CHAPTER 12

HYPERTENSION, CHRONIC OBSTRUCTIVE PULMONARY DISEASE AND ASTHMA IN ADULTS

12.1 Introduction

It would be ideal to have a full clinical assessment of the health of a sample of the population but this was not considered to be feasible. Instead, two indicator conditions, hypertension and lung disease, which can be measured reliably by lay interviewers, were selected for measurement and investigation. This chapter outlines the findings related to the blood pressure measurements and the peak flow measurements reflecting lung function.

12.2 Hypertension

The impact of untreated hypertension on the health of people is a major contributor to the overall burden of adult diseases in any population that does not actively work towards improving the early detection and cost-effective management of the condition. The major hypertension outcomes that contribute to this burden of diseases include strokes (cerebrovascular diseases), heart attack (myocardial infarction), kidney disease or failure as well as heart enlargement due to left ventricular hypertrophy, which could predispose to congestive heart failure (Guidelines Subcommittee, 1999). In the United States of America in 1972, high levels of these conditions prompted the creation of a National High Blood Pressure Education Programme by the National Heart Lung and Blood Institute of the National Institutes of Health (Joint National Committee, 1997). Since then and by 1995 the age-adjusted mortality rates for strokes have declined by about 60 percent and for coronary heart diseases by about 40 percent.

The data from developing countries suggest that in the next millennium the pattern of health and disease in developing countries will become more closely aligned to that of the developed countries. (Chockalingam and Balaguer, 1999). In 1997 the World Health Report showed that cardiovascular diseases accounted for 15 million deaths worldwide. The bulk of these, (9 million) occurred in developing countries and another 2 million in countries in economic transition. The prevention of such conditions includes the timely diagnosis and cost-effective management of hypertension in the population as a whole. Community-based surveys in South Africa (Steyn, *et al*., 1996; Steyn *et al*., 1986; Steyn, *et al*., 1993; Metcalf *et al*., 1996) found that hypertension is usually inadequately diagnosed and poorly treated. Similar findings of inadequate care hold for most of the risk factors for chronic diseases in adults. These include the care provided for conditions such as diabetes, hyperlipidaemia and chronic lung diseases (Levitt, *et al*., 1997; Steyn, *et al*., 1998).

In large community surveys it is easier to determine hypertension and its treatment status than most other chronic conditions or risk factors that require the collection of blood samples or other technically difficult and costly measures. Blood pressure measurements were taken after the participant was seated for 5 minutes using an Omron M1 electronic blood pressure manometer. Systolic and diastolic blood pressure and pulse were taken 3 times with the patient seated and the left arm at the level of the heart. The measurement of blood pressure (BP) has indeed become much easier since good quality, accurate, electronic tools have become available. This development led to the decision to include electronically measured BPs in the adult section of the Demographic and Health Survey as a means to identify hypertension in South Africa. In addition, it was decided to study hypertension, its determinants and

treatment status in detail in order to use it as a proxy measure for the overall quality of care provided for adult chronic diseases.

This chapter reports on the distribution of blood pressure and pulse rate in South Africa, along with the treatment status of hypertensive South Africans and the distribution of the related risk factors for hypertension in the community.

12.3 Mean Blood Pressure, Pulse Rates and Pulse Pressure of Adults

The BP used for the analyses was determined in the following way. In accordance with accepted definitions (Joint National Committee 1997) if the second systolic or diastolic BP differed by more than 5 mmHg, the first BP reading was excluded. A BP reading was retained in the data set if the systolic BP was 80 mmHg or larger and if the systolic BP was at least 15mmHg larger than the diastolic BP level. Thereafter a mean systolic and diastolic BP was calculated the remaining BPs. The pulse pressure of each patient was calculated as the difference between these mean systolic and diastolic BPs.

Tables 12.1 and 12.2 show the mean systolic and diastolic blood pressure as well as the mean pulse rate and pulse pressures of men and women according to the descriptive variables of study participants 15 years and older. For both men and women the systolic and diastolic BP increases with age. This needs to be kept in mind when considering the distribution of these variables according to other descriptive characteristics reported in the tables, as these have not been corrected for the influence age might have on these descriptors. (For example, men and women with no education have the highest systolic and diastolic BPs, this could be a true finding or due to the fact that as a group they are older than those with more education and will therefore have higher BPs.)

The mean systolic BP for men is higher than that for women while the diastolic level is similar. For men the highest mean systolic BP level is recorded in the Province of the Northern Cape and the mean diastolic BP level in the provinces of the Northern Cape and the Free State. Coloured and white men have higher BPs than the other groups of men, while the lowest rates are recorded for non-urban African men. The coloured and white women have the highest BPs and the Asian women the lowest.

The mean pulse rate of women is higher (77 vs. 73) than that of men with relatively little variation between the different groups of people. The mean pulse pressure also increased with age for both men and women and the mean pulse pressure is higher in men than in women. Similarly to the pulse rate, there is little variation between the groups of people considered.

Table 12.1 Mean blood pressure - men

Mean levels of systolic and diastolic blood pressure (BP) and pulse rates and standard error (SE) of men age 15 and over, according to background characteristics, South Africa 1998

Background characteristic	Mean systolic BP	SE	Mean diastolic BP	SE	Mean pulse rate	SE	Mean pulse pressure	SE	Number
Age									
15-24	115	0.41	69	0.33	71	0.33	47	0.30	1,781
25-34	120	0.58	75	0.46	72	0.46	45	0.35	1,058
35-44	123	0.69	79	0.47	74	0.47	44	0.41	978
45-54	130	1.08	83	0.62	75	0.60	47	0.66	676
55-64	134	1.19	82	0.66	75	0.63	51	0.82	512
65+	140	1.49	82	0.75	73	0.70	58	0.95	523
Residence									
Urban	124	0.46	76	0.29	73	0.28	48	0.29	3,224
Non-urban	122	0.65	75	0.45	73	0.39	47	0.39	2,304
Province									
Western Cape	126	1.12	78	0.72	74	0.66	48	0.69	518
Eastern Cape	124	0.74	76	0.51	73	0.42	48	0.44	1,275
Northern Cape	127	1.10	79	0.59	75	0.62	48	0.77	549
Free State	126	1.10	79	0.72	72	0.57	48	0.67	531
KwaZulu-Natal	122	0.73	76	0.57	74	0.58	46	0.47	799
North West	119	1.26	75	0.69	74	0.66	44	0.96	521
Gauteng	126	1.15	76	0.77	72	0.66	50	0.61	390
Mpumalanga	119	0.99	73	0.68	73	0.58	46	0.69	504
Northern	120	0.99	72	0.68	72	0.75	47	0.59	441
Education									
No education	129	1.15	80	0.71	75	0.66	50	0.72	630
Sub A - Std 3	125	0.90	77	0.58	74	0.51	48	0.57	787
Std 4 - Std 5	122	0.74	75	0.49	73	0.53	47	0.52	818
Std 6 - Std 9	121	0.58	74	0.40	72	0.33	47	0.34	2,175
Std 10	123	1.00	76	0.60	73	0.50	47	0.61	712
Higher	124	0.87	77	0.73	71	0.66	47	0.49	390
Population group									
African	121	0.38	75	0.27	73	0.26	46	0.26	4,116
Afr. urban	122	0.53	75	0.35	72	0.34	47	0.35	2,087
Afr non-urban	120	0.57	74	0.41	73	0.39	46	0.39	2,029
Coloured	128	0.91	79	0.61	74	0.67	49	0.54	762
White	132	1.44	80	0.86	73	0.71	52	0.84	475
Asian	122	1.41	76	0.97	79	1.14	46	1.00	175
Total	123	0.37	76	0.25	73	0.23	47	0.23	5,528

Table 12.2 Mean blood pressure - women

Mean levels of systolic and diastolic blood pressure (BP) and pulse rates and standard error (SE) of women age 15 and over, according to background characteristics, South Africa 1998

Background characteristic	Mean systolic BP	SE	Mean diastolic BP	SE	Mean pulse rate	SE	Mean pulse pressure	SE	Number
Age									
15-24	106	0.38	67	0.29	78	0.34	39	0.25	2,025
25-34	111	0.48	73	0.35	76	0.38	38	0.28	1,575
35-44	118	0.66	77	0.39	76	0.39	41	0.40	1,340
45-54	126	0.72	81	0.43	77	0.47	45	0.48	1,029
55-64	134	1.05	82	0.53	76	0.44	52	0.70	892
65+	141	1.12	82	0.54	76	0.56	59	0.86	860
Residence									
Urban	119	0.49	75	0.27	76	0.25	43	0.31	4,228
Non-urban	119	0.51	75	0.28	77	0.29	44	0.33	3,493
Province									
Western Cape	120	1.15	76	0.68	76	0.56	44	0.71	575
Eastern Cape	121	0.65	77	0.36	77	0.36	45	0.42	2,001
Northern Cape	122	1.28	77	0.67	79	0.66	45	0.75	688
Free State	122	1.19	78	0.68	77	0.63	45	0.76	621
KwaZulu-Natal	119	0.73	76	0.37	76	0.42	43	0.51	1,171
North West	118	1.13	76	0.69	78	0.65	42	0.74	603
Gauteng	118	1.05	75	0.55	77	0.53	43	0.65	664
Mpumalanga	114	0.84	73	0.58	78	0.47	41	0.50	688
Northern	115	0.82	72	0.45	77	0.62	43	0.58	710
Education									
No education	130	0.86	80	0.44	78	0.41	49	0.60	1,232
Sub A - Std 3	124	0.82	78	0.46	77	0.46	46	0.57	1,104
Std 4 - Std 5	121	0.84	77	0.47	76	0.48	44	0.55	1,165
Std 6 - Std 9	115	0.54	73	0.30	77	0.27	42	0.34	2,862
Std 10	111	0.73	72	0.47	76	0.52	39	0.45	913
Higher	113	1.03	72	0.66	75	0.54	40	0.67	434
Population group									
African	118	0.41	75	0.23	77	0.22	43	0.25	5,901
Afr. urban	118	0.63	75	0.35	77	0.31	43	0.38	2,728
Afr non-urban	118	0.50	75	0.28	77	0.30	43	0.34	3,173
Coloured	122	0.91	77	0.56	77	0.58	45	0.59	993
White	121	1.32	76	0.59	74	0.58	45	0.96	566
Asian	114	1.54	73	0.77	79	0.78	41	1.01	261
Total	119	0.36	75	0.20	77	0.19	43	0.23	7,721

