



# Trends in adult tobacco use from two South African demographic and health surveys conducted in 1998 and 2003

Nasheeta Peer, Debbie Bradshaw, Ria Laubscher, Krisela Steyn

**Introduction.** Since peaking in the early 1990s in South Africa, tobacco use has declined significantly. The reduction has been attributed to the government's comprehensive tobacco control policies that were introduced at the time.

**Objective.** To assess the pattern of tobacco use in the South African Demographic and Health Surveys of 1998 and 2003.

**Methods.** Multi-stage sampling was used to select approximately 11 000 households in cross-sectional national surveys. Face-to-face interviews, conducted with 13 826 adults (41% men) aged  $\geq 15$  years in 1998, and 8 115 (42% men) in 2003, included questions on tobacco use according to the WHO STEP-wise surveillance programme. Logistic regression analysis was used to assess the independent effects of selected characteristics on smoking prevalence.

**Results.** Daily or occasional smoking prevalence among women remained unchanged at 10 - 11%; it decreased among men from 42% (1998) to 35% (2003). The decline for men was significant among the poorest and those aged 25 - 44 years. Strong age patterns were observed, peaking at 35 - 44 years, which was reduced among men in 2003. Higher income and education were associated with low prevalence of smoking, while living in urban areas was associated with higher rates. Black men and women smoked significantly less than other population groups.

**Conclusion.** Despite decreased smoking rates in some subgroups, a lapse exists in the efforts to reduce tobacco use, as smoking rates have remained unchanged among women, and also among young adults aged 15 - 24 years.

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South Africa introduced comprehensive tobacco control policies in the 1990s to address the growing epidemic of tobacco use. The Tobacco Products Control Act of 1993 introduced health warnings on cigarette packs and advertising material, and the 1999 amendment banned tobacco advertising and the sale of tobacco to minors.<sup>1-3</sup> Steep rises in excise taxes increased real cigarette prices by 115% between 1993 and 2003.<sup>4</sup>

Following a peak in the early 1990s, tobacco consumption in South Africa declined,<sup>2</sup> with the reduction in tobacco use attributed to the government's tobacco control initiatives. Smoking rates dropped markedly from 32% and 34% (adults  $\geq 18$  years) in 1992 and 1995, respectively,<sup>2</sup> to 25% (adults  $\geq 15$  years) in the first South African Demographic and Health Survey (SADHS) of 1998. The SADHS, a comprehensive survey covering maternal and child health, as well as adult health that included tobacco use, was conducted in 1998 and 2003. We compared the prevalence and patterns of tobacco use in the second SADHS with those of the first SADHS.

Medical Research Council, Cape Town  
Nasheeta Peer, MB ChB, MBA, MPH  
Debbie Bradshaw, DPhil  
Ria Laubscher, BComm

Medical Research Council and Department of Medicine, University of Cape Town  
Krisela Steyn, MSc, MD, NED

Corresponding author: N Peer (nasheeta.peer@mrc.ac.za)

## Methodology

### Sample design and study population

The second SADHS was conducted similarly to the first.<sup>2</sup> This national household survey provided cross-sectional data on a representative sample of the total non-institutionalised population of South Africa. The 2001 census was used as a sample-frame for the two-stage sample. Census enumeration areas (EAs) were selected using the probability proportional to size technique, and stratified into urban formal, urban informal, rural formal, and tribal areas of the 9 provinces.

The second stage systematically sampled households within the selected EAs. Of the 10 214 households selected, 7 756 were interviewed, with a response rate of 85%. All usual residents  $\geq 15$  years of every second household were selected for inclusion.

The previously defined official South African population groups classified participants. In 2003, the South African population was 52% female and comprised 79.5% black, 9.1% white, 8.9% coloured and 2.5% Indian/Asian by population group.<sup>5</sup>

### Data collection

Questionnaires were translated into the 11 official South African languages, following pre-testing in 2 languages. The second survey was conducted between October 2003 and August 2004. Questions on tobacco use from the World Health Organization (WHO) STEP-wise surveillance programme questionnaire were included in the 2003 SADHS.<sup>6</sup> This was



similar to the WHO questionnaire used in 1998, though with greater emphasis on current and daily smoking habits.

