	1·49	0·77	0·51 (0·24 to 1·11)
Past month:						
Episodes of wheeze	2·33	5·24	2·25*** (1·66 to 3·07)	3·61	6·41	1·78** (1·15 to 2·74)
Wheeze but no episodes	1·16	2·47	2·12** (1·34 to 3·35)	1·44	1·31	0·91 (0·45 to 1·82)
All wheeze	3·48	7·81	2·24*** (1·74 to 2·89)	5·13	7·75	1·51* (1·05 to 2·17)
Waking at night with wheeze	1·20	2·98	2·49*** (1·65 to 3·75)	1·19	2·16	1·81* (1·01 to 3·23)
Speech limiting attack	0·39	0·21	0·55 (0·19 to 1·60)	‡	‡	‡

*P<0·05, **P<0·01, ***P<0·001. †Figures standardised to November interview, nine months after screen. ‡Adjusted figures impossible to calculate due to small numbers.

TABLE V—*Population prevalences (percentages) for indicators of chronic disability and prevalence ratios adjusted for month of interview, time lag, and frequency of wheeze at screening*

Detail	Population prevalence estimates† 1978	1991	Estimated ratio of prevalences 1991:1978 (95% confidence interval for ratio)
Any school absence in past 12 months	8·92	7·44	0·83 (0·60 to 1·16)
More than 10 days' school absence in past 12 months	3·80	1·96	0·52* (0·30 to 0·90)
Physical education and games affected in past 12 months	2·45	2·24	0·91 (0·56 to 1·49)
Any days in bed in past 12 months	6·23	4·15	0·67 (0·44 to 1·01)
More than five days in bed in past 12 months	1·42	0·62	0·44* (0·21 to 0·91)
Home activities or play affected in past 12 months	4·37	2·22	0·51** (0·31 to 0·83)
Any affect on child's everyday activities in past 12 months	6·15	6·05	0·98 (0·70 to 1·38)
Child's activities affected a lot in past 12 months‡	1·46	0·82	0·56 (0·24 to 1·27)
Any affect on parent's everyday activities in past 12 months	4·71	3·51	0·75 (0·49 to 1·14)
Parent's activities affected a lot in past 12 months‡	1·40	0·48	0·34* (0·12 to 0·97)
Parent prefers child to avoid certain activities because of wheeze	1·31	0·78	0·60 (0·30 to 1·17)

*P<0·05, **P<0·01, ***P<0·001.
†Figures standardised to November interview nine months after screen.
‡Adjusted figures may be unreliable due to small numbers.

TABLE VI—*Percentages of currently wheezy children with precipitating factors reported, ratios of percentages, and 95% confidence intervals*

Details of wheezing	Estimated percentage* 1978	1991	Estimated ratio of percentages* 1991:1978 (95% confidence interval for ratio)
Wheeze brought on by exercise	34·9	52·5	1·51 (1·10 to 2·06)
Wheeze brought on by colds	94·3	94·8	1·01 (0·95 to 1·06)
Wheeze brought on by excitement	27·7	35·4	1·28 (0·87 to 1·86)
Wheeze brought on by animals	20·4	32·2	1·58 (1·01 to 2·48)
Wheeze brought on by foods	2·7	5·5	2·03 (0·87 to 4·71)
Wheeze brought on by plants	22·2	30·9	1·39 (0·89 to 2·19)
Wheeze brought on by dust	23·3	18·6	0·80 (0·46 to 1·37)
Wheeze brought on by smoke	16·6	37·8	2·28 (1·37 to 3·79)
Wheeze brought on by weather	55·0	56·4	1·02 (0·81 to 1·30)
Wheezing comes on at particular time of day	47·1	38·2	0·81 (0·60 to 1·10)
Wheezing worse at particular time of year	62·6	64·7	1·03 (0·84 to 1·27)

*All figures standardised to November interview nine months after screen.

