

Prevalence of tobacco use among adults in South Africa: Results from the first South African National Health and Nutrition Examination Survey

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Background. Data on tobacco use have informed the effectiveness of South Africa (SA)'s tobacco control strategies over the past 20 years. **Objective.** To estimate the prevalence of tobacco use in the adult SA population according to certain demographic variables, and identify the factors influencing cessation attempts among current smokers. **Methods.** A multistage disproportionate nationally representative stratified cluster sample of households was selected for the South African National Health and Nutrition Examination Survey, conducted in 2012. A sample of 10 000 households from 500 census enumerator areas was visited. A detailed questionnaire was administered to all consenting adults in each consenting household. **Results.** Of adult South Africans, 17.6% (95% confidence interval (CI) 6.3 - 18.9) currently smoke tobacco. Males (29.2%) had a prevalence four times that for females (7.3%) (odds ratio 5.20, 95% CI 4.39 - 6.16; $p < 0.001$). The provinces with the highest current tobacco smoking prevalence were the Western Cape (32.9%), Northern Cape (31.2%) and Free State (27.4%). Among current tobacco smokers, 29.3% had been advised to quit smoking by a healthcare provider during the preceding year, 81.4% had noticed health warnings on tobacco packages, and 49.9% reported that the warning labels had led them to consider quitting. **Conclusion.** A large proportion of adult South Africans continue to use tobacco. While considerable gains have been made in reducing tobacco use over the past 20 years, tobacco use and its determinants need to be monitored to ensure that tobacco control strategies remain effective.

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Smoking is one of the major preventable causes of disease and premature death globally.^[1] Tobacco is the second leading risk factor for the global burden of disease, accounting for 6.3% of disability-adjusted life-years lost^[2] and causing six million deaths annually.^[1] Since 1995 there has been a modest increase in tobacco consumption in low- and middle-income countries (LMICs), but a consistent decline in high-income countries (HICs).^[3] By 2030 it is estimated that tobacco will kill more than eight million people annually, with 80% of these deaths occurring in LMICs.^[3] Consumers in LMICs such as South Africa (SA) are likely to be less informed about the adverse health consequences of tobacco use than those in HICs, and are therefore likely to bear the major health impact of tobacco unless an aggressive educational programme is mounted.^[3,4]

SA epidemiological and economic data on tobacco use have informed tobacco control efforts since the 1980s, resulting in a halving of the prevalence of smoking in adults over the past 20 years.^[4] Tobacco interventions used have included legislation such as the Tobacco Products Control Amendment Act No. 12 of 1999, hikes in excise duty on cigarettes, and health promotion interventions to educate and improve individuals' health knowledge.^[4,5] Despite initial successes, there have been recent increases in tobacco use between 2008 and 2011 among SA youth, particularly girls.^[4]

This study provides data on tobacco use among SA adults, and the factors influencing quitting among current smokers. The insights it

provides into tobacco-related behaviours can be used to strengthen measures and health policies for tobacco control.

Methods

The first South African National Health and Nutrition Examination Survey (SANHANES-1)^[6] investigated the smoking status of South Africans aged ≥ 15 years through an interviewer-administered questionnaire survey and the collection of blood samples to measure serum cotinine levels. SANHANES-1 was a cross-sectional, biobehavioural survey providing baseline data as a foundation for future longitudinal studies. This article focuses on the self-reported tobacco-using behaviour of adults aged ≥ 18 years. The survey instrument included questions on the respondents' history of smoking tobacco, current use of other tobacco products, frequency and duration of use, and attempts to stop smoking tobacco or using other tobacco products. SANHANES-1 was conducted by the Human Sciences Research Council (HSRC) in 2012 and received approval from the Research Ethics Committee (REC) of the HSRC (REC 6/16/11/11).

Sampling

The detailed sampling method is described in the main report.^[6] Persons in all nine provinces aged ≥ 18 years were sampled, using a multistage disproportionate, stratified cluster sampling approach to select 10 000 households from a random sample of 500 census enumerator areas. All such adults in the household were interviewed

in their homes, usually after hours, in a standardised manner by trained interviewers in the preferred language of the respondents. The reliability of the interviewers' survey techniques was ensured by reinterviewing 10% of the sample.

Respondents were considered to be current tobacco smokers if they reported that they currently smoked tobacco daily or less than daily. Similarly, current users of other tobacco products were defined as those who reported use of other tobacco products on a daily or less than daily basis. Other tobacco products were defined as hand-rolled cigarettes, pipes, cigars, cheroots and cigarillos, hookah, hubbly bubbly or water-pipe sessions, electronic cigarettes, snuff, chewing tobacco and smokeless tobacco. Reference to non-smokers in the text includes ex-smokers.

Data management and statistical analysis

Data were double-entered and verified using Census Survey Processing (CS Pro) software version 5.0 (US Census Bureau) and converted to the Statistical Package for the Social Sciences (SPSS) for further exploration. Sampling weights were computed to account for unequal sampling probabilities and benchmarking to 2012 mid-year population estimates. Data on tobacco use were analysed for adults aged ≥18 years. Weighted data were analysed using STATA version 12 (Stata Corporation, USA). Estimates and 95% confidence intervals (CIs) were reported with odds ratios (ORs) as measures and direction of association. Chi-square and *t*-tests were used for categorical and continuous random variables, respectively. A *p*-value of <0.05 indicated statistical significance. Logistic regression analyses were conducted on the subsample of current tobacco smokers to determine the factors associated with having tried to stop smoking in the preceding 12 months in this group. The variables found to be significant in the univariate models were used in the multivariate model.

Results

Demographic profile of the sample

Of the adult sample of 15 401, 52.2% were females (Table 1), 77.2% classified themselves as black Africans, 10.7% as white, 9.3% as coloured and 2.8% as of Indian descent, and 82.8% were aged 18 - 54 years.