12.4 Prevalence of Hypertension and Treatment Status of Hypertensive Participants

The prevalence of hypertension is described in different ways according to the different guidelines published internationally and nationally (Hypertension Society of Southern Africa, 1995). The first published South African guidelines classified a person as being hypertensive with a BP equal or above 160/90 mmHg or taking anti-hypertensive medication (Hypertension Society of Southern Africa, 1995). The later published JNC VI (Joint National Committee, 1997) and World Health Organisation - International Society of Hypertension Guidelines for the management of Hypertension (Guidelines Subcommittee, 1999) suggested that a person be considered as hypertensive with a BP of equal or above 140/90 mmHg or taking anti-hypertensive medication. It is likely that the South African guidelines may also change to the cut-off point of 140/90 mmHg as indicative of hypertension. In order to accommodate the different cut-off points, the prevalence for hypertension reported here will be classified as follow:

Moderate and severe hypertension: BP equal to or above 160/95 mmHg or taking hypertension medication
Any hypertension: BP equal to or above 140/90 mmHg or taking hypertension medication

In all cases the name of the medication was recorded by the fieldworker and verified as a medication for hypertension using the Anatomical Therapeutic Chemical Classification (ATC) Index for hypertension medication (WHO Collaborating Centre for Drugs, 1998).

Tables 12.3 and 12.4 show the prevalence of hypertension and the treatment status achieved for hypertensive men and women respectively. Of all the participants 19 percent of men and 8 percent of women report having been told by a health professional that they are hypertensive. For men and women identified as having any hypertension (BP equal or above 140/90 mmHg) this figure goes up to 26 percent and 51 percent, respectively. When moderate and severe hypertension (BP $\geq$ 160/90 mmHg) is used, 41 percent and 67 percent of hypertensive men and women, respectively, report that they are hypertensive. This difference between men and women again highlights that only about two thirds the number of hypertensive men than women know they suffer from the condition. This figure for men is considerably lower than the international 'rule of halves' described by Bannan, *et al*., (1981). This rule predicts that in most community surveys half of all hypertensive patients are not known to health services (50 percent), half of those who are known are not treated (25 percent), and half of those treated are treated inadequately, with the result of only about 13 percent of hypertensives being well-controlled. This figure of control applies to a definition of being hypertensive at a level of 160/95 mmHg. Thus, the South African hypertensive men are far less aware of being hypertensive than those in other settings. Fewer hypertensive men in the non-urban areas know that they suffer from the condition than their urban counterparts. Furthermore, hypertensive men in the Northern Province are the least aware of being hypertensive. These data identify men as having the most undiagnosed hypertension in the country, particularly if they are younger than 45 years and live in certain areas. These groups need to be targeted specifically to improve the rate of hypertension diagnoses.

Of the men, 13 percent are found to have a blood pressure above 160/95 mmHg or are taking appropriate medication (moderate or severe hypertension). About 23 percent of South African men are hypertensive according to the WHO definition of hypertension (BP equal or above 140/90 mmHg). For women the equivalent prevalence is 16 percent (moderate or severe hypertension) and overall, 25 percent have hypertension as defined by the WHO. A calculation, based on the prevalence rates of the two levels of hypertension and the census figures published for the South African population aged 15 years and older, leads to the estimation of about 3.3 million hypertensive people with a BP equal or above 160/95 mmHg and 6.1 million with a BP equal or above 140/90 mmHg, respectively in the country.

As expected, older South Africans are more hypertensive than younger ones. The urban/non-urban differences are marked when considering moderate and severe hypertension and much smaller when

considering any hypertension with a cut off point of 140/90 mmHg. For men the urban/non-urban differences are quite similar to findings published between 10 and 20 years ago that found non-urban South Africans had much lower rates of hypertension (then identified with a cut-off point of 160/95 mmHg) than their urban counterparts (Seedat *et al*., 1982). However the proposed WHO cut-off points find much less difference between urban and non-urban South Africans. The highest rates for moderate and severe hypertension are found in Gauteng and in the Northern Cape men have the highest rate of any hypertension for men and women. Mpumalanga and the Northern Province have markedly lower rates of hypertension than the other provinces. Although both tables show lower rates of hypertension in more educated people, this could be incorrect as it might well be that the least educated sector of the South African population could also be the oldest section of the population. For men the highest rate is found in the white group, followed by the Asian and coloured group while for women the highest rates are found in the white and coloured groups.

In South Africa the cut off point for hypertension is still 160/95 mmHg, although the previous guidelines are currently being reconsidered. Therefore this cut off point needs to be considered when assessing the level of drug use and BP control that has been achieved. Of the men and women with moderate or severe hypertension 39 percent and 55 percent respectively are taking an appropriate anti-hypertensive medication. Of the men with hypertension 26 percent, and of the women 39 percent have BP below 160/95 mmHg. In addition 18 percent of men and 27 percent of women have BP below 140/90 mmHg.

In this survey strict criteria were used to identify those participants who were using anti-hypertensive medication. For most surveys in the past self-reported anti-hypertensive medication use was used to identify those hypertensive participants who had controlled BP but were identified as being hypertensive by virtue of the fact that they reported using medication. In this survey patients had to produce their medication containers from which the name of the medication was coded according to the Anatomical Chemical Therapeutic Index.

However, this is still a low level of BP control and highlights the need to improve hypertension control in the country if premature death and disability are to be prevented. That such a move, if successfully implemented, will have a major impact on hypertension-related mortality and morbidity is well illustrated by the major reduction in stroke and heart attacks that occurred in the USA since the inception of their National High Blood Pressure Education Programme in 1972 (Joint National Committee, 1997).

One of the more disturbing findings reported here is the poor level of hypertension control in young patients with hypertension compared to older patients. These are the hypertensive patients who have the longest working life ahead of them as members of the labour force of the country and who require even better control than older patients in order to prevent target organ damage. For men the worst level of control is reported in the young men as well as the African and coloured group, while for women it is found in young women and the non-urban African women.

Table 12.3 Hypertension prevalence and treatment status of men

Percentage of men aged 15 and older who report having hypertension, percentage who are measured as being hypertensive using the two cut-off points of 140/90 mmHg and 160/95 mmHg and of those with hypertension, the percentage who report being hypertensive, who use medication, who have controlled their hypertension, according to background characteristics, South Africa 1998

	Prevalence of hypertension				Among those with any hypertension, using cut-off of 140/90 mmHg (percentage)					Among those with moderate or severe hypertension, using cut-off of 160/95 mmHg (percentage)				
Background characteristic	Self-reported hyper-tension	Moderate and severe hyperten-sives with BP ≥160/95 mmHg	Any Hyperten-sives with BP ≥140/90 mmHg	Number of men	Who reported hyper-tension	Who use medi-cation	With controlled BP <140/90 mmHg	With controlled BP <160/95 mmHg	Number	Who reported hyper-tension	Who use medi-cation	With controlled BP <140/90 mmHg	With controlled BP <160/95 mmHg	Number
Age														
15-24	3.8	1.7	7.4	1,816	0.2	0.2	0.2	76.8	135	(0.8)	(0.8)	(0.8)	(0.8)	32
25-34	8.0	4.8	14.6	1,123	9.3	4.5	2.2	69.4	164	17.4	13.6	6.8	6.8	54
35-44	15.1	12.1	24.0	1,005	19.4	11.1	6.5	57.4	241	30.5	22.0	12.9	15.8	122
45-54	30.5	25.9	38.2	701	37.2	32.2	17.6	55.0	268	52.7	47.5	25.9	33.7	182
55-64	40.9	27.9	44.0	518	32.9	31.0	10.9	55.9	228	43.7	49.0	17.2	30.3	144
65+	42.2	36.2	52.0	507	38.4	31.9	13.9	53.3	265	46.7	45.9	20.1	32.6	184
Residence														
Urban	20.6	13.7	24.1	3,569	29.5	24.6	10.8	59.4	861	45.6	43.1	19.0	28.8	490
Non-urban	15.4	4.0	20.9	2,102	19.3	14.6	8.0	59.1	440	29.9	28.4	15.6	20.6	226
Province														
Western Cape	19.3	12.1	25.7	721	25.8	22.2	10.8	68.1	185	48.7	47.1	23.0	32.1	87
Eastern Cape	18.9	13.8	24.1	758	28.4	18.7	4.7	54.3	183	42.2	32.6	8.3	20.2	105
Northern Cape	22.8	15.7	28.7	135	29.2	20.5	8.1	58.1	39	46.4	37.4	14.8	23.7	21
Free State	20.4	12.0	25.9	444	18.1	10.6	2.8	58.6	115	28.5	22.8	6.1	10.6	53
KwaZulu-Natal	20.7	12.6	21.8	1,064	27.5	23.0	11.7	58.5	232	37.7	40.0	20.3	27.9	134
North West	14.9	11.3	23.0	551	13.1	11.8	7.1	61.0	127	25.1	23.9	14.4	20.6	62
Gauteng	21.7	16.4	24.9	1,099	36.3	31.4	15.2	54.8	273	50.5	47.5	22.9	31.7	181
Mpumalanga	16.7	7.1	14.8	378	18.5	18.5	5.8	64.8	56	(33.2)	(38.7)	(12.1)	(26.3)	27
Northern	8.7	9.0	17.4	521	18.7	17.3	13.7	63.2	90	28.9	33.5	26.5	28.9	47
Education														
No education	27.0	20.2	33.0	562	23.4	14.9	9.0	50.1	187	31.4	24.5	14.8	17.9	114
Sub A - Std 3	25.6	15.8	26.3	777	20.7	22.8	12.1	57.4	205	31.6	38.0	20.1	29.0	123
Std 4 - Std 5	22.5	9.1	21.2	755	20.5	17.0	6.9	71.6	160	39.5	39.5	16.1	33.8	69
Std 6 - Std 9	15.6	10.6	19.7	2,297	25.8	18.9	7.4	56.9	452	39.3	35.0	13.7	20.3	244
Std 10	10.1	12.8	22.5	801	34.2	29.1	13.8	62.5	180	55.3	51.2	24.2	33.9	102
Higher	11.7	12.3	22.4	440	33.7	34.3	17.7	68.3	99	57.4	62.3	32.1	42.4	54
Population group														
African	17.4	7.9	20.2	4,257	20.3	14.4	7.3	58.2	860	31.8	27.6	14.1	19.8	449
Afr. urban	19.9	11.7	21.5	2,375	23.7	17.5	8.2	57.2	510	37.1	32.1	15.1	21.5	278
Afr. non-urban	14.6	9.1	18.6	1,882	15.3	10.0	6.1	59.6	350	23.2	20.4	12.5	17.1	171
Coloured	22.3	13.6	25.9	637	24.1	19.4	6.6	58.7	165	42.2	36.9	12.5	21.4	87
White	21.4	24.6	38.0	564	46.9	42.9	17.1	62.6	214	64.1	66.2	26.4	42.2	139
Asian	23.8	18.7	29.9	195	37.0	46.2	27.7	68.2	54	52.5	68.9	41.4	52.4	36
Total	18.6	12.6	22.9	5671	26.0	21.2	9.9	59.3	1300	40.6	38.5	17.9	26.2	717