### Classification and statistical analyses of data

Descriptive statistics were calculated using the weights based on the sample design and the response rate. Variance estimates were calculated using the Taylor series method. The Surveyset option of Stata 9.2 (StataCorp, College Station, Texas, USA) was used for the logistic regression, applying the Taylor series method for the estimation of the variance. Age-standardised prevalence was calculated using the WHO World Population as the standard.<sup>7</sup>

Assets that defined wealth included ownership of consumer items (durable goods), dwelling characteristics, and source of drinking water and toilet facilities. A principal component analysis of the pooled data was used to develop an asset index and wealth quintiles.<sup>8</sup>

Those who smoked tobacco products, irrespective of the quantity, were classified as 'smoke daily or occasionally'. 'Users of smokeless tobacco or snuffers' described adults who used snuff or chewed tobacco, irrespective of whether they smoked tobacco products.

Logistic regressions investigated the factors associated with smoking. Relative risk ratios and 95% confidence intervals were calculated for men, women, age categories, place of residence, wealth using the asset index, level of education and population group.

The Ethical Committee of the South African Medical Research Council approved the study protocol. Informed consent was obtained from participants.

### Results

The adult survey was administered to 13 826 and 8 115 participants in the first and second SADHS, respectively. Men comprised 41 - 42%; response rates were 93% in 1998 and 71% in 2003, with higher rates for women. Data are presented by gender and categorised by sociodemographic characteristics of age, population group, residence, education levels and wealth quintiles.

Smoking prevalence among men who smoked daily or occasionally dropped significantly from 42% in 1998 to 35% in 2003 ( $p < 0.0001$ ) (Table I), with age-standardised rates decreasing from 44% to 35%. Little difference was seen between the rates of those who smoked daily and those who smoked daily or occasionally.

The most significant decline in smoking rates from 1998 to 2003 occurred among men aged 25 - 34 ( $p = 0.0005$ ) and 35 - 44 years old ( $p < 0.0001$ ), blacks ( $p < 0.0001$ ), non-urban ( $p < 0.0001$ ), and the poorest ( $p = 0.0007$ ) and poor ( $p < 0.0001$ ). Smoking rates for men aged 15 - 24 years did not drop. Men who smoked the most in 2003 were 25 - 54 years old (>40%), Indian (56%)

or coloured (52%), urban (39%), and those with no education (42%) or grades 1 - 7 (41%).

The prevalence of men who had ever used smokeless tobacco increased from <1% (1998) to 3% (2003) and was highest among men >65 years old, black or white, rural, the poorest and those with no education.

Women smoked markedly less than men, with rates of 10 - 11% among those who smoked daily or occasionally (age-standardised rates were similar). However, there was no significant reduction in their smoking rates from 1998 to 2003. Women who smoked the most in 2003 were 35 - 64 years old ( $\geq 14\%$ ), coloured (42%), urban (13%) and wealthier (rich: 12%, richest: 15%).

Rates of women who had ever used smokeless tobacco increased from 10% in 1998 to 12% in 2003. Use of smokeless tobacco was highest among women who were older, black, rural, less educated and poorer.

Among those who currently smoked daily, the mean daily cigarette consumption decreased from 8.1 (standard error (SE) 0.2) to 6.7 (SE 0.3) in men, and from 8.1 (SE 0.5) to 5.8 (SE 0.4) in women between 1998 and 2003 (data not shown). However, Fig. 1 shows little difference from 1998 to 2003 in the distribution of the log of the cigarette numbers smoked daily. Those who smoked most cigarettes in 2003 were white, urban, better educated and wealthier. Men who were <55 years old, women aged 25 - 44 years and Indian men also had a high cigarette consumption.

The consumption of manufactured cigarettes among men and women who currently smoked daily increased from 77% and 81% in 1998, respectively to 84% in 2003 (data not shown). Younger, wealthier and better educated men and women smoked more manufactured cigarettes. Other tobacco products smoked in 2003 included hand-rolled cigarettes (men: 22%, women: 14%), pipes (3%) and cigars/cigarillos (men: 1%, women: 4%) (data not shown).