Current tobacco smoking

The tobacco smoking status of the respondents is shown in Table 2. Of the 15 401 interviewed, 13 897 (90.2%) indicated their tobacco smoking status. The national prevalence of current tobacco smoking among adults was 17.6% (95% CI 16.3 - 18.9), with 15.9% (95% CI 14.7 - 17.2) being daily smokers and 1.7% (95% CI 1.4 - 2.0) less than daily smokers.

The prevalence of current tobacco smoking among males (29.2%) was four times that among females (7.3%) (OR 5.20, 95% CI 4.39 - 6.16; *p*<0.001).

The provinces with the highest current tobacco smoking rates were the Western Cape (32.9%), Northern Cape (31.2%) and Free State (27.4%); North West and Limpopo had the lowest rates (12.7% and 12.8%, respectively). Coloured adults had a significantly higher current smoking prevalence (40.1%) than Indians (22.1%) (*p*<0.001), whites (15.3%) (*p*<0.001) and black Africans (15.1%) (*p*<0.001).

Adults aged 18 - 24 (13.6%), and ≥65 years (10.8%) had significantly lower current tobacco smoking prevalences than those aged 25 - 34 (18.5%), 35 - 44 (19.7%), 45 - 54 (21.2%) and 55 - 64 years (19.5%) (*p*<0.001 for all).

Use of other tobacco products

Nationally, 5.2% of adults reported current use of other tobacco products, with 4.2% being daily users and 1.0% less than daily users

Table 1. Demographic profile of adults aged ≥18 years, SANHANES 2012

	%	95% CI	<i>n</i>
National	100.0		15 401
Gender			
Males	47.8	46.8 - 48.9	6 366
Females	52.2	51.1 - 53.2	9 021
Age (years)			
18 - 24	21.0	19.9 - 22.2	3 253
25 - 34	26.7	25.3 - 28.1	3 381
35 - 44	20.8	19.8 - 22.0	2 750
45 - 54	14.3	13.3 - 15.4	2 539
55 - 64	9.3	8.4 - 10.4	1 918
≥65	7.8	7.0 - 8.7	1 560
Province			
Western Cape	11.1	9.6 - 12.7	2 229
Eastern Cape	11.1	9.2 - 13.3	1 675
Northern Cape	1.7	1.4 - 2.2	973
Free State	5.2	4.0 - 6.7	868
KwaZulu-Natal	15.9	13.2 - 19.0	2 666
North West	8.7	7.4 - 10.1	1 849
Gauteng	32.4	27.3 - 38.0	2 626
Mpumalanga	5.3	4.2 - 6.6	1 331
Limpopo	8.7	7.3 - 10.3	1 184
Race			
Black African	77.2	73.1 - 80.8	9 961
White	10.7	7.9 - 14.2	727
Coloured	9.3	7.9 - 11.0	3 122
Indian	2.8	1.8 - 4.5	1 414

(Table 3). Significantly (*p*<0.001) more males (6.8%) than females (3.7%) reported current use of other tobacco products (OR 1.90, 95% CI 1.52 - 2.36).

Among males, there was no significant variation in current use of other tobacco products by age group, whereas among females this increased with age. Females aged 18 - 24 (1.8%) and 25 - 34 years (2.1%) had a significantly lower prevalence of current use of other tobacco products than those aged 35 - 44 (4.6%), 45 - 54 (4.9%), 55 - 64 (6.1%) and ≥65 years (6.2%). The Free State had the highest provincial prevalence of current use of other tobacco products (18.3%), and North West (2.1%) the lowest.

Significantly more coloured adults (7.7%) than Indian (3.0%) (*p*=0.009) and white (2.2%) (*p*<0.001) adults reported current use of other tobacco products. Furthermore, significantly more black African adults (5.4%) than white adults (2.2%) reported current use of other tobacco products (*p*<0.001).

Current use of any tobacco product

Nationally, 20.1% (95% CI 18.7 - 21.5) of adults reported current use of any tobacco product (either smoking or use of other tobacco products). Males had a significantly higher prevalence of current tobacco use (31.0%) than females (10.3%) (OR 3.90, 95% CI 3.37 - 4.52; *p*<0.001).

Significantly fewer adults aged 18 - 24 (14.8%) and ≥65 years (15.9%) than those aged 25 - 34 (20.2%), 35 - 44 (22.5%), 45 - 54

Table 2. Prevalence of current tobacco smoking by gender according to age, province and race among adults aged ≥18 years, SA 2012