Table 12.4 Hypertension prevalence and treatment status of women

Percentage of women aged 15 and older who report having hypertension, percentage who are measured as being hypertensive using the two cut-off points of 140/90 and 160/95 mmHg and of those with hypertension, the percentage who report being hypertensive, who use medication, who have controlled their hypertension, according to background characteristics, South Africa 1998

	Prevalence of hypertension				Among those with any hypertension, using cut-off of 140/90 mmHg (percentage)					Among those with moderate or severe hypertension, using cut-off of 160/95 mmHg (percentage)				
Background characteristic	Self-reported hyper-tension	Moderate and severe hyperten-sives with BP ≥160/95 mmHg	Any hyperten-sives with BP ≥140/90 mmHg	Number of women	Who reported hyper-tension	Who use medi-cation	With controlled BP <140/90 mmHg	With controlled BP <160/95 mmHg	Number	Who reported hyper-tension	Who use medi-cation	With controlled BP <140/90 mmHg	With controlled BP <160/95 mmHg	Number
Age														
15-24	0.2	1.6	4.1	2,084	6.3	1.2	1.2	61.3	85	(7.8)	(3.1)	(3.1)	(3.1)	34
25-34	2.7	5.2	10.2	1,720	31.7	15.9	11.0	62.6	176	55.7	33.3	21.6	26.4	89
35-44	7.5	12.8	21.8	1,460	40.2	27.4	13.4	59.8	319	56.3	46.8	22.9	31.3	187
45-54	18.0	27.2	38.7	1,116	56.1	43.5	25.4	61.6	432	71.8	61.9	36.0	45.4	304
55-64	16.9	38.5	51.6	914	64.2	45.3	22.5	57.4	471	75.6	60.7	30.1	43.0	352
65+	25.0	42.5	60.4	861	55.2	40.9	15.6	56.4	521	68.8	58.1	22.1	38.1	366
Residence														
Urban	9.4	18.5	26.0	4,998	57.6	43.9	21.1	59.4	1299	72.3	61.7	29.8	42.9	924
Non-urban	5.5	12.9	22.3	3,157	38.8	22.7	11.9	58.4	704	55.2	39.2	20.6	28.2	408
Province														
Western Cape	9.2	18.8	27.2	799	57.5	51.1	23.5	69.1	217	76.4	74.0	34.0	55.3	150
Eastern Cape	9.0	16.4	26.4	1,161	46.0	28.1	12.6	57.9	306	63.2	45.3	20.3	32.2	190
Northern Cape	13.2	21.1	29.7	168	53.5	38.0	19.3	58.7	50	65.0	53.5	27.1	42.0	36
Free State	7.2	15.6	28.6	519	51.1	31.3	11.4	62.1	148	67.0	57.3	20.9	30.8	81
KwaZulu-Natal	7.5	17.7	24.5	1,608	54.1	34.4	18.5	51.8	394	64.6	47.7	25.7	33.2	284
North West	4.8	15.7	26.1	646	38.3	24.3	15.1	59.1	169	53.2	40.4	25.1	31.9	101
Gauteng	10.7	19.8	25.7	1,887	61.4	50.0	24.9	57.1	485	76.8	64.7	32.3	44.3	374
Mpumalanga	4.9	10.2	18.6	507	49.2	29.7	14.0	64.7	94	61.3	54.3	25.6	35.5	52
Northern	4.4	7.5	16.3	859	22.8	15.3	8.0	66.4	140	39.2	33.4	17.4	26.4	64
Education														
No education	11.6	25.4	40.0	1,186	46.7	28.3	14.0	55.1	475	61.4	44.7	22.1	29.2	301
Sub A - Std 3	7.2	21.7	33.7	1,088	50.8	33.3	15.8	58.5	367	66.7	51.7	24.5	35.6	236
Std 4 - Std 5	7.0	18.3	26.5	1,136	55.5	33.3	15.0	54.7	301	69.5	48.1	21.7	34.6	208
Std 6 - Std 9	6.4	13.8	20.3	3,093	52.4	42.7	21.8	63.0	626	69.9	62.9	32.1	45.5	425
Std 10	8.7	9.6	14.2	1,120	47.3	44.4	22.7	64.6	159	64.5	65.2	33.3	47.9	108
Higher	10.9	9.3	13.2	495	59.3	52.0	25.0	62.2	65	79.9	73.8	35.5	46.3	46
Population group														
African	5.8	14.6	23.5	6,269	47.0	28.9	15.2	57.9	1470	63.7	46.5	24.4	32.2	914
Afr. urban	6.9	17.0	25.4	3,348	54.3	35.6	18.7	57.6	852	70.2	53.2	28.0	36.5	569
Afr. non-urban	4.4	11.8	21.2	2,921	36.9	19.8	10.3	58.2	618	53.1	35.4	18.4	25.2	245
Coloured	9.0	22.4	29.5	806	56.7	47.6	21.8	61.0	238	69.2	62.7	28.7	48.6	180
White	21.1	23.4	29.1	767	63.3	64.1	30.1	64.1	223	76.7	79.8	37.5	55.4	179
Asian	11.9	18.0	22.1	300	75.3	70.6	26.7	63.8	66	84.7	86.6	32.8	55.7	54
Total	7.9	16.3	24.6	8,155	51.0	36.5	17.9	59.1	2004	67.1	54.8	27.0	38.4	1,332

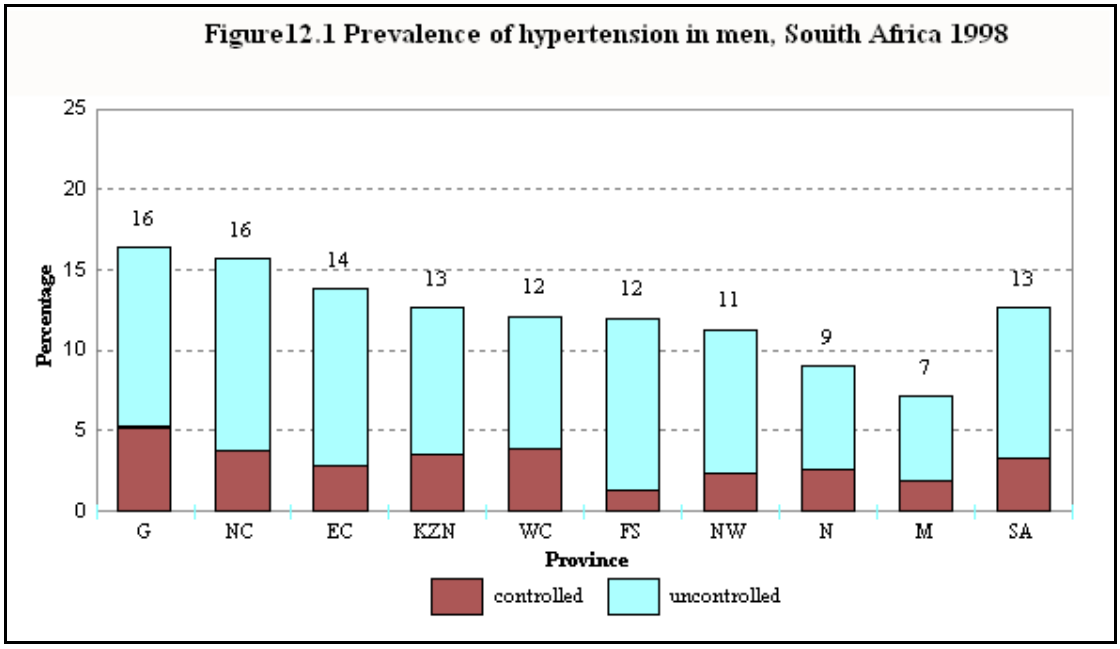
Figure12.1 Prevalence of hypertension in men, South Africa 1998
Percentage
25
20
15
10
5
0
16
16
14
13
12
12
11
9
7
13
G
NC
EC
KZN
WC
FS
NW
N
M
SA
Province
controlled
uncontrolled