Table II shows the logistic regression models for the relationship of smoking in men and women with the socio-demographic variables for the pooled data of the two surveys. Interaction terms were included in the model for men because the change between 1998 and 2003 differed across age groups and wealth quintiles. Once adjustments were made for socio-demographic factors, the odds for smoking by year differed from the univariate analysis. In men, with the exception of the 15 - 24 and 35 - 44 years age groups, smoking prevalence dropped significantly. In women, the odds for smoking by year were slightly higher in 2003 compared with 1998.

Among men and women, the odds for smoking were significantly lower for non-urban residents and decreased with increasing education levels. In women, the trend for the decreased odds of smoking with increasing education level illustrated in the logistic regression was masked in the



**Table I. Prevalence and pattern of tobacco use among men and women by socio-demographic characteristics in 1998 and 2003**

Socio-demographic characteristic	Among all men,* percentage who:						Among all women,† percentage who:					
	Smoked daily or occasionally		Smoked daily		Ever used smokeless tobacco		Smoked daily or occasionally		Smoked daily		Ever used smokeless tobacco	
	1998	2003	1998	2003	1998	2003	1998	2003	1998	2003	1998	2003
<b>Age (yrs)</b>												
15 - 24	24.4	22.9	20	20.5	0.4	2.3	5.6	6.9	4.7	6.7	2.8	3.1
25 - 34	53.1	41.9	45.1	37.7	0.1	1.3	9.7	7.6	8.5	5.8	7	8
35 - 44	58.7	44.2	51.1	41.3	0.4	3.5	16.1	14.2	14.6	12.5	9.8	13.6
45 - 54	47.4	46	44.3	41.3	2.1	3.2	17.2	14	15.3	12.2	13.5	18.1
55 - 64	46.9	35.2	39.9	31.1	1.6	2	10.7	14	9.3	12.6	16.3	21.9
65+	38.5	28.4	35.4	25.3	3.2	9.5	7.6	6.5	6.6	6.1	22.9	26
<b>Population group</b>												
Black	40	32.8	33.9	29.3	1	2.9	5	5.2	4.2	4.1	12.6	14.3
Black urban	42.4	36.5	35.3	33.2	0.6	2.5	6.2	6.3	5	5.1	12.4	13.3
Black non-urban	37.1	26.7	32.2	23	1.4	3.7	3.7	3.6	3.3	2.7	12.9	15.7
Coloured	57	52.1	54.9	48.9	0.4	1.9	40	41.8	37.3	39	2.9	4.1
White	39	35.7	33.4	34.7	1.2	3.6	26.6	27.3	23.2	26.7	0.4	0.1
Indian	54.2	55.5	47.7	50.4	0.5	1.4	9	13.1	7.6	13	0	1.4
<b>Residence</b>												
Urban	44.1	38.7	38	35.5	0.7	2.5	13.3	12.7	11.6	11.3	8.7	10.6
Rural	39.3	27.9	34.4	24.2	1.3	3.6	6.6	5.8	6.1	4.9	12.1	15.1
<b>Education</b>												
None	50.6	41.6	44.9	37.3	2.7	6.8	11.5	12.1	10.3	10.7	22.5	27.1
Grades 1 - 7	46.9	41.3	41.9	37.1	1.3	3.6	12.2	11.6	11.1	9.4	13.3	20.3
Grades 8 - 12	40	33.4	34.1	30.2	0.5	2.2	9.6	9.3	8.4	8.4	5.8	7.1
Higher	32	24.3	25.4	22.3	0	2.4	9.9	10.7	7.6	9.7	1.5	5.3
<b>Asset index (quintiles)</b>												
Poorest	46.5	34.4	40.1	30.3	1.8	4	6.2	8.2	5.4	6.3	12.6	14.9
Poor	41	31.8	35.7	28.3	0.9	2.7	7.6	6.5	6.8	5.4	13.5	15.8
Average	40.3	37.8	33.8	33.7	0.6	3.4	9.6	8	8.3	7	13.4	14.9
Rich	45.4	34.3	40.4	31.1	0.4	2	13.5	12.5	12.2	11.4	8	9.9
Richest	38.1	35.9	33	33.9	0.9	2.7	17.2	15.3	14.9	13.9	2.6	6.1
<b>Total</b>	<b>42.3</b>	<b>35.1</b>	<b>36.7</b>	<b>31.7</b>	<b>0.9</b>	<b>2.9</b>	<b>10.7</b>	<b>10.2</b>	<b>9.4</b>	<b>9</b>	<b>10</b>	<b>12.2</b>

\* All men 1998: N=5 753; 2003: N=3 328.