	Males						Females						Total									
	Current tobacco smoking		Current daily smoking		Current less than daily smoking		Current tobacco smoking		Current daily smoking		Current less than daily smoking		Current tobacco smoking		Current daily smoking		Current less than daily smoking					
	%	95% CI	%	95% CI	%	n	%	95% CI	%	95% CI	%	n	%	95% CI	%	95% CI	%	n				
National	29.2	26.9 - 31.6	26.6	24.3 - 28.9	2.6	2.1 - 3.3	5 619	7.3	6.4 - 8.4	6.5	5.6 - 7.5	0.8	0.6 - 1.1	8 275	17.6	16.3 - 18.9	15.9	14.7 - 17.2	1.7	1.4 - 2.0	13 897	
Age (years)																						
18 - 24	22.4	19.5 - 25.5	19.3	16.8 - 22.2	3.0	2.0 - 4.5	1 315	4.9	3.7 - 6.3	4.4	3.3 - 5.8	0.5	0.2 - 1.4	1 640	13.6	11.9 - 15.4	11.8	10.3 - 13.4	1.8	1.2 - 2.6	2 955	
25 - 34	30.8	26.7 - 35.2	28.4	24.4 - 32.7	2.4	1.6 - 3.7	1 255	6.9	5.6 - 8.4	5.4	4.2 - 6.8	1.5	0.9 - 2.6	1 754	18.5	16.3 - 20.9	16.5	14.4 - 18.9	2.0	1.4 - 2.7	3 009	
35 - 44	33.2	28.8 - 37.9	30.5	26.2 - 35.2	2.7	1.7 - 4.3	963	7.5	5.9 - 9.5	7.1	5.5 - 9.1	0.4	0.2 - 1.1	1 540	19.7	17.4 - 22.2	18.2	15.9 - 20.7	1.5	1.0 - 2.3	2 503	
45 - 54	35.8	30.8 - 41.1	32.5	27.7 - 37.8	3.3	2.1 - 4.9	903	8.5	6.8 - 10.6	7.7	6.1 - 9.8	0.8	0.4 - 1.6	1 383	21.2	18.5 - 24.1	19.2	16.7 - 22.1	1.9	1.4 - 2.8	2 288	
55 - 64	29.4	24.4 - 35.1	27.6	22.7 - 33.0	1.9	0.9 - 3.8	711	11.3	8.9 - 14.2	10.1	7.8 - 13.0	1.2	0.6 - 2.5	1 021	19.5	16.8 - 22.5	18.0	15.4 - 20.9	1.5	0.9 - 2.5	1 733	
≥65	16.9	12.7 - 22.1	15.7	11.7 - 20.8	1.2	0.5 - 2.8	472	7.5	4.3 - 12.7	7.2	4.1 - 12.5	0.3	0.1 - 0.7	937	10.8	8.1 - 14.4	10.2	7.5 - 13.8	0.6	0.3 - 1.2	1 409	
Province																						
Western Cape	39.6	34.1 - 45.5	38.0	32.5 - 43.7	1.6	0.9 - 2.9	803	26.8	21.6 - 32.8	25.6	20.6 - 31.4	1.3	0.7 - 2.2	1 138	32.9	28.3 - 37.8	31.4	27.0 - 36.2	1.4	1.0 - 2.1	1 941	
Eastern Cape	31.4	26.1 - 37.2	27.1	21.4 - 33.8	4.3	2.7 - 6.7	610	6.7	4.4 - 9.9	5.6	3.7 - 8.6	1.0	0.6 - 1.8	864	18.4	15.5 - 21.9	15.9	12.8 - 19.5	2.6	1.7 - 3.8	1 475	
Northern Cape	38.3	28.2 - 49.4	34.7	25.2 - 45.5	3.6	1.9 - 6.5	364	24.5	18.3 - 32.0	23.1	17.0 - 30.6	1.4	0.7 - 3.0	533	31.2	24.1 - 39.4	28.8	21.9 - 36.8	2.5	1.4 - 4.2	897	
Free State	46.9	41.7 - 52.2	39.3	34.7 - 44.1	7.6	4.4 - 13.0	306	8.5	5.4 - 13.1	8.4	5.4 - 12.9	0.1	0.0 - 0.9	441	27.4	23.7 - 31.4	23.6	20.6 - 26.9	3.8	2.2 - 6.5	747	
KwaZulu-Natal	35.7	31.1 - 40.6	31.5	26.7 - 36.7	4.2	2.7 - 6.6	946	4.1	2.3 - 7.4	3.6	1.8 - 6.9	0.6	0.3 - 1.3	1 371	17.8	15.5 - 20.3	15.6	13.3 - 18.2	2.2	1.4 - 3.2	2 317	
North West	22.3	17.8 - 27.6	21.2	16.7 - 26.7	1.1	0.4 - 2.5	656	5.2	3.6 - 7.4	4.9	3.4 - 7.0	0.3	0.1 - 0.8	1 094	12.7	10.5 - 15.4	12.1	9.8 - 14.8	0.7	0.3 - 1.2	1 750	
Gauteng	21.8	17.3 - 27.1	20.6	16.2 - 25.8	1.2	0.5 - 2.6	1 028	4.4	3.2 - 6.0	3.0	2.0 - 4.6	1.4	0.8 - 2.3	1 419	13.0	10.7 - 15.8	11.8	9.6 - 14.4	1.3	0.8 - 2.1	2 448	
Mpumalanga	28.7	22.9 - 35.3	27.3	21.6 - 33.8	1.4	0.6 - 3.2	478	3.6	2.2 - 5.8	3.4	2.0 - 5.7	0.2	0.0 - 1.4	722	15.3	12.0 - 19.4	14.6	11.3 - 18.6	0.8	0.4 - 1.6	1 201	
Limpopo	26.9	20.8 - 34.2	23.0	17.5 - 29.7	3.9	2.0 - 7.5	428	2.1	1.1 - 3.8	2.0	1.1 - 3.7	0.1	0.0 - 0.4	693	12.8	9.7 - 16.6	11.0	8.3 - 14.6	1.7	0.9 - 3.3	1 121	
Race																						
Black African	28.5	25.9 - 31.3	25.5	23.0 - 28.2	3.0	2.3 - 3.9	3 615	3.3	2.8 - 4.0	2.6	2.1 - 3.2	0.7	0.5 - 1.1	5 537	15.1	13.9 - 16.5	13.3	12.2 - 14.6	1.8	1.4 - 2.2	9 152	
White	18.0	12.1 - 25.9	17.3	11.4 - 25.2	0.8	0.3 - 2.2	308	12.9	8.4 - 19.2	12.8	8.3 - 19.1	0.1	0.0 - 0.5	370	15.3	11.7 - 19.9	14.9	11.3 - 19.5	0.4	0.2 - 1.1	678	
Coloured	47.0	42.0 - 51.9	45.1	40.3 - 50.0	1.8	1.1 - 3.0	1 114	34.4	30.3 - 38.7	32.1	28.3 - 36.0	2.3	1.4 - 3.7	1 661	40.1	36.5 - 43.8	38.0	34.6 - 41.6	2.1	1.5 - 2.9	2 776	
Indian	36.8	27.7 - 46.9	35.6	26.4 - 46.0	1.2	0.6 - 2.5	553	7.5	5.0 - 11.1	4.8	3.0 - 7.5	2.7	1.2 - 6.1	687	22.1	16.9 - 28.2	20.1	15.2 - 26.1	2.0	1.1 - 3.5	1 240	