TABLE VII—*Percentages of currently wheezy children with reported clinical features, ratios of percentages, and 95% confidence intervals*

Details of wheezing	Estimated percentage* 1978	1991	Estimated ratio of percentages* 1991:1978 (95% confidence interval for ratio)
Eczema in past 12 months	21·7	39·2	1·80 (1·13 to 2·87)
Allergic nose problems in past 12 months	39·0	40·4	1·03 (0·75 to 1·43)
More than five headaches in past 12 months	40·0	20·5	0·51 (0·34 to 0·78)
More than five attacks of stomach pain in past 12 months	23·2	12·5	0·54 (0·32 to 0·91)
Age of onset (years):			
0–1	48·7	31·1	0·64 (0·47 to 0·86)
2–4	32·3	35·9	
5–8	19·0	33·0	

*All figures standardised to November interview nine months after screen.

there was a low prevalence reported in the spring interviews. Table III also shows that there were differences between surveys in the time lag between screen and interview. In view of this we decided to adjust prevalence estimates for season of interview and time from screening to interview by using techniques described above in the methods section.

Table IV gives the prevalence of various morbidity indicators with and without adjustment. Comparison of adjusted with unadjusted estimates showed that adjustment reduces the 1991/1978 prevalence ratios of all variables shown, in some cases considerably. In view of this the remaining tables present only adjusted data.

For episodes of wheeze in the past 12 months the adjusted prevalence ratio derived from the home interview data (1·15) corresponds closely to the ratio derived directly from responses to the screening questionnaire (1·16).[11] Significant relative increases were observed for the one month prevalence of episodes of wheeze (by 78%, P<0·01), any wheeze (episodic or non-episodic; by 51%, P<0·05) and of night waking with wheeze (by 81%, P<0·05). Other indicators tended to be increased but not significantly so. The largest relative decrease was in the 12 month prevalence of children reported to have had a speech limiting attack (by 49%), but this was not significant.

Table V shows adjusted population prevalence estimates for various indicators of chronic disability due to wheezing illness. Significant and substantial relative falls were observed for school absence for more than 10 days (by 48%, P<0·05), more than five days in bed (by 56%, P<0·05), and home activities or play affected (by 49%, P<0·01). The relative decline in any school absence derived from our adjusted interview data (0·83) closely approximates the ratio derived from the screening surveys (0·87).[11]

Table V also shows trends in the perceived effects of the child's wheezing illness on the parents themselves. There was a clear and significant fall (by 66%, P<0·05) in parents reporting that their own activities were affected a lot by their child's asthma and a non-significant fall (by 44%) in those reporting that their child's activities were affected a lot. There was a non-significant fall (by 40%) in the proportion of parents who preferred their child to avoid certain activities because of his or her illness.

Table VI shows trends in precipitating factors as proportions of affected children. Most showed an increase, significant differences being observed for exercise (by 51%), contact with animals (by 58%), and smoke (by 128%).

Table VII shows the trends in proportions of wheezy children reported to have other disorders with known or possible atopic mechanisms. The proportion reported to have current eczema increased significantly (by 80%) whereas the proportion reporting frequent headaches or abdominal pain (both associated with childhood wheezing[9 14]) fell significantly (by 49% and 46%, respectively). There was no change in the proportion with allergic nose problems. There was a trend in the direction of later age at onset of wheezing episodes, with a significant decrease in the proportion reporting onset of wheezing episodes in the first two years of life.

Discussion

COMPARABILITY OF TWO SURVEYS

Both surveys were conducted in the same London borough among the same school age group by using almost identical methods for both the screening and home interview questionnaires. The sample size was large enough to obtain estimates of trends in the prevalence of more severe forms of wheezing. The lower response to the screening questionnaire in 1991 is unlikely to have caused substantive bias since the prevalence of wheezing was similar among early and late respondents and schools with high and low response rates.[11] The screening questionnaire could not be subject to seasonal bias, being administered at the same time of the year, but there were differences in the time gap between the screening questionnaire and the home interview, which could have led to bias due to seasonal and memory effects. Adjustment for these tended to reduce differences in morbidity between the two surveys, and when a comparison could be made adjustment of the home interview data resulted in greater consistency with the results of the two screening surveys.