† All women 1998: N=8 073; 2003: N=4 787.

univariate analysis; this was attributed to the confounding influence of other variables – in particular, population group and residence. Also influenced by these confounding factors was the trend by asset index for women; it was the inverse of that demonstrated in the univariate analysis.

There were significantly higher odds for smoking in coloured, white and Indian, compared with black men and women. The odds for smoking were 16 - 17 times higher for coloured and white women compared with black women, and markedly higher than the twofold increase in the odds for smoking in their male counterparts compared with black men.

## Discussion

The SADHS added valuable information on the pattern of tobacco use in South Africa. It was ideally suited for assessing the effectiveness of the government's tobacco control policies, and it highlighted subgroups that required further attention.

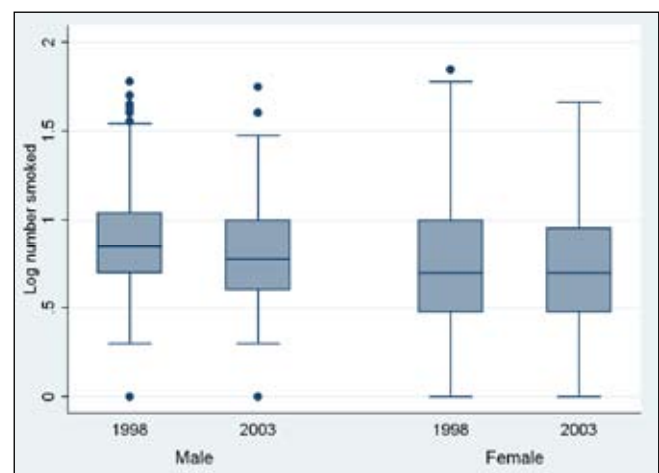


Fig. 1. Distribution of the number of cigarettes smoked by current daily smokers among men and women for 1998 and 2003 (log scale).



**Table II. Logistic regression of the prevalence of current daily and occasional smoking in men and women by socio-demographic characteristics and year**

Characteristic	Men			Women				
	Odds ratio	95% confidence interval		<i>p</i> -value	Odds ratio	95% confidence interval		<i>p</i> -value
Age (yrs)								
15 - 24	1				1			
25 - 34	3.59	2.94	4.37	<0.001	1.29	0.97	1.71	0.08
35 - 44	4.31	3.5	5.3	<0.001	2.29	1.74	3	<0.001
45 - 54	2.53	2	3.21	<0.001	2.06	1.53	2.76	<0.001
55 - 64	2.38	1.85	3.07	<0.001	1.25	0.89	1.75	0.191
65+	1.62	1.22	2.16	0.001	0.71	0.48	1.06	0.093
2003*age interaction								
15 - 24	1							
25 - 34	0.68	0.49	0.95	0.024				
35 - 44	0.58	0.4	0.82	0.002				
45 - 54	0.98	0.66	1.46	0.91				
55 - 64	0.64	0.41	1	0.052				
65+	0.66	0.42	1.03	0.069				
Population group								
Black	1				1			
Coloured	2.3	1.88	2.8	<0.001	15.94	12.87	19.74	<0.001
White	1.73	1.3	2.32	<0.001	16.68	11.31	24.59	<0.001
Indian	2.78	2.03	3.79	<0.001	3.22	2.05	5.04	<0.001
Residence								
Urban	1				1			
Non-urban	0.63	0.54	0.73	<0.001	0.55	0.42	0.73	<0.001
Education								
None	1				1			
Grades 1 - 7	0.83	0.68	1.01	0.06	0.71	0.55	0.91	0.008
Grades 8 - 12	0.66	0.54	0.82	<0.001	0.39	0.29	0.51	<0.001
Higher	0.35	0.25	0.48	<0.001	0.25	0.16	0.38	<0.001
Asset index								
Poorest	1				1			
Poor	0.74	0.6	0.92	0.007	0.92	0.68	1.25	0.612
Average	0.61	0.49	0.77	<0.001	0.82	0.58	1.15	0.242
Rich	0.57	0.44	0.73	<0.001	0.64	0.44	0.94	0.023
Richest	0.38	0.28	0.52	<0.001	0.43	0.27	0.69	<0.001
2003* asset interaction								
Poorest	1							
Poor	1.16	0.77	1.73	0.481				
Average	1.63	1.12	2.39	0.012				
Rich	1.26	0.83	1.9	0.28				
Richest	1.75	1.14	2.68	0.011				
Year								
1998	1				1			
2003	0.75	0.52	1.08	0.12	1.14	0.95	1.38	0.169