Table 3. Prevalence of current use of other tobacco products* by gender according to age, province and race among adults aged ≥18 years, SA 2012

	Males												Females												Total																																																																																																																																																																				
	Current use of other tobacco products				Current use of other tobacco products				Current use of other tobacco products				Current use of other tobacco products				Current use of other tobacco products				Current use of other tobacco products																																																																																																																																																																								
	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n																																																																																																																																																																		
Age (years)	6.8	5.9 - 7.9	5.5	4.7 - 6.4	1.4	1.0 - 1.8	5 502	3.7	3.1 - 4.5	3.1	2.6 - 3.8	0.6	0.4 - 0.9	8 051	5.2	4.6 - 5.9	4.2	3.7 - 4.8	1.0	0.8 - 1.2	13 556	6.1	4.4 - 8.3	4.1	2.7 - 6.2	2.0	1.2 - 3.2	1 300	1.8	0.8 - 3.9	1.2	0.4 - 3.7	0.5	0.3 - 1.2	1 599	3.9	2.9 - 5.3	2.6	1.7 - 4.0	1.3	0.8 - 2.0	2 899	7.5	5.7 - 9.9	6.1	4.3 - 8.5	1.5	0.9 - 2.5	1 233	2.1	1.4 - 3.2	1.9	1.2 - 2.9	0.2	0.1 - 0.6	1 710	4.7	3.7 - 6.0	3.9	2.9 - 5.2	0.8	0.5 - 1.3	2 943	5.7	4.1 - 7.9	4.5	3.1 - 6.5	1.2	0.5 - 2.8	939	4.6	3.3 - 6.5	4.0	2.7 - 5.8	0.6	0.3 - 1.4	1 507	5.1	4.0 - 6.5	4.2	3.2 - 5.5	0.9	0.5 - 1.7	2 446	7.4	5.3 - 10.3	5.9	4.1 - 8.5	1.5	0.7 - 3.4	880	4.9	3.7 - 6.5	4.1	3.0 - 5.4	0.8	0.3 - 2.1	1 348	6.1	4.7 - 7.8	4.9	3.8 - 6.4	1.1	0.6 - 2.1	2 230	7.7	5.4 - 10.8	7.7	5.4 - 10.8	0.0	0.0	693	6.1	4.1 - 8.9	4.8	3.4 - 6.7	1.3	0.4 - 4.1	988	6.8	5.1 - 9.0	6.1	4.7 - 8.0	0.7	0.2 - 2.3	1 682	8.0	5.1 - 12.2	7.4	4.8 - 11.4	0.6	0.1 - 2.4	457	6.2	4.5 - 8.5	5.5	4.0 - 7.7	0.6	0.3 - 1.7	899	6.8	5.1 - 9.0	6.2	4.6 - 8.2	0.6	0.3 - 1.4	1 356																																										
Province	6.4	4.0 - 9.9	4.5	2.5 - 8.0	1.9	1.0 - 3.3	796	4.9	2.8 - 8.5	4.0	2.0 - 7.8	0.9	0.4 - 1.9	1 126	5.6	3.7 - 8.4	4.2	2.5 - 7.1	1.3	0.8 - 2.2	1 922	7.2	5.0 - 10.4	6.0	3.9 - 9.1	1.2	0.5 - 2.7	607	4.6	3.2 - 6.5	3.8	2.4 - 5.8	0.8	0.4 - 1.9	846	5.8	4.5 - 7.5	4.9	3.6 - 6.5	1.0	0.6 - 1.7	1 454	10.2	5.7 - 17.6	9.0	4.7 - 16.5	1.2	0.4 - 3.0	370	10.2	5.5 - 18.2	8.8	4.4 - 16.9	1.4	0.7 - 2.9	535	10.2	6.0 - 17.0	8.9	4.9 - 15.8	1.3	0.8 - 2.2	905	18.8	12.9 - 26.5	15.2	10.5 - 21.3	3.6	1.8 - 7.4	302	17.9	13.4 - 23.5	15.9	11.6 - 21.5	2.0	1.0 - 3.7	425	18.3	14.1 - 23.5	15.5	11.9 - 20.1	2.8	1.6 - 4.8	727	6.6	4.7 - 9.1	4.6	2.9 - 7.2	2.0	1.1 - 3.6	911	2.1	1.2 - 3.6	1.7	0.9 - 3.0	0.4	0.1 - 1.5	1 301	4.1	2.9 - 5.6	3.0	2.1 - 4.2	1.1	0.6 - 1.9	2 212	2.6	1.1 - 5.9	2.2	0.9 - 5.6	0.4	0.1 - 2.3	616	1.7	0.8 - 3.7	1.7	0.8 - 3.7	0.0	0.0	1 045	2.1	1.0 - 4.4	1.9	0.9 - 4.3	0.2	0.0 - 1.0	1 661	5.6	4.1 - 7.6	5.0	3.6 - 6.8	0.6	0.2 - 1.7	1 007	1.7	1.0 - 2.9	1.2	0.7 - 1.9	0.6	0.2 - 1.5	1 395	3.7	2.8 - 4.8	3.1	2.3 - 4.0	0.6	0.3 - 1.2	2 403	7.5	4.7 - 11.7	6.3	3.8 - 10.4	1.2	0.5 - 2.8	468	2.7	1.3 - 5.6	2.7	1.3 - 5.6	0.0	0.0	710	4.9	3.2 - 7.5	4.4	2.7 - 7.0	0.5	0.2 - 1.3	1 179	7.8	4.9 - 12.0	5.3	3.1 - 8.9	2.5	1.1 - 5.5	425	5.0	2.8 - 8.7	4.4	2.6 - 7.2	0.6	0.2 - 1.9	668	6.2	3.9 - 9.7	4.8	3.0 - 7.5	1.4	0.7 - 3.1	1 093
Race	7.1	6.1 - 8.3	5.8	4.9 - 6.9	1.3	0.9 - 1.9	3 533	3.9	3.1 - 4.7	3.3	2.7 - 4.1	0.5	0.4 - 0.9	5 382	5.4	4.7 - 6.2	4.5	3.9 - 5.1	0.9	0.7 - 1.2	8 915	2.1	1.0 - 4.3	2.1	1.0 - 4.3	0.0	0.0	296	2.3	0.7 - 7.5	1.4	0.2 - 8.1	0.9	0.2 - 3.8	356	2.2	1.1 - 4.5	1.7	0.7 - 4.1	0.5	0.1 - 2.0	652	10.8	7.8 - 14.8	8.0	5.2 - 12.1	2.8	1.7 - 4.6	1 115	5.1	3.5 - 7.3	4.3	2.8 - 6.5	0.8	0.5 - 1.4	1 640	7.7	5.6 - 10.4	5.9	4.0 - 8.7	1.7	1.1 - 2.6	2 756	5.4	2.2 - 12.6	2.5	0.9 - 6.9	2.9	0.7 - 11.4	530	0.5	0.2 - 1.4	0.2	0.0 - 0.7	0.4	0.1 - 1.2	653	3.0	1.3 - 6.9	1.4	0.5 - 3.6	1.7	0.4 - 6.0	1 183																																																																																																									