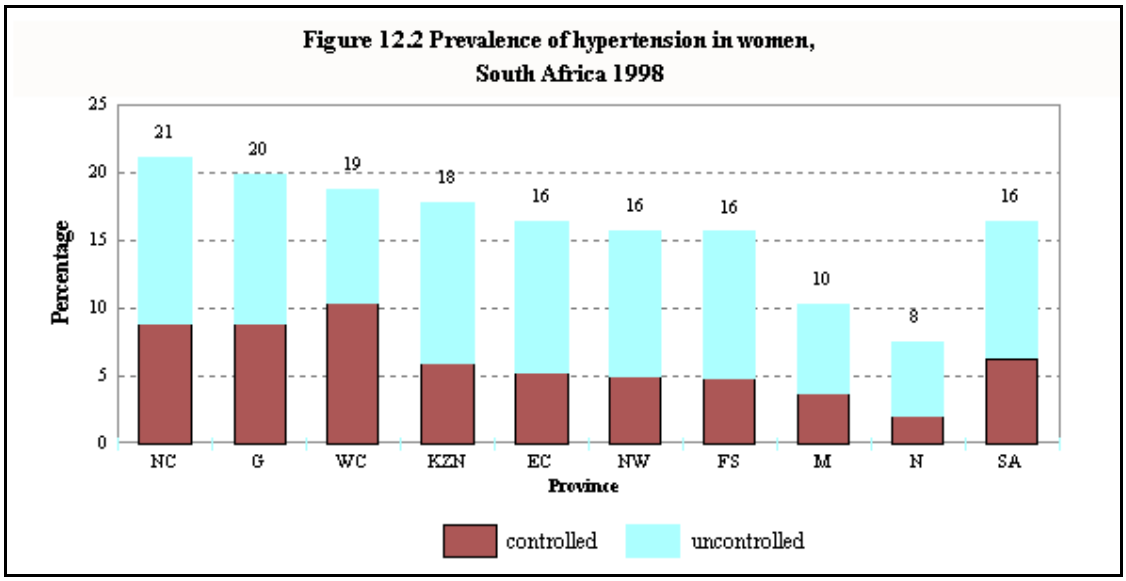
Figure 12.2 Prevalence of hypertension in women,
South Africa 1998
Percentage
25
20
15
10
5
0
21
20
19
18
16
16
16
10
8
16
NC
G
WC
KZN
EC
NW
FS
M
N
SA
Province
controlled
uncontrolled

12.5 Hypertension Risk Factors

Tables 12.5 and 12.6 show the salt-seeking behaviour of all participants and the participants with any hypertension (BP equal or above 140/90 mmHg), along with other hypertension-related risk factors.

Salt-seeking behaviour is reported more frequently in men than women including the hypertensive participants. The most common features of the salt-seeking behaviour include the fact that younger participants report consuming more salt than older participants, as do urban participants compared to non-urban participants. In fact, the urban African participants report markedly high salt-seeking behaviour as do those with more education. It has been suggested that the African people in South Africa are more salt-sensitive than other groups of South Africans (Worthington, *et al*., 1993). Should this be the case it is of great concern that the younger urban Africans are consuming so much more salt than other groups, as they may be more prone to develop hypertension when they grow older. Already this group has a significant level of hypertension and they suffer the consequences of high stroke rates.

When the pattern of alcohol consumption of the hypertensive men and women is compared with that of all participants (Table 13.6 in Chapter 13) it is clear that more hypertensive participants consume alcohol at present than is the case for other participants. The differences for men are larger than for women, in fact 53 percent of hypertensive men consume alcohol compared to 45 percent of all men, whereas 20 percent of hypertensive women compared to 17 percent of all women consume alcohol. The young hypertensive males consume alcohol more frequently compared to all young men. The CAGE questionnaire identifies people who may have a pattern of excess alcohol use. When the prevalence of CAGE positive hypertensive patients is compared to the same prevalence in all the participants (Table13.6) the hypertensive men have a prevalence of 29 percent compared to 23 percent in all men and for hypertensive women the prevalence is 12 percent compared to 10 percent of all women who participated. This clearly suggests that heavy alcohol use is associated with being hypertensive, particularly in men in South Africa.

The association between high levels of alcohol use and hypertension as well as an increased risk for stroke is well described in the literature (Chockalingam & Balaguer, 1999; Guidelines Subcommittee, 1999; Wannamethee & Shaper, 1996). The finding is an issue that needs consideration when South Africa formulates a policy related to alcohol consumption and the management of hypertension.

The prevalence of obesity (BMI $\geq$ 30) in the hypertensive men and women, respectively is 19 percent and 45 percent. When comparing this to the data presented in Table 13.4, it is clear that this obesity prevalence in hypertensives is much higher than in the general study population, where it is for men 9 percent and for women 26 percent. This association has also been established for a long time (Guidelines Subcommittee, 1999) and identifies the need to look at the ever increasing rates of obesity in South Africans and, in particular, in African women.

Table 12.5 Hypertension risk factors - men

Percentage of all men and men with hypertension age 15 or over who eat salty foods, who add salt before tasting food and who eat salty snacks more than three times a week and, among those with hypertension, percentage who drink alcohol, who abuse alcohol, who are obese, who had their blood pressure (BP) measured in the previous year, who say they know their BP and who know it is high, according to background characteristics, South Africa 1998

	Among all men, percentage				Among those with any hypertension, percentage[1]									
Background characteristic	Who eat food very salty	Who add salt before tasting food	Who eat salty snacks > 3 times/ week	Number	Who eat food very salty	Who add salt before tasting food	Who eat salty snacks > 3 times/ week	Who drink alcohol	Who abuse alcohol[2]	Who are obese[3]	Who had their BP measured during last year	Who say they know their BP	Who know their BP is high	Number
Age														
15-24	16.9	7.8	54.8	1,816	18.3	8.5	47.7	32.5	22.5	8.8	13.0	13.0	0.0	135
25-34	19.5	7.7	45.9	1,123	23.2	8.3	45.7	55.0	36.9	13.1	31.6	28.7	5.4	164
35-44	21.5	6.9	33.2	1,005	17.6	9.6	27.6	63.0	35.2	22.0	39.8	29.3	8.5	241
45-54	18.9	5.5	27.2	701	17.8	5.3	22.6	65.6	32.9	22.3	52.9	42.3	20.7	268
55-64	16.2	4.2	19.1	518	14.7	3.8	15.2	52.3	26.8	22.0	46.3	36.7	14.4	228
65+	12.6	5.2	12.9	507	12.0	4.9	9.0	46.8	21.8	18.1	50.6	35.1	12.2	265
Residence														
Urban	19.0	7.4	41.6	3,569	18.2	7.5	26.8	53.9	28.1	21.4	47.9	36.8	11.9	861
Non-urban	16.4	5.8	33.9	2,102	13.9	4.5	21.3	54.8	32.0	13.6	30.5	24.1	10.7	440
Province														
Western Cape	16.9	5.7	26.9	721	18.5	5.1	10.2	48.3	34.8	20.5	45.5	37.9	8.5	185
Eastern Cape	14.2	8.7	26.2	759	14.4	6.6	15.0	48.8	31.9	22.2	32.5	19.7	8.1	183
Northern Cape	22.9	2.6	31.0	135	21.9	3.1	22.9	54.4	42.1	13.1	45.4	27.5	12.5	39
Free State	25.7	7.3	38.4	444	18.2	7.8	29.2	67.2	37.9	20.4	40.0	24.5	7.0	115
KwaZulu-Natal	15.6	8.2	33.4	1,064	15.8	8.3	23.2	51.6	24.0	16.0	38.7	40.1	10.9	232
North West	21.3	5.9	51.5	551	22.4	5.4	39.9	57.7	27.1	13.3	33.0	24.7	6.1	127
Gauteng	21.9	6.5	51.4	1,099	18.4	6.8	32.9	59.5	21.3	21.9	57.4	42.1	22.7	273
Mpumalanga	14.9	8.6	43.6	378	8.8	12.1	28.8	61.8	41.3	17.0	42.3	31.7	9.4	56
Northern	13.0	3.5	43.0	522	8.6	1.3	27.6	41.4	31.6	15.0	30.0	22.4	6.4	90
Education														
No education	12.3	4.8	20.8	562	8.1	4.6	13.6	58.4	32.6	12.9	30.8	18.7	8.2	187
Sub A - Std 3	20.9	5.8	28.6	777	19.2	3.6	20.2	54.4	38.2	14.1	32.5	23.7	7.2	205
Std 4 - Std 5	18.9	6.9	40.0	755	16.5	6.6	24.6	47.0	38.8	16.0	32.5	25.1	9.1	160
Std 6 - Std 9	18.6	6.3	45.2	2,297	18.3	6.7	31.5	50.5	26.7	20.1	42.4	32.8	10.9	452
Std 10	19.0	8.7	44.4	801	19.3	7.1	27.6	61.2	20.7	21.3	56.8	50.8	23.2	180
Higher	13.1	9.7	35.4	440	14.5	12.0	25.4	64.9	15.5	33.7	65.9	56.3	13.7	99
Population group														
African	18.4	6.1	42.8	4,257	16.8	5.8	29.5	51.4	32.7	16.0	30.3	22.2	7.3	860
Afr. urban	20.2	6.3	48.3	2,375	19.3	7.1	32.8	52.0	33.0	7.9	35.1	24.1	7.6	510
Afr. non-urban	16.2	5.9	35.9	1,882	13.2	3.9	24.6	50.5	32.2	2.6	23.3	19.3	6.8	350
Coloured	17.2	4.0	23.2	637	18.4	4.3	13.9	49.4	42.4	16.2	48.2	40.7	9.9	165
White	20.8	14.5	29.5	564	18.6	10.3	18.2	70.5	8.6	32.4	74.7	59.5	28.4	214
Asian	5.9	9.1	31.6	195	5.7	8.8	15.7	49.6	23.5	9.8	75.5	58.3	11.0	54
Total	18.0	6.8	38.8	5,671	16.8	6.5	24.9	54.2	29.4	18.8	42.0	32.5	11.5	1,300