Smoking rates decreased rapidly between 1992 and 1998, dropping from 52%<sup>9</sup> to 42% in men, and continued declining from 1998 to 2003. These significant reductions may be attributed predominantly to the South African government's anti-smoking initiatives.<sup>3</sup> Smoking rates decreased most markedly among men in the lowest two wealth quintiles and among black men. Steep increases in cigarette prices rendered them unaffordable for the poor (the majority of whom are black), probably because they are more affected by price increases than wealthier individuals.<sup>10</sup> A 10% increase in the real price of cigarettes in South Africa caused a decrease in consumption of 6 - 8%.<sup>4</sup>

Men with  $\leq$  grade 12 education showed greater declines in their smoking rates from 1998 to 2003 but a higher smoking prevalence compared with men with higher education – similar to findings in the USA.<sup>10</sup> Higher smoking rates in less educated men accord with 74 studies from high-, medium- and low-income economies which showed that poorer men (according to income, education or profession) were more likely to smoke, regardless of each economy's level of development.<sup>11</sup>

Compared with wealthier or better-educated adults, poorer or less-educated adults showed lower cigarette consumption but higher smoking rates in this study, which was similar to



smoking trends by education level in the USA.<sup>10</sup> Therefore, increases in cigarette prices cause some poor adults to decrease consumption rather than quit smoking.<sup>4</sup>

The smoking prevalence in women levelled between 1998 and 2003, after decreasing from 17% in 1992 to 11% in 1998.<sup>9</sup> The most marked decrease was among coloured women, from 59%<sup>9</sup> to 40%. However, from 1998 to 2003, their rates increased from 40% to 42%. These excessive rates are higher than among women in developed (22%) or other developing (9%) countries.<sup>12</sup> Coloured women who smoked were among the poorest, with mainly grade 8 - 12 education. While the reasons for such high smoking rates are unclear, studies from developed countries report that tobacco use and the inability to quit smoking are associated with low socio-economic status and poor psychological health.<sup>12</sup> Smoking is related to poverty and social distress and has cultural and social standing, making it more difficult not to start smoking or to stop smoking.<sup>13</sup> Further initiatives are required to overcome the plateau in the smoking rate of coloured women.

Smoking is a complex behaviour with multi-factorial influences including knowledge, perceptions and socio-cultural norms.<sup>13</sup> Low smoking rates (5%) in black women bear testament to the influence of gender norms and social disapproval.<sup>14</sup> However, social and cultural constraints that previously prevented black women from smoking are weakening.<sup>12</sup> Greater female autonomy and resources may encourage women to smoke, while increases in spending power make cigarettes more affordable.<sup>12</sup> Relying on traditional constraints to maintain low smoking rates among black women would be imprudent.<sup>14</sup>

Social change and strong marketing initiatives can overshadow cultural prohibitions against women's use of tobacco.<sup>15</sup> Owing to stringent tobacco control legislation, the absence of marketing influences on South African women might have offered significant protection against smoking. Van Walbeek emphasised the inability to increase sales among blacks, despite new marketing opportunities that arose following political transformation and rapid urbanisation,<sup>4</sup> when smoking prevalence in black women dropped from 10% in 1992<sup>9</sup> to 5% in 1998.