*Other tobacco products include hand-rolled cigarettes, tobacco smoked in pipes, cigars, cheroots, cigarillos, hookah, hubbly bubbly, water pipe, electronic cigarettes, snuff, chewing tobacco, and smokeless tobacco.

Table 4. Advice to stop tobacco smoking, cessation attempts and the effects of warning labels on cessation attempts among current tobacco smokers aged ≥18 years by gender, age, province and race, SA 2012

	Advised to quit using tobacco during any visit to a doctor/other healthcare provider (past 12 months)			Tried to stop smoking tobacco during the past 12 months			Noticed health warnings on tobacco packages during the past 30 days			Warnings labels on tobacco packages led one to think about quitting smoking		
	%	95% CI	n	%	95% CI	n	%	95% CI	n	%	95% CI	n
National	29.3	26.3 - 32.4	2 543	47.8	44.9 - 50.7	2 561	81.4	78.5 - 83.9	2 513	49.9	46.7 - 53.1	2 442
Gender												
Males	26.5	23.2 - 30.1	1 699	47.4	44.0 - 50.8	1 720	81.3	78.1 - 84.2	1 684	50.8	47.1 - 54.4	1 633
Females	39.3	33.9 - 45.0	844	49.2	43.4 - 54.9	841	81.5	76.6 - 85.5	829	46.8	41.0 - 52.7	809
Age (years)												
18 - 24	14.7	10.5 - 20.3	432	45.0	37.9 - 52.3	438	79.6	72.7 - 85.0	431	49.1	42.8 - 55.5	422
25 - 34	24.3	20.0 - 29.2	599	45.6	40.5 - 50.7	606	82.3	77.6 - 86.3	596	52.1	46.7 - 57.4	581
35 - 44	30.2	23.9 - 37.3	493	47.6	41.0 - 54.3	494	81.7	75.9 - 86.4	489	45.2	38.5 - 52.1	472
45 - 54	35.8	28.4 - 43.9	504	52.7	45.5 - 59.9	508	83.7	78.1 - 88.1	498	56.2	48.8 - 63.4	486
55 - 64	41.6	34.5 - 49.1	361	49.0	41.8 - 56.3	360	80.2	72.8 - 86.0	347	47.0	39.1 - 55.1	334
≥65	52.3	39.0 - 65.3	154	50.5	35.4 - 65.5	155	74.0	60.9 - 83.9	152	47.2	32.8 - 62.1	147
Province												
Western Cape	36.0	31.7 - 40.6	703	49.3	43.9 - 54.7	702	86.5	81.7 - 90.1	690	47.3	41.2 - 53.5	684
Eastern Cape	27.3	20.2 - 35.8	290	54.2	47.1 - 61.0	291	80.7	72.2 - 87.1	281	59.5	49.3 - 68.9	275
Northern Cape	31.4	24.2 - 39.6	307	40.8	31.2 - 51.2	306	93.2	88.0 - 96.3	305	61.1	55.0 - 66.8	293
Free State	21.9	15.2 - 30.5	187	51.2	43.4 - 59.0	187	75.8	67.3 - 82.6	187	48.0	40.7 - 55.4	182
KwaZulu-Natal	32.1	21.8 - 44.3	349	53.8	45.6 - 61.8	356	88.0	83.1 - 91.6	350	58.3	51.0 - 65.2	339
North West	38.9	32.2 - 46.0	171	42.2	35.5 - 49.2	172	74.8	64.5 - 82.9	168	50.4	43.2 - 57.7	164
Gauteng	26.2	19.5 - 34.2	278	44.5	37.5 - 51.7	281	78.6	69.1 - 85.8	274	45.1	36.6 - 53.8	258
Mpumalanga	18.9	10.2 - 32.4	134	41.9	29.2 - 55.7	139	71.0	58.1 - 81.2	135	48.0	32.9 - 63.5	126
Limpopo	22.3	15.2 - 31.5	124	38.4	27.7 - 50.4	127	74.6	66.6 - 81.2	123	35.7	27.1 - 45.2	121
Race												
Black African	25.3	21.8 - 29.0	1 158	47.7	43.8 - 51.5	1 178	78.4	74.6 - 81.9	1 150	51.8	47.6 - 56.0	1 111
White	33.3	23.1 - 45.4	120	47.0	36.2 - 58.2	120	84.2	70.9 - 92.1	120	37.1	26.3 - 49.4	119
Coloured	36.2	32.6 - 40.0	1 052	47.8	43.3 - 52.4	1 053	88.0	84.7 - 90.7	1 036	49.3	44.2 - 54.5	1 014
Indian	53.7	28.9 - 76.8	205	52.9	47.0 - 58.8	203	89.2	76.4 - 95.4	199	54.0	47.4 - 60.6	190