[1] Any hypertension is BP 140/90 mmHg or higher
[2] Alcohol abuse is determined through the CAGE questions (see Table 13.6)
[3] Obese is defined as having a body mass index (BMI) of 30 or over (see Table 13.8)

Table 12.6 Hypertension risk factors - women

Percentage of all women and women with hypertension age 15 or over who eat salty foods, who add salt before tasting food and who eat salty snacks more than three times a week and, among those with hypertension, percentage who drink alcohol, who abuse alcohol, who are obese, who had their blood pressure (BP) measured in the previous year, who say they know their BP and who know it is high, according to background characteristics, South Africa 1998

	Among all women, percentage				Among those with any hypertension, percentage[1]									
Background characteristic	Who eat food very salty	Who add salt before tasting food	Who eat salty snacks > 3 times/ week	Number	Who eat food very salty	Who add salt before tasting food	Who eat salty snacks > 3 times/ week	Who drink alcohol	Who abuse alcohol[2]	Who are obese[3]	Who had their BP measured during last year	Who say they know their BP	Who know their BP is high	Number
Age														
15-24	13.2	6.3	54.0	2,084	8.3	2.2	59.7	3.4	1.4	17.9	16.1	16.8	6.3	85
25-34	11.7	6.2	42.3	1,721	16.3	3.3	39.2	20.8	11.0	33.8	43.6	36.1	17.0	176
35-44	9.2	4.9	33.7	1,460	8.8	2.6	33.4	23.3	18.3	48.1	49.5	45.1	22.5	319
45-54	9.4	4.7	24.0	1,116	9.3	3.5	18.8	26.9	15.3	52.9	58.2	49.5	24.0	432
55-64	8.8	4.4	19.5	914	7.4	4.6	17.1	19.7	9.6	53.1	62.2	52.1	25.8	471
65+	7.1	3.1	12.9	861	6.8	3.4	11.8	19.0	11.3	37.7	54.9	41.0	20.4	521
Residence														
Urban	11.9	6.2	37.3	4,999	9.0	3.4	23.3	22.2	12.5	48.7	63.5	52.8	25.5	1,299
Non-urban	8.3	3.8	32.9	3,157	8.1	3.8	20.8	18.9	12.2	38.4	35.9	29.6	15.3	704
Province														
Western Cape	14.9	5.4	26.8	799	10.5	3.1	17.0	22.4	13.5	47.1	66.0	58.8	20.8	217
Eastern Cape	9.6	5.2	29.0	1,161	8.1	4.0	17.2	21.6	12.7	42.1	37.1	20.9	12.2	306
Northern Cape	17.8	1.3	27.6	168	13.4	1.0	18.1	23.7	20.8	36.9	73.1	51.1	23.2	50
Free State	12.9	4.1	29.1	519	13.6	3.3	20.6	33.3	15.8	43.3	54.1	44.9	25.4	148
KwaZulu-Natal	7.8	5.9	30.3	1,608	7.8	4.6	18.1	13.4	8.8	51.6	52.9	49.9	20.1	394
North West	9.8	3.8	45.7	647	5.8	2.3	31.8	23.2	15.1	27.2	43.7	35.4	16.1	169
Gauteng	12.7	7.4	44.1	1,887	8.2	3.3	26.8	22.9	12.6	54.4	68.3	60.1	34.7	485
Mpumalanga	8.0	2.6	37.5	507	8.2	2.3	25.4	24.7	15.1	39.8	56.2	43.0	22.2	94
Northern	7.1	3.4	40.9	859	8.2	4.2	29.6	13.8	8.1	27.5	27.5	16.1	8.2	140
Education														
` No education	8.5	3.5	20.5	1,186	8.6	4.5	17.8	23.2	17.4	40.1	42.7	30.7	17.3	475
Sub A - Std 3	10.8	2.7	28.2	1,088	8.3	2.3	19.8	19.5	15.3	48.9	48.4	39.1	16.5	367
Std 4 - Std 5	10.6	5.1	31.4	1,136	8.2	3.2	19.8	15.1	14.2	46.1	53.6	45.7	26.5	301
Std 6 - Std 9	11.2	4.9	41.4	3,094	9.0	3.2	24.7	18.0	9.2	48.5	59.7	50.7	23.9	626
Std 10	11.2	9.1	45.9	1,120	9.9	6.0	35.4	32.7	3.2	35.7	71.3	65.1	28.3	159
Higher	8.2	8.5	38.7	495	7.3	1.3	28.8	40.1	3.2	46.9	73.6	68.6	32.5	65
Population group														
African	9.4	4.1	39.1	6,269	8.5	3.2	26.0	17.7	13.0	46.6	44.5	36.2	18.2	1,470
Afr. urban	10.7	4.7	43.1	3,348	8.4	2.7	29.1	17.2	14.1	52.2	54.7	44.8	22.1	852
Afr non-urban	7.9	3.4	33.5	2,921	8.5	3.9	21.7	18.4	11.5	38.8	30.6	24.3	12.9	618
Coloured	16.7	3.2	22.4	806	11.3	0.7	14.2	23.9	20.9	44.4	67.4	61.3	25.5	238
White	15.9	13.7	23.9	767	9.3	6.9	11.8	46.1	3.0	39.8	89.3	76.9	37.4	223
Asian	4.0	13.0	28.9	300	2.9	9.1	11.1	3.0	1.5	28.9	87.3	58.4	31.8	66
Total	10.5	5.2	35.6	8,155	8.7	3.5	22.4	21.1	12.4	45.1	53.8	44.6	21.9	2,004

[1] Any Hypertension is BP 140/90 mmHg or higher
[2] Alcohol abuse is determined through the CAGE questions (see Table 13.6)
[3] Obese is defined as having a body mass index (BMI) of 30 or over (see Table 13.9)

12.6 Patient's Reported Frequency of BP Measurements and Knowledge of Their Measured BPs

Tables 12.5 and 12.6 also show how frequently hypertensive patients reported their BP had been measured during the previous year, whether they knew what their BP reading was and if it was high or not. Of the hypertensive men 42 percent had their BP measured the previous year, compared to 54 percent of women, which again points to the need to improve the care provided, particularly for hypertensive men in South Africa.

Forty-four percent of hypertensive women reported that they knew what their BP was and 22 percent said their BP was high. Only 33 percent of the hypertensive men said that they knew what their BP was and 12 percent knew that is was high. It is the younger hypertensive persons, particularly the males, whose BPs had been measured least frequently during the last year, who did not know what their BPs were and whether it was high. Similarly, it is the non-urban hypertensive patients, and particularly the non-urban African hypertensive patients, who least frequently had their BP measured. The provinces with the lowest rates of reported BP measurements during the last year are the Eastern Cape, the North West and Northern Provinces. Those with the lowest levels of education reported having their BP measured least frequently during the last year. The hypertensive patients in Gauteng reported most frequently that their BP was measured, that they knew what their BP was and most frequently reported that their BP was controlled, however, the hypertensive patients of this province did not have better control than other provinces.

Effective hypertension control requires that the patient becomes an active participant in their own care and that they have an understanding of what level of BP control has been achieved. The South African Hypertension guidelines for primary level care recommend that patients should not only know that they are hypertensive, but also if their BP is controlled. Clearly, these data show that this aspect of the guidelines has not been implemented, an issue that needs to be addressed.

12.7 Comparison of BP Control Between Public and Private Health Care Services

From the preceding data and the different patterns of prescribed drug use for hypertension between the private and public health care sector (see Chapter 11, Table 11.11) the question arises, as to which of these sectors are achieving the best hypertension control. The data presented in Table 12.7 attempt to answer this question by comparing hypertension control between the private and public health care sector in a number of ways.

As stated earlier the current guidelines for hypertension definition and control are based on a BP level of 160/95 mmHg. It is, therefore, realistic to evaluate BP control in South Africa as control below this cut-off point. However, this level may change in the future and, therefore, the level of 140/90 mmHg is also shown in this table. The table shows the prevalence of "any BP control", which is defined as hypertensive patients with a BP below 160/95 mmHg. In addition, the table shows "true BP control", which is defined as a hypertensive patient with a BP below 140/90 mmHg and moderate BP control which is the difference between the two figures calculated above.

When hypertensive patients from the private or public sector who are taking appropriate medication are compared, it is found that those from the private sector are marginally less controlled than those found in the public sector for both cut-off points used. Making this comparison by defining being hypertensive as having a BP above 160/95 mmHg or taking medication (the current definition in South Africa) we find that for both cut-off points under consideration the private sector fared better than the public sector. This would suggest that fewer hypertensive patients in the public sector were receiving medication and that the private

sector may also fare better by improved non-drug management of hypertension compared to the public sector as well as by better BP control provided by the medication used in the private sector.

Table 12.7 Public vs. private sector source of hypertension medication

Percentage of hypertensive patients who received their medication from either the public or private sector, according to level of control of blood pressure (BP), South Africa 1998

Percentage of hypertensives who received drugs from	True control BP ≤ 140/90 mmHg	Moderate control BP ≥ 140/90 but < 160/95mmHg	Any BP controlled BP < 160/95 mmHg	Uncontrolled BP ≥ 160 /95 mmHg	Number
Among all taking medications					
Public sector	49.6	21.2	70.9	25.3	424
Private sector	47.7	20.9	68.5	24.9	582
Among those with moderate or severe hypertension[1]					
Public sector	16.3	7.0	23.3	75.5	1,292
Private sector	36.7	16.1	52.8	42.2	756
Among those with any hypertension[2]					
Public sector	9.1	47.8	56.9	42.3	2,303
Private sector	27.9	36.2	64.1	32.0	995

[1] Moderate or severe hypertension is 160/95 mmHg or higher
[2] Any hypertension is 140/90 mmHg or higher

12.8 Chronic Obstructive Pulmonary Disease And Asthma

Chronic obstructive pulmonary disease (COPD) and asthma make up a large part of chronic lung disease in developed countries. In developing countries there is a changing pattern of disease and it is expected that these conditions will increase in developing countries. This survey describes the extent and distribution of COPD and asthma in the population aged 15 years and above in South Africa.