The differential effects of tobacco control policies were also evident in the less pronounced response of those aged 15 - 24 years, whose smoking rates did not change significantly between 1998 and 2003. Nevertheless, these rates were lower than those of most other age cohorts in the study: 23% and 7% of young men and women, respectively, smoked in 2003, compared with 28 - 46% of men and 7 - 14% of women,  $\geq 25$  years, who did. Therefore, smoking is losing its appeal in South Africa, as higher-than-average smoking rates among young people would tend to be associated with positive social status.<sup>14</sup>

It is imperative to deter uptake and induce cessation among the youth, as most adult smokers start smoking before 18 years of age.<sup>16</sup> Tobacco control policies limit access by youths to

cigarettes in South Africa and also influence initiation rates of adolescent smoking.<sup>16</sup> The mean age of smoking initiation in 15 - 24-year-olds was 16 years, which is the current minimum age for buying cigarettes. The forthcoming increase in the minimum age to 18 years may further assist to delay cigarette uptake.

The most frequent users of smokeless tobacco were women, rural residents, the most elderly, the poor and less educated, and black. These vulnerable groups must be actively discouraged from continuing or initiating this habit, particularly as many are unaware of the health hazards of smokeless tobacco use.<sup>17</sup>

Despite the achievements of the preceding 5 years, smoking rates in South Africa are higher than those of most other African countries.<sup>18</sup> Compared with African countries that also implemented the STEP-wise tobacco programme in 2003, South Africa had the second-highest smoking prevalence among men, after Mauritius (43%) (Fig. 2). Although South African women smoked much less than men, their rate was  $>10\%$ , along with those in 3 other African countries: Comoros (17%), Namibia (12%) and Burkina Faso (11%).<sup>18</sup>

While economic development probably accounts for the high smoking prevalence among men in Mauritius and South Africa,<sup>19</sup> there are no clear socio-economic or demographic patterns to describe the prevalence of tobacco smoking in Africa.<sup>20</sup> This may reflect the lack of detailed research on these topics.<sup>20</sup>

Caution is necessary when interpreting trends suggested by the current data as these might have been influenced by a

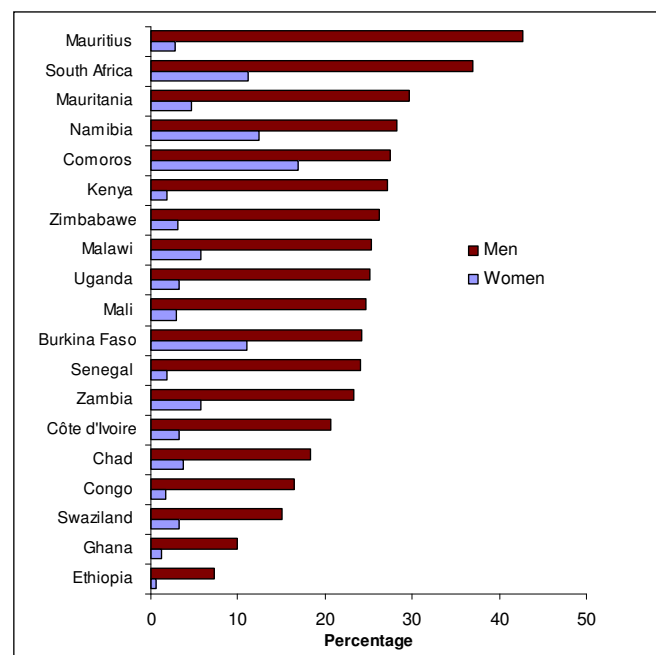


Fig. 2. Prevalence of current daily and occasional tobacco smoking (including cigarettes, cigars, pipes and any other smoked tobacco products) among adults ( $\geq 15$  years) in selected African countries in 2003.<sup>18</sup>





change in the questionnaire format. Further limitations include possible data quality concerns. Difficulties in conducting the fieldwork are reflected in the lower response rate in 2003 compared with 1998.

## Conclusion

South Africa has the highest smoking rate in Africa. While the significant decline among selected subsets of men is promising, over a third of the male population still smoke, with higher rates among the poorer and less educated. The next SADHS should cast light on whether smoking rates in these groups are still declining, which may be indicative of the continuing success of current tobacco control policies, or whether further initiatives are required.

Also highlighted were the constant smoking prevalence among women, adolescents and young adults, and the unacceptably high rates for coloured women. Understanding the factors associated with tobacco use among specific subgroups will enable the development of culturally relevant, gender-specific and youth-orientated smoking prevention and cessation programmes.<sup>21</sup>

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