(24.4%) and 55 - 64 years (22.8%) currently used tobacco ($p<0.05$ for all).

The highest prevalence of current tobacco use was observed in the Free State (36.7%) and Western Cape (35.8%), and the lowest in North West (14.2%). The prevalence was significantly higher among coloured adults (43.1%) than among Indians (23.5%) ($p<0.001$), black Africans (17.7%) ($p<0.001$) and whites (17.1%) ($p<0.001$).

Factors affecting tobacco smoking cessation attempts

Among current tobacco smokers, 29.3% reported that they had been advised to quit smoking tobacco during a visit to a healthcare practitioner during the 12 months preceding the survey, and 47.8% had tried to quit smoking during that time (Table 4).

Significantly fewer male (26.5%) than female (39.3%) current tobacco smokers reported being advised to quit smoking (OR 0.56, 95% CI 0.42 - 0.74; $p<0.001$). The proportions of respondents who had been advised to quit increased with age group. Significantly more current tobacco smokers aged 55 - 64 (41.6%) and ≥65 years (52.3%) were advised to quit smoking by a healthcare practitioner than those aged 35 - 44 (30.2%) ($p=0.020$ and $p=0.005$, respectively), 25 - 34 (24.3%) ($p<0.001$ and $p<0.001$, respectively) and 18 - 24

years (14.7%) ($p<0.001$ and $p<0.001$, respectively). Of the provinces, Mpumalanga (18.9%) had the lowest proportion of current smokers who had been advised to quit smoking, and North West (38.9%) the highest. Significantly more Indian (53.7%) and coloured (36.2%) current smokers than black Africans (25.3%) ($p=0.035$ and $p<0.001$, respectively) reported being advised to quit smoking.

Attempts to quit tobacco smoking in the past year did not differ significantly by gender (OR 0.93, 95% CI 0.71 - 1.22; $p=0.607$), or by race or age for all within-group pairwise tests. The prevalence of having tried to quit smoking was highest in the Eastern Cape (54.2%) and KwaZulu-Natal (53.8%) and lowest in Limpopo (38.4%).

Among current tobacco smokers, 81.4% reported that they had noticed health warnings on tobacco packages during the 30 days preceding the survey, and 49.9% reported that these labels had led them to think about quitting smoking.

There was no significant association of gender (OR 0.99, 95% CI 0.71 - 1.37; $p=0.955$) or age in the likelihood of having noticed health warnings on tobacco packages among current smokers. The Northern Cape (93.2%) had the highest proportion of current smokers who had noticed health warnings on tobacco packages. Significantly more coloured (88.0%) and Indian (89.2%) than black

Table 5. Logistic regression of factors associated with having tried to stop smoking tobacco among current tobacco smokers aged ≥18 years, SA 2012

	Tried to stop smoking tobacco during the past 12 months					
	Univariate regression			Multivariate regression		
	OR	95% CI	<i>p</i> -value	OR	95% CI	<i>p</i> -value
Gender						
Males	0.93	0.71 - 1.22	0.607			
Females	Ref	-	-			
Age (years)						
18 - 24	Ref	-	-			
25 - 34	1.02	0.71 - 1.47	0.899			
35 - 44	1.11	0.75 - 1.66	0.596			
45 - 54	1.37	0.91 - 2.05	0.135			
55 - 64	1.18	0.77 - 1.79	0.449			
≥65	1.25	0.63 - 2.48	0.529			
Race						
Black African	Ref	-	-			
White	0.98	0.6 - 1.58	0.918			
Coloured	1.01	0.79 - 1.27	0.960			
Indian	1.24	0.92 - 1.65	0.154			
Advised to quit using tobacco during any visit to a doctor/ other healthcare provider during the past 12 months	3.97	2.94 - 5.34	<0.001	3.79	2.8 - 5.14	<0.001
Noticed health warnings on tobacco packages during the past 30 days	2.00	1.43 - 2.79	<0.001	1.71	1.21 - 2.41	0.002

African (78.4%) ($p<0.001$ and $p=0.032$, respectively) current smokers had noticed health warnings on tobacco packages.

There was no significant variation by gender in the prevalence of current smokers who reported that warning labels on tobacco packages led them to think about quitting smoking (OR 1.17, 95% CI 0.89 - 1.54; $p=0.248$). Significantly more current smokers aged 45 - 54 (56.2%) than those aged 35 - 44 years (45.2%) reported that warning labels on tobacco packages led them to think about quitting smoking ($p=0.042$). The Northern Cape had the highest proportion of current smokers who reported that warning labels led them to think about quitting (61.1%), and Limpopo the lowest (35.7%). Significantly more black African (51.8%) and Indian (54.0%) current smokers than white current smokers (37.1%) reported that warning labels led them to think about quitting ($p=0.022$ and $p=0.015$, respectively).