Chronic obstructive pulmonary disease (COPD) includes chronic bronchitis, a condition characterised by excessive mucus production in the airways (bronchi), and emphysema, in which there is damage to the gas exchange part of the lung. Asthma is a condition which overlaps with COPD, but in which the limitation of airflow is reversible. COPD and asthma result in episodic or persistent symptoms including wheezing, coughing, phlegm and/or breathlessness. Emphysema and, to a lesser extent, chronic bronchitis are associated with loss of lung function and reduced life expectancy.

In industrial countries, about 4 percent of all deaths are due to the complications of COPD (Lopez, 1993). However, the long symptomatic period of the disease and the associated episodes of respiratory infection create an enormous burden in symptom and disability days, doctor visits, medication and hospitalisation. It has been estimated that the resulting illness and death due to COPD cost the United States $23.9 billion in 1993, of which 61 percent were direct medical costs, particularly hospitalisations. The equivalent costs for asthma were $12.6 billion, of which 77 percent were direct medical costs (Sullivan *et al*, 2000).

The most important risk factor for COPD in developed countries is tobacco smoking, although genetic predisposition, early childhood respiratory infections, TB, occupational exposures and outdoor air pollution play contributory roles (The National Lung Health Education Program Executive Committee,1998; Coultas, 1993). In developed countries, there is an association between COPD and lower socioeconomic class (Prescott, 1999). While asthma prevalence is not necessarily associated with poverty, the complications of asthma are.

The burden of COPD and asthma in developing countries such as South Africa is not well documented, but can be assumed to be on the increase due to ageing of the population and the increase in tobacco smoking

(Bumgarner and Speizer,1993). In addition, there are risk factors relatively uncommon in developed countries, such as indoor smoke pollution, the chronic effects of lung infection such as tuberculosis and the combination of sub-optimal nutrition and respiratory infection in early life (Bumgarner and Speizer,1993; Barker *et al*.,1991).

South African mortality data indicate that during the 1980s the contribution to total mortality from chronic lung disease rose while that from acute respiratory infection fell, so that by 1990 both were in the region of 4 percent of all deaths (Louw,1995). There were strong social differences in the burden of mortality from chronic lung disease, with white and coloured South Africans showing considerably higher death rates than Africans.

In the current survey, three types of respiratory outcome data are collected: (1) self-reporting of specific diagnoses, in this case "emphysema/bronchitis" and "asthma", (2) self-reporting of symptom complexes, one describing airflow limitation and the other chronic bronchitis and (3) peak expiratory flow rates (PEFR) measured on a mini-peak flow meter by the interviewer during the survey.

12.9 Self Reporting of Respiratory Diagnoses

These diagnoses formed part of a list of chronic conditions in the questionnaire prefaced by the words "Has a doctor or nurse or staff member at a clinic or at a hospital told you that you had or have any of the following conditions?"

"Emphysema/bronchitis"

Self-reporting of these conditions can be used only as a very rough guide to the prevalence of chronic lung diseases for a variety of reasons. First, use of diagnostic terms reflects health service access, which in South Africa varies considerably by socio-economic status and geography. A term such as emphysema is likely to be used inconsistently by medical practitioners based on varying clinical criteria. Lung function testing, which contributes important information to diagnosis, is uncommon at primary care level.

Bronchitis also is a non-specific term that would elicit reports of acute bronchitis as well as chronic bronchitis. Acute bronchitis is a common ailment, often a mild and self-limiting viral infection, which may occur without underlying chronic disease. Finally, asthma in adults is probably frequently misdiagnosed as bronchitis.

The self reported rates of emphysema/bronchitis (Tables 10.3 and 10.4 in Chapter 10) are of the order of 2 to 3 percent in men aged less than 44 years with a sharp increase (7 to 9 percent) in men over 44 years. Younger women reported these conditions more commonly than men of the same age, and showed a more even increase from one age category to the next. These figures (averaged across the age groups) are comparable to the overall estimate of 6 percent of the United States population with self-reported chronic bronchitis and/or emphysema (The National Lung Health Education Program Executive Committee,1998).

Urban rates of reported emphysema/bronchitis are higher than non-urban rates. The association with education is complex. Among men, rates among respondents with the least and most education are somewhat higher than those with intermediate education. Among women, the trend is for those with the highest education to report the highest prevalence of emphysema/bronchitis (11 percent among women with greater than standard ten education).

In parallel with the education findings, rates are much higher among white men and women than among other population groups, with Africans reporting the lowest rates.

Among the provinces, the highest rate of emphysema/bronchitis for men and women are reported in the Western Cape and the lowest in the Free State. The range (highest to lowest) is very wide.

"Asthma"

On the one hand, self-reporting of asthma is likely to reflect some degree of under-diagnosis. On the other hand, asthma rates may be inflated by confusion with emphysema and chronic bronchitis, particularly in older age groups.
Reported asthma prevalence rates (Tables 10.3 and 10.4 in Chapter 10) are similar in men and women, and increase with age, particularly in men. Although not an age-standardised comparison, the whole range of age-specific prevalences in this survey is lower (except for men aged 75 years and over) than the prevalence of self-reported asthma from national surveys in the USA in which 6 percent of men and 6 percent of women reported asthma in 1994 (Hurd, 2000).

Urban prevalences exceed non-urban. The association of reported asthma with education is complex, with a tendency for those with intermediate education to report less asthma than those with the lowest and highest educational levels. Population group comparisons reveal the highest rates among whites and the lowest among Africans.

For reported asthma, rates among women are highest in the Western Cape and lowest in the Northern Province. Among men, similar rates (above 4 percent) are reported in the Western Cape, Eastern Cape, KwaZulu-Natal and Gauteng, with somewhat lower rates in the other provinces.

12.10 Reporting of Symptoms

Airflow limitation

This symptom complex is made up by wheezing/tight chest with breathlessness in the past year associated with sleep interruption by wheezing/tight chest or by coughing.[1] This syndrome is characteristic of airflow limitation. If this airflow limitation is reversible, spontaneously or by therapy, it should be diagnosed as asthma. However, patients with emphysema or chronic bronchitis may have similar symptoms to those of asthma and show partial reversibility of airflow limitation. Lung function testing is essential for proper evaluation of these conditions.

Women show a moderate excess in prevalence over men at most ages, with the prevalence rising from 6 percent among women aged 15 to 24 years (3 percent in men) to 14 percent in women 65 years and over (11 percent in men) (Table 12.8). It should be noted that the definition used in this survey was somewhat stricter than those used in other surveys in which individual rather than composite symptoms of airflow limitation tend to be reported. As with chronic bronchitis, non-urban rates are unexpectedly higher than urban rates.

Across educational strata, the rate of airflow limitation is highest in the group with lowest education, declining sharply with increased education. Rates among population groups show some variation, with white and Asian men showing somewhat higher rates than men in other groups, and Asian and non-urban African women reporting the higher rates among women.

Across the provinces, the Northern Cape and KwaZulu-Natal stand out as having the highest prevalences of airflow limitation.

[1] Questions and responses making up definition: During the last year have you had wheezing or tightness of your chest? If yes, were you also short of breath? Is your sleep ever interrupted by you coughing? OR Is your sleep every interrupted by a wheezing or a tight chest?

Chronic bronchitis

Reporting of symptoms is less likely to be influenced by contact with health services than is reporting of diagnoses. The chronic bronchitis symptom complex is defined by chronic cough with phlegm every day for at least 3 months a year, for at least 2 successive years.[2] It was one of the earliest symptom complexes to be defined by standard respiratory questionnaires, and has entered into common usage as both a clinical and epidemiological definition.

Rates of chronic bronchitis symptoms range from 0.9 percent among men and 2 percent among women aged 15 to 24 years, to 4 percent among men and 6 percent among women aged 65 years and over (Table 12.8). Rates in men are considerably lower than those reported in working populations and in some general populations in Africa including South Africa (Becklake,1995), which range from 10 to 45 percent.

Surprisingly, non-urban rates of chronic bronchitis are higher than urban rates among both men and women. There is a sharp decline in prevalence with increasing education, with those with lowest education having 5 times the prevalence of those with higher education. This is correlated with current rather than past smoking prevalences (Table 13.1 and Table 13.2 in Chapter 13). Of interest, however, in the population group comparison is that non-urban African women, who have the lowest current smoking rates (Table 13.2 in Chapter 13) report the highest prevalence of chronic bronchitis symptoms.

Among the provinces, the Northern Cape has the highest rate of chronic bronchitis among men, and the Eastern Cape the highest rate among women.

Abnormal Peak Expiratory Flow Rates

Peak expiratory flow rate (PEFR) is the maximum rate of flow of air expelled during a forced expiration. It is less sensitive and more variable than lung function measured by more sophisticated equipment, and is strongly dependent on how hard the subject tries. However, PEFR can be measured with a simple portable meter suitable for field studies, and can be regarded as a crude measure of airways function.

Besides effort, PEFR is strongly dependent on age, body size and sex. Thus, in order to examine its relationship to environmental and other variables of interest, it is necessary to control for these intrinsic sources of variation. The most common method of doing this is to express PEFR as a percentage of a predicted or reference value drawn from a study of a population suitable for this purpose.