COMPARISON WITH OTHER STUDIES

The 12 month prevalence of wheezing in 1991 was 12·8% (95% confidence interval 11·6 to 14·0%). This is within the range of estimates obtained from most other studies carried out among school children in recent years.[8] The main exception is that of 19·8% reported for 1989 from Aberdeen,[3] though it is important to note that this was a three year prevalence estimate. Otherwise there is no evidence that Croydon is different from other parts of the country in terms of the prevalence of childhood asthma.

We observed a 16% (2% to 31%) relative increase in the 12 month prevalence of wheezing between 1978 and 1991. These results are directly comparable with only one other study in the United Kingdom, that carried out in Cardiff, which compared the 12 month prevalence of wheezing in 12 year old children between 1974 and 1988.[1] The Cardiff study reported an increase in prevalence from 9·8% to 15·2%, a relative increase of 55% (20% to 100%), and these findings were corroborated by the results of bronchial hyperreactivity testing by using an exercise challenge. Since the confidence interval for the increase overlaps with that of the Croydon survey, both surveys are consistent with a 20-30% increase in the prevalence of wheeze since the 1970s.

The comparison of children in Aberdeen between 1964 and 1989 showed a clear increase of 91% (67% to 118%), but this finding is difficult to interpret because the questions about wheeze were not the same in each survey, and the questionnaire was administered as part of a prolonged interview with parents in 1964 and as a stand alone instrument for self completion by parents in 1990. Both the Cardiff and Aberdeen studies were of older children, and the prevalence of asthma has possibly increased to a greater extent in older children.

Two other studies have examined trends in wheeze over time in primary school children but the question used (wheeze on most days or nights of the year) was different and not linked to a previous time period.[2,4] Both studies found evidence for an increase over time and while it is difficult to reconcile this with the lack of an increase in frequent wheezing in the Croydon screening survey,[11] their results are consistent with the increase in night waking reported at the home interview (table IV).

Of the five British trend studies reported to date, the Croydon survey has shown the smallest increase. It should be noted that the baseline year for the Croydon study was later (1978) than in the other four (1964, 1966, 1973, and 1974), which raises the possibility that it took place after the prevalence had begun to rise.[8]

WHAT DO THE FINDINGS MEAN?

Morbidity indicators varied in the direction of their trends. There was an increase in the prevalence of wheeze and night waking, no change in the frequency of episodes, and decreases in acute speech limiting attacks and markers of chronic disability. In considering the explanation for these trends, artefactual, epidemiological, and medical care factors should all be considered. The main source of artefact would be an increase in the recognition of symptoms and in the tendency to report wheeze. This is not unlikely in view of the increased amount of publicity and professional concern surrounding asthma in recent years, together with the recognition that many chest illnesses previously thought of as bronchitis are now considered to have asthma as the underlying cause. There may also have been an increase in parental awareness of chest symptoms generally.[4]

If the increase in prevalence and night waking is real the most likely explanation is that there has been a change in the environmental factors which trigger, prolong, or intensify asthma. The nature of these factors remains unknown, though there is current interest in indoor pollutants such as cigarette smoke and house dust mites and outdoor pollution from motor vehicles.

The shift towards a later age at onset suggests that there may have been a change in the pattern of environmental factors responsible for the induction of asthma. A greater awareness of asthma would have produced the opposite result.

One explanation for changes in asthma prevalence might be that the prevalence of atopy is changing. Several studies have shown an increase in the prevalence of atopic eczema and allergic rhinitis.[13,15] Our findings are consistent with an increase in atopic eczema, but there was no trend in the proportion of wheezy children suffering from allergic rhinitis.