Among current tobacco smokers, no statistically significant univariate associations were found between having tried to stop smoking tobacco in the past 12 months

and each of the categories gender, age group and race (Table 5). Having been advised to quit using tobacco during a visit to a healthcare provider during the past 12 months and having noticed health warnings on tobacco packages in the past 30 days were significantly associated with attempts to stop smoking tobacco in both the univariate (OR 3.97, 95% CI 2.94 - 5.34 and OR 2.00, 95% CI 1.43 - 2.79, respectively) and multivariate (OR 3.79, 95% CI 2.80 - 5.14 and OR 1.71, 95% CI 1.21 - 2.41, respectively) logistic regression models.

Prevalence of exposure to second-hand smoke

Among current users of any tobacco products, 56.4% reported that someone smoked in their home (either daily or less than daily), while among non-current users of tobacco products this figure was 13.0% (Table 6).

Among current tobacco users, daily exposure to tobacco smoke in the home did not vary significantly by gender (OR 1.11, 95% CI 0.86 - 1.44; $p=0.409$)

or age group. The Northern Cape and Western Cape had the highest proportions of current smokers who reported that someone smoked daily in their homes (64.9% and 64.3%, respectively) while the Eastern Cape and Mpumalanga had the lowest proportions (41.9% and 42.5%, respectively). Significantly fewer black African (45.1%) than coloured (67.1%) and white (59.9%) current tobacco users reported daily exposure to tobacco smoke in their homes ($p<0.001$ and $p=0.049$, respectively).

Among adults who did not currently use tobacco, significantly fewer males (8.4%) than females (11.8%) (OR 0.69, 95% CI 0.58 - 0.82; $p<0.001$) reported that someone smoked daily in their homes. Significantly more 18 - 24-year-old non-current users of tobacco (13.8%) than those aged 25 - 34 (9.0%), 35 - 44 (9.4%), 45 - 54 (9.9%) and ≥65 years (8.3%) reported that someone smoked daily in their homes ($p<0.001$, $p=0.002$, $p=0.008$ and $p=0.001$, respectively). The Western Cape had the highest proportion of non-current tobacco users who reported that someone smoked daily in their homes (18.6%), and North West the lowest (6.9%). Significantly more coloured (24.5%) and Indian (20.3%) than black African (9.3%) ($p<0.001$ and $p=0.005$, respectively) and white (8.5%) ($p<0.001$ and $p=0.007$, respectively) non-current tobacco users reported that someone smoked daily in their homes.

Discussion

The SANHANES-1 study collected self-reported data on tobacco-using behaviour among 13 897 SA adults aged ≥18 years. The study revealed significantly greater use of tobacco products by males than by females, perhaps because tobacco use is believed to be more socially acceptable among men than women in many SA communities, and because men often have more disposable income to buy tobacco products.^[4]

There were considerable variations in tobacco use between the provinces and different racial groups in SA, perhaps reflecting differences in sociocultural and demographic determinants. For example, tobacco smoking rates are very high among coloured people, who comprise a high proportion of the Western Cape and Northern Cape populations - tobacco smoking rates in the Western Cape were 39.6% for men and 26.8% for women, and in the Northern Cape 38.3% for men and 24.5% for women. High rates of smoking among pregnant women in the Western Cape have been reported in other studies.^[7] Surprisingly

Table 6. Prevalence of current and non-current users of tobacco aged ≥18 years who had someone smoke in their homes, by gender, age, province and race, SA 2012