In order to use a population as close as possible to the one studied, the total sample recruited in the survey was chosen as the reference population. Smokers were excluded from the reference group, as were people who reported asthma, emphysema/bronchitis, lung cancer or tuberculosis, those who met the definition for chronic bronchitis or airflow limitation, and women who reported pregnancy. The final reference group comprised 2,373 men and 5,080 women.

A statistical prediction model was developed as a function of age, sex and height and weight (Appendix D). From this a mean or "expected" PEFR value could be calculated for any group of interest as well as the “lower limit of normal” for PEFR (in this case 2 standard deviations below the prediction mean).

The proportions of the survey population falling below this abnormal threshold value are reported for each stratum of interest (Table 12.8).

The prevalence of abnormal PEFR increases with age for men and women. The highest prevalence of abnormal PEFR in both men and women is reported in the Northern Cape, a finding which parallels the prevalence of airflow limitation.

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[2] Questions and responses used for definition: Do you usually cough? When you cough, do you usually bring up phlegm from your chest? If yes, have you brought up phlegm every day for at least three months during the last year? If yes, for how may years have you brought up phlegm in this way? (> 2).

As with the symptom complexes, there is a sharp increase in the prevalence of abnormal PEFR with decreasing educational attainment. Men with no education show a five times higher prevalence of abnormal PEFR than men with greater than standard 10 education. The corresponding ratio for women is fourfold.

When prevalence of abnormal PEFR is compared by population group, white men have the lowest prevalence and Asian men the highest. Among women, coloured women have the highest prevalence of abnormal PEFR, and Asian women the lowest.

Table 12.8 Symptoms of lung disease

Percentage of men and women aged 15 years and over who report symptoms of airflow limitation or chronic bronchitis or who have abnormal peak flow rates, according to background characteristics, South Africa, 1998

	MEN				WOMEN			
Background characteristic	Airflow limitation	Chronic bronchitis	Abnormal peak flow rates	Number of men	Airflow limitation	Chronic bronchitis	Abnormal peak flow rates	Number of women
Age								
15 - 24	3.1	0.9	1.8	1,816	5.6	1.9	2.3	2,084
25 - 34	4.6	1.7	2.3	1,123	6.4	1.4	2.2	1,721
35 - 44	7.3	2.4	4.5	1,005	8.3	2.5	3.9	1,460
45 - 54	11.1	4.8	6.4	701	10.3	3.7	5.6	1,116
55 - 64	12.2	3.6	9.3	518	12.7	4.1	7.2	914
65+	11.1	4.3	5.8	507	14.2	5.6	7.8	861
Residence								
Urban	5.9	2.2	3.9	3,569	8.0	2.2	4.5	4,999
Non-urban	8.1	2.6	4.1	2,102	9.6	3.7	3.5	3,157
Province								
Western Cape	4.4	2.4	2.9	721	7.1	3.0	5.5	799
Eastern Cape	6.9	3.0	3.7	758	8.0	4.9	4.1	1,161
Northern Cape	10.3	5.1	9.4	135	9.1	2.5	11.8	168
Free State	6.4	1.6	3.8	444	6.8	2.1	2.2	519
KwaZulu-Natal	10.0	2.8	4.2	1,064	13.5	3.6	3.2	1,608
North West	4.7	1.9	2.3	551	7.4	0.9	4.7	647
Gauteng	7.3	2.4	5.5	1,099	8.3	2.4	5.6	1,887
Mpumalanga	5.4	1.4	3.7	378	7.1	1.6	1.9	507
Northern	3.8	1.3	3.1	521	5.4	1.5	2.0	859
Education								
No education	13.9	5.1	8.2	562	15.7	5.6	7.0	1,186
Sub A - Std 3	11.6	3.7	7.0	777	13.0	4.5	6.4	1,088
Std 4 - Std 5	7.5	2.8	4.9	755	7.7	2.4	3.4	1,136
Std 6 - Std 9	4.3	1.4	2.7	2,297	6.3	2.1	3.5	3,094
Std 10	5.3	1.6	1.6	801	6.2	1.0	2.6	1,120
Higher	2.1	1.1	1.7	440	4.6	0.9	1.8	495
Population group								
African	6.5	2.1	4.2	4,257	8.5	2.8	4.1	6,269
Afr. urban	5.7	1.8	4.4	2,375	7.5	2.1	5.1	3,349
Afr. non-urban	7.4	2.4	4.0	1,882	9.7	3.6	2.9	2,921
Coloured	6.2	3.6	3.8	637	8.2	2.8	5.5	806
White	8.5	2.8	2.4	564	8.1	2.9	4.0	767
Asian	8.9	2.9	4.9	195	12.5	0.7	2.7	300
Total	6.7	2.3	4.0	5,671	8.6	2.8	4.1	8,156

12.11 Associations of Respiratory Symptoms and Abnormal PEFR with Risk Factors Measured in the Survey

The associations between specific risk factors and chronic lung diseases are examined by cross-tabulation of responses to questions about smoking, indoor air pollution, occupational exposure, underground mining (in men) and past tuberculosis with the symptom responses and abnormal PEFR prevalences. The comparison is expressed as a prevalence ratio, where a ratio of one implies no association and a ratio of two a "moderate" association. It should be emphasised that these risk factors may be correlated with each other, and that the resulting associations need to be examined further in an analysis that is able to control for competing risk factors so as to isolate the effect of the risk factor of interest more clearly. In this analysis, the prevalence ratios are adjusted for age only.

Tobacco smoking

The importance of tobacco smoking in respiratory disease in South Africa is confirmed by the finding that at all ages, men and women, who had "ever" smoked have a higher prevalence particularly of chronic bronchitis, but also of episodic airflow limitation and abnormal PEFR, than "never smokers"(Table 12.9).

There is a complex exposure response relationship between the number of years smoked and such symptoms (data not shown). In many of the age strata, smokers who have smoked for more than the median number of years have lower prevalences than those with fewer years of smoking. Inaccurate reporting of duration of smoking history may be one explanation for this anomaly. Another explanation is that smokers who suffer respiratory symptoms are more likely to give up smoking, producing a spurious association between symptoms and shorter duration of smoking.

Tobacco smoking and associated policy needs are discussed in detail in Chapter 13. However, some points bear emphasis in this chapter. The impact of tobacco smoking on lung function and associated symptoms is slow and cumulative, beginning with a long phase in which smokers may be unaware of lung damage, followed by a period in middle and later life of increasing symptoms and disability.

There is good evidence that smokers who quit can slow the accelerated decline in their lung function compared to those who continue smoking (Rennard,1998). Further, among smokers there is a sub-group at greater risk of significant COPD. The earlier in the natural history that these "fast decliners" can be detected and assisted to stop smoking, the greater the lung function loss and risk of significant COPD prevented.

The benefits of smoking cessation have important implications for action within the health services. Early detection of lung function loss through spirometry may be a means of both identifying those at highest risk of COPD in later life and also a valuable educational tool in assisting such people to give up smoking. However, unlike the widespread availability of blood pressure measuring equipment, spirometers are typically unavailable outside of the private sector and the larger state hospitals.

COPD is associated with relatively high consumption of a variety of medications by patients. However, many of the medications prescribed and used in the treatment of COPD offer little or arguable benefit, requiring a more discriminating prescribing policy by practitioners (Working group of the South African Pulmonology Society,1998).

At the level of referral services, there is a shortage of medical practitioners with special expertise in respiratory medicine in a number of areas of the country. In addition, there has been a downgrading of the

profession of clinical pulmonary technologist (with special expertise in lung function testing) in recent years as a result of the freezing or disappearance of hospital posts. This will reduce incentives to enter the profession and cause a shortage of trained pulmonary technologists in state hospitals in the future.

Exposure to indoor air pollution from cooking fuels

High exposures to indoor air pollution are common in the developing world (Smith,1987). The use of fuels such as coal, wood and cow dung for domestic purposes in conditions of inadequate ventilation has the potential to produce high concentrations of indoor air pollution. This has been implicated in both acute and chronic respiratory disease, including acute respiratory infection in children (Bumgarner and Speizer,1993; Terblanche *et al.*,1993).

In this study, respondents who use coal, wood or animal dung for cooking and heating report higher prevalences of chronic bronchitis than those reporting use of electricity, gas or paraffin (Table 12.9). The effect is weaker for airflow limitation and hardly evident for abnormal PEFR.

Also, the effect is not consistent across different age groups. Among men, the association is strongest in the younger age groups, particularly the age group 25 to 34 years, while among women the effect is strongest in older age groups, particularly the age group 55-64 years. Speculatively, this may fit a pattern whereby the cumulative effect of indoor air pollution is evident in women who spend most time at home and among young adult men at home prior to their entry into the workplace and among whom rates of unemployment are highest.

Besides indoor air pollution, the above findings may be partly due to the correlated effects of tuberculosis. Local outdoor air pollution from use of these fuels in residential areas may also contribute to this effect (Terblanche,1993).

The survey did not include questions about outdoor air pollution. The findings of higher prevalences of symptoms in non-urban/countryside respondents than urban suggest that factors other than pollution from industry and motor vehicles are important. In addition, the most urban industrialised province, Gauteng, did not stand out as having the highest prevalences of symptoms or PEFR abnormality.

However, a previous study of the effects of outdoor air pollution in the Vaal Triangle revealed a health impact of some magnitude (Terblanche,1993). There are also parts of the country with high prevalences of respiratory symptom complaints attributed to indoor air pollution, for example in areas of Cape Town and Durban. In addition, the contribution of motor vehicles to air pollution in the form of photochemical smog is likely to increase. A recent study of Cape Town's "brown haze" phenomenon found a high proportion of the haze was attributable to diesel exhaust (Wicking-Baird,1997). The recapitalisation of the country's taxi fleet with diesel mini-buses, if successful, has the potential to add to the country's load of air pollution, particularly in respect of small particulates.