One important explanation for our findings may lie in the increase in antiasthmatic treatment received by this population. Over this period the proportion of wheezy children diagnosed as asthmatic increased from 31% to 61%, and the proportions reporting the use of antiasthmatic drugs in the previous three months increased from 26% to 57% (β agonists 19%-55%, steroids 2%-17%).[16] Among those with symptoms over the past month, the proportions treated increased from 54% to 69%. It is therefore possible that the reduction in acute and chronic disability combined with a lack of increase in frequency of attacks reflects more extensive and more effective treatment. More widespread and effective treatment is unlikely to have affected the moderate increase in prevalence of wheeze in the past year because only rarely are symptoms entirely abolished by treatment.

Another possible factor which might influence trends in markers of disability is the knowledge and attitudes of parents and children about asthma. Parents may be less likely now to restrict the activities of their asthmatic child and more likely to encourage a normal pattern of activities. This is supported by the finding that there was a clear fall in the proportion of parents who preferred their child to avoid certain activities.

CONCLUSION

We found that there has been a modest increase in the prevalence of wheezing in primary school children in Croydon. This is consistent with other trend studies, although the rate of increase is the lowest yet reported from the United Kingdom. With the exception of night waking, chronic disability due to wheezing has clearly

Clinical implications

- The prevalence of asthma among children in Croydon has increased by 16% in the period 1978-91, a finding consistent with results of other studies in the United Kingdom
- This is likely to reflect changes in environmental factors which are, as yet, unknown
- In clear contrast there has been a substantial reduction by about half in the level of disability and of acute severe episodes
- This may be explained in part by more treatment and greater use of inhaled steroids in this population
- These findings indicate that the rising rates of hospital admissions for childhood asthma are unlikely to be explained by an increase in acute morbidity

decreased, perhaps because of the much higher level of treatment which now exists in this population. The occurrence of speech limiting attacks of asthma, an indicator of episodes which might be considered deserving of admission to hospital, has not increased substantially and may well have become much less common. These observations reinforce our earlier conclusion[11] that the recent rise in hospital admission rates for asthma in childhood has been influenced more by changes in medical care than by an increase in the prevalence or severity of asthma.

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Cardiovascular disease and distribution of cognitive function in elderly people: the Rotterdam study

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Abstract

***Objective*—To investigate the distribution of cognitive function in elderly people and to assess the impact of clinical manifestations of atherosclerotic disease on this distribution.**

***Design*—Single centre population based cross sectional door to door study.**

***Setting*—Ommoord, a suburb of Rotterdam, the Netherlands.**

***Subjects*—4971 subjects aged 55 to 94 years.**

***Main outcome measure*—Cognitive function as measured by the mini mental state examination.**

***Results*—The overall participation rate in the study was 80%. Cognitive test data were available for 90% of the participants. Increasing age and lower educational level were associated with poorer cognitive function. Previous vascular events, presence of plaques in the carotid arteries, and presence of peripheral arterial atherosclerotic disease were associated with worse cognitive performance independent of the effects of age and education. On average the differences were moderate; however, they reflected the net result of a shift of the total population distribution of cognitive function towards lower values. Thereby, they resulted in a considerable increase in the proportion of subjects with scores indicative of dementia.**

***Conclusions*—These findings are compatible with the view that atherosclerotic disease accounts for considerable cognitive impairment in the general population.**

Introduction

The incidence and severity of cognitive impairment and dementia strongly increase with age. Dementia is often labelled an age related disorder with the implicit suggestion that the decline in cognitive function may be intrinsic to aging itself. Many old people, however, show no mental decline at all.[1] In those instances when cognitive decline does occur, in general it develops insidiously and asymptomatically before it reaches the clinical threshold at which it becomes manifest and is referred to as dementia. The division of populations into diseased versus normal tends to neglect this heterogeneity.[2,3] It has therefore been suggested that research in degenerative disorders should focus not only on disease but also on the total distribution of health states.[4] We present data on the distribution of cognitive function and on the impact of clinical manifestations of atherosclerotic disease on this distribution in a geographically defined sample of subjects aged 55 to 94 years.

Methods

STUDY POPULATION

The Rotterdam study is a single centre prospective follow up study for which the total population aged