Occupational exposure

Occupational respiratory hazards exist in a range of sectors including mining, construction, manufacturing and agriculture. While there are a number of specific work exposures that have been shown to cause fibrosis of the lung, occupational asthma and chronic bronchitis, there is more general evidence associating work in dusty occupations with COPD (Becklake,1989). In this survey respondents were asked whether they had "ever worked in a job.... regularly exposed to smoke, dust, fumes or strong smells", and the duration in such a job.

There is a moderately strong association in males between occupational exposure and both airflow limitation and chronic bronchitis, and a little less so for PEFR abnormality. Of note is that these prevalence ratios are generally higher than those for smoking.

As with smoking, however, there is no clear exposure response effect by years of exposure (data not shown). Similar bias factors may be operating here as for smoking, including inaccurate reporting of duration of exposure and selection of those with respiratory symptoms out of the more polluted jobs. In addition, the nature of the household survey methodology in this study may have introduced biases with respect to occupational influences. This is discussed in more detail in section 10.8 in Chapter 10.

Work-related COPD outside the mining sector is not a compensatable disease. While the difficulties of attributing cause in individual cases is recognised, an unfortunate consequence is that the contribution of occupational air pollution to aggravation of COPD is under-recognised and an opportunity for prevention lost.

Underground mining work

Underground mining work, which is of particular relevance in South Africa, is associated with a variety of respiratory hazards, the principal being silica in the gold mining industry. Silica exposure and silicosis are in turn associated with an increased risk of tuberculosis.

A sizeable number of male respondents (n=562) reported ever having worked underground in a mine, reflecting the importance of this sector in South Africa. An increased prevalence of airflow limitation, chronic bronchitis and abnormal PEFR is evident among those who had done such work (Table 12.9).

This survey supports what has been found in a limited number of studies (Cowie and Mabena, 1991;Hnizdo,1992) namely, that underground mineworkers are at increased risk of COPD. This condition has in fact been compensatable in mineworkers for a long time, although it is likely that it is under-recognised and under-reported by medical practitioners, particularly in Africa.

This is a striking example of a population-based survey documenting an apparent adverse health effect of dust or other respiratory hazards associated with mine work. This association may contribute to the adverse effects noted under more general occupational exposure in the previous section. Here too, however, further analysis is needed to examine the relative effects of other factors such as smoking and tuberculosis that may be associated with mine work.

Tuberculosis

Although active pulmonary tuberculosis is curable if diagnosed early and adequately treated, permanent damage to the lungs is commonly noted in persons with a prior history of tuberculosis. Such damage may take the form of scarring and shrinkage of part of the lung, damage to the air spaces, or abnormal dilatation of the bronchial tree (bronchiectasis). Chronic phlegm production and airflow limitation may be features of such damage.

There was a strong association between a history of diagnosed tuberculosis and airflow limitation, chronic bronchitis and abnormal PEFR among men and women, confirming the importance and impact of the tuberculosis epidemic at the population level. The prevalence ratios are the highest of any of the associations investigated.

These data add to the findings of a recent study of mineworkers that observed a strong impact of tuberculosis on airflow limitation, the effect increasing after recurrent episodes of tuberculosis (Hnizdo *et al.*, 2000). Tuberculosis in South Africa is discussed in more details in Chapter 10, Section 10.6.

Table 12.9 Lung disease and risk factors

Percentage of men and women aged 15 and over who report symptoms of airflow limitation or chronic bronchitis or who have abnormal peak flow rates, by history of various risk factors for lung disease (smoking, past TB, exposure to smoky home fuels, exposure to occupational air pollution, or underground mining work), South Africa, 1998

	Airflow limitation			Chronic bronchitis			Abnormal peak flow rate		
Risk factor	Yes	No	Prevalence ratio*	Yes	No	Prevalence ratio*	Yes	No	Prevalence ratio*
					MEN				
Tobacco smoking	9.0	4.2	1.7	3.3	1.2	2.1	5.1	2.8	1.4
Indoor fuel exposure	7.6	6.2	1.3	3.1	1.9	1.8	4.5	3.8	1.2
Occupational exposure	13.0	3.7	2.8	4.3	1.4	2.3	6.2	3.0	1.6
Underground mine work	13.1	7.6	0.7	3.9	2.5	0.8	6.5	4.0	1.3
History of TB	32.7	5.9	4.3	14.7	2.0	5.7	13.4	3.7	2.8
					WOMEN				
Tobacco smoking	12.5	7.4	1.5	4.7	2.1	1.9	6.4	3.4	1.3
Indoor fuel exposure	10.0	7.9	1.2	4.0	2.2	1.7	4.5	3.9	1.1
Occupational exposure	14.2	7.7	1.7	3.9	2.6	1.4	5.9	3.8	1.4
History of TB	20.7	8.4	2.3	18.3	2.5	4.7	11.7	4.0	2.6

* Adjusted for age

12.12 Discussion

The data presented here show clearly that about 6.1 million South Africans have a BP of ≥140/90mmHg or are taking medication for hypertension, which, if untreated, imparts risk to develop strokes, heart attacks, kidney failure, eye diseases and even heart failure. Of these, about 3.3 million have high risk (BP≥160/95mmHg) for these conditions if uncontrolled. About a quarter of hypertensive men and half of the women know that they suffer from the condition, and less than 40 percent of men and about 55 percent of women are taking appropriate hypertensive medication. About a third of the patients with hypertension have a BP below 160/95mmHg. Ideally, good BP control is present when hypertensive patients have BP below 140/90mmHg. Depending on what definition of hypertension is used, about a quarter of hypertensive women and less than 20 percent of hypertensive men had BP control that reduced the risk of target organ damage that will reduce the level of morbidity and mortality. It is particularly the high risk non-urban African hypertensive men and women who had the worse level of hypertension control, along with the young male hypertensive patients. Although a large proportion of South Africa's chronic diseases drug bill is spent on anti-hypertensive medication relatively little benefit will be gleaned from this expenditure if such poor levels of control are achieved.

Many aspects of lifestyle-related hypertension risk factors have been found to be much higher in the hypertensive patients than in the general population, including alcohol use and being obese. Although crude methods of identifying high salt intakes were used in this study that did not show a difference between hypertensive and normotensive participants, they clearly showed that young people consume more salt than older people. If the hypertensive people in our country are found to be salt-sensitive, this higher intake of salt in the young might well predispose even more of them to develop hypertension when they grow older in comparison to what is currently found in the older African people in the country. South Africa bread has a much higher level of salt than that of other industrialised countries and many foods are preserved with high levels of sal in the country. This aspect of the food industry needs attention if BP levels are to be

controlled. Also important is the issue of excessive alcohol use as a predisposing risk factor for hypertension. Similarly, being obese also needs to be addressed if hypertension rates are to be reduced.The level of hypertension diagnoses is inadequate, particularly in younger men and more so in non-urban African men. Many aspects of patient education that are recommended in the guidelines for hypertension care in South Africa need to be addressed according to these findings. For example as seen from Chapter 10, Table 10.7 relatively few patients knew the names of their drugs or, as seen from Tables 12.5 and 12.6, very few patients knew if their BP was high or controlled. About half of the women and just more than a third of the men had their BP measured during the previous year.

The data presented here represent the first national survey of the symptoms and prevalence of chronic lung disease in South Africa. A potential bias is that healthy working people may be under represented in a household survey. Previous morbidity information was derived from surveys of selected populations only.

For example, Wicht *et al*. (1979) demonstrated high prevalences of COPD and moderate prevalences of asthma in a population sample of whites in Cape Town. A number of workforce studies have demonstrated high rates of chronic bronchitis (Becklake,1995). Studies of asthma in children in Cape Town documented high population prevalences of asthma symptoms in children (Ehrlich et al,.1994), although in an international comparison using a video depicting scenes of asthma symptoms the prevalence of wheezing in Cape Town pre-adolescents lay in the mid-range internationally (ISAAC Steering Committee,1998).

Regarding asthma specifically, the findings of this survey suggest that asthma is underdiagnosed and undertreated. As stated earlier, it is difficult in a survey of this nature to distinguish asthma from COPD in adults. Nevertheless, of the prevalence of airflow limitation reported (10 to 15 percent of the population above 44 years of age), a significant proportion is likely to have asthma.

The public health and clinical approaches to asthma are usually distinguished from those with respect to COPD. While measures to reduce tobacco consumption as well as domestic and workplace air pollution are likely to have a positive impact on the asthma, medical evaluation and therapy make a particularly significant contribution to the quality of life of people with asthma. Early diagnosis of asthma is important in that proper patient education and treatment can maintain the quality of life, and perhaps slow down the rate of lung function loss, in people with asthma.

There is evidence internationally that asthma is underdiagnosed and undertreated, and similar local evidence for children (Ehrlich *et al.,*1998). Treatment guidelines for asthma have been produced by consensus expert groups (Potter *et al.*,1994;South African Pulmonology Society Adult Asthma Working Group, 2000) and have been updated from time to time.

Recent guidelines have emphasised the use of inhaled adrenergic and steroid agents in milder, more frequently encountered asthmatics. Table 11.10 in Chapter 11 gives an indication of the medications commonly used to treat asthma and chronic bronchitis. The data show a strong preference for use of oral agents (adrenergics and xanthines) in these conditions. This preference may be that of the prescribers or consumers of these medications, but either way there is cause for concern because of the low efficacy and generally poor cost-benefit ratio of this type of medication. In this survey, inhaled adrenergics and steroids were reported half as often as the oral medications.

The relatively high cost and/or unavailability of asthma care in poorly-resourced health care facilities should be recognised (Watson and Lewis,1997). However, the cost-effectiveness of such treatment for the system as a whole in reducing frequent severe attacks and hospital admissions needs to be taken into account.