	Among current users of any tobacco product*										Among non-users of tobacco†									
	How often does anyone smoke inside your home?					Don't know					How often does anyone smoke inside your home?					Don't know				
	Daily	Less than daily	Never	95% CI	n	Daily	Less than daily	Never	95% CI	n	Daily	Less than daily	Never	95% CI	n	Daily	Less than daily	Never	95% CI	n
National	51.2	47.5 - 54.9	5.2	4.0 - 6.9	41.9	38.3 - 45.5	1.7	1.1 - 2.6	2 636	10.4	9.2 - 11.8	2.6	2.1 - 3.1	84.3	82.7 - 85.8	2.7	2.0 - 3.6	10 384		
Gender																				
Males	51.9	47.9 - 56.0	4.5	3.3 - 6.0	41.6	37.8 - 45.5	2.0	1.2 - 3.3	1 648	8.4	7.0 - 10.0	2.0	1.5 - 2.7	86.8	84.7 - 88.6	2.8	1.9 - 4.0	3 581		
Females	49.2	43.2 - 55.3	7.3	4.3 - 12.3	42.5	36.8 - 48.5	0.9	0.4 - 2.1	988	11.8	10.4 - 13.4	2.9	2.3 - 3.6	82.6	80.8 - 84.2	2.7	2.0 - 3.7	6 800		
Age (years)																				
18 - 24	47.7	39.8 - 55.8	6.2	3.8 - 10.2	44.0	36.6 - 51.7	2.0	0.8 - 5.1	418	13.8	11.6 - 16.3	2.6	1.9 - 3.7	81.4	78.5 - 84.0	2.2	1.4 - 3.3	2 377		
25 - 34	49.9	44.0 - 55.7	2.4	1.3 - 4.4	44.9	39.2 - 50.8	2.7	1.3 - 5.7	602	9.0	7.5 - 10.8	2.3	1.6 - 3.4	85.1	82.9 - 87.1	3.6	2.6 - 5.0	2 237		
35 - 44	50.8	44.4 - 57.2	5.1	2.9 - 8.8	42.5	36.3 - 49.0	1.5	0.7 - 3.4	524	9.4	7.5 - 11.8	2.6	1.8 - 3.8	85.2	82.5 - 87.6	2.8	1.8 - 4.2	1 835		
45 - 54	56.7	49.0 - 64.1	4.2	2.4 - 7.4	38.8	31.2 - 47.0	0.3	0.1 - 1.2	521	9.9	7.9 - 12.3	2.7	1.8 - 4.2	84.9	81.7 - 87.7	2.4	1.3 - 4.4	1 605		
55 - 64	57.0	49.3 - 64.4	7.4	4.5 - 12.1	34.3	27.3 - 42.2	1.2	0.4 - 3.5	376	11.1	8.9 - 13.9	2.4	1.4 - 4.0	84.0	80.6 - 86.9	2.5	1.5 - 4.0	1 222		
≥65	43.0	30.8 - 56.1	14.7	5.1 - 35.4	41.0	29.9 - 53.1	1.3	0.4 - 3.8	195	8.3	6.1 - 11.1	3.0	2.0 - 4.4	86.7	83.6 - 89.2	2.1	1.2 - 3.5	1 108		
Province																				
Western Cape	64.3	56.0 - 71.8	3.3	1.6 - 6.9	32.3	25.4 - 40.0	0.1	0.0 - 0.6	694	18.6	14.1 - 24.2	1.4	0.8 - 2.7	79.0	73.4 - 83.7	0.9	0.3 - 2.8	1 122		
Eastern Cape	41.9	33.9 - 50.5	5.5	2.9 - 10.0	49.9	41.2 - 58.6	2.7	0.9 - 7.3	312	11.0	8.4 - 14.3	2.9	1.7 - 4.8	80.5	75.5 - 84.7	5.6	3.0 - 10.3	1 099		
Northern Cape	64.9	57.8 - 71.4	3.4	1.9 - 6.2	28.5	22.4 - 35.5	3.2	1.4 - 7.4	328	13.1	9.0 - 18.7	0.7	0.2 - 2.3	83.8	79.2 - 87.6	2.3	0.8 - 6.6	541		
Free State	43.7	33.9 - 54.0	5.8	3.4 - 9.6	49.4	38.5 - 60.4	1.1	0.2 - 5.4	242	15.3	11.4 - 20.3	1.9	0.8 - 4.2	81.1	76.2 - 85.1	1.8	0.6 - 4.8	459		
KwaZulu-Natal	46.0	35.8 - 56.6	10.4	5.1 - 20.1	41.0	31.8 - 50.8	2.5	1.1 - 5.9	336	12.1	8.5 - 16.7	3.9	2.6 - 5.9	82.2	77.2 - 86.3	1.8	1.1 - 3.1	1 778		
North West	48.0	35.7 - 60.5	4.8	1.8 - 11.9	46.5	34.5 - 58.9	0.8	0.1 - 5.5	125	6.9	4.7 - 10.1	4.0	2.7 - 5.8	82.9	78.3 - 86.6	6.3	3.7 - 10.5	1 451		
Gauteng	48.8	39.6 - 58.1	1.5	0.6 - 3.8	48.8	39.7 - 57.9	0.9	0.1 - 6.4	284	8.4	6.2 - 11.4	1.4	0.8 - 2.4	88.4	85.5 - 90.9	1.8	0.8 - 3.8	2 047		
Mpumalanga	42.5	29.7 - 56.5	6.1	3.1 - 11.5	44.9	32.7 - 57.7	6.5	2.5 - 15.6	153	8.5	5.7 - 12.6	2.3	0.9 - 5.6	83.6	76.3 - 89.0	5.6	2.3 - 13.1	985		
Limpopo	58.6	50.7 - 66.1	11.1	6.9 - 17.4	27.8	20.9 - 35.8	2.6	0.8 - 8.1	162	9.3	6.9 - 12.5	4.8	2.8 - 8.1	84.4	79.1 - 88.5	1.5	0.7 - 3.0	902		
Race																				
Black African	45.1	40.8 - 49.5	5.4	4.2 - 6.9	47.2	42.9 - 51.6	2.2	1.3 - 3.6	1 290	9.3	7.9 - 10.8	2.8	2.3 - 3.5	84.7	82.9 - 86.4	3.2	2.3 - 4.3	7 328		
White	59.8	45.4 - 72.6	8.8	2.3 - 28.5	31.0	20.1 - 44.7	0.4	0.1 - 2.7	113	8.5	5.1 - 13.9	1.5	0.6 - 4.0	89.3	83.7 - 93.1	0.7	0.2 - 2.0	517		
Coloured	67.1	61.2 - 72.5	3.1	1.5 - 6.4	29.4	24.4 - 35.0	0.4	0.2 - 0.9	1 042	24.5	20.1 - 29.5	1.2	0.7 - 2.0	73.0	68.1 - 77.4	1.3	0.6 - 2.8	1 559		
Indian	62.0	44.2 - 77.1	5.4	2.9 - 9.7	30.8	15.9 - 51.2	1.8	0.5 - 6.4	184	20.3	13.8 - 29.0	1.3	0.8 - 2.3	77.1	69.3 - 83.3	1.3	0.5 - 3.2	937		

*Currently use any tobacco product, i.e. smoking tobacco or other tobacco products.
†Do not currently use any tobacco product.

high prevalences of use of other tobacco products were observed among both males and females in the Northern Cape and Free

State, and further investigation is needed to ascertain the factors driving these high rates.

Economic factors are also important in determining smoking prevalence rates, as tobacco use in LMICs such as SA is often

highest among poorly educated, urban men and women who have low incomes.^[8-11]

These sociocultural and geographical differences in tobacco use and prevalence suggest that tailored culture- and context-specific interventions need to be designed for smoking prevention and cessation among SA's heterogeneous and rapidly changing populations. Tobacco control interventions such as hikes in excise taxes are likely to be more effective in citizens with lower disposable income. A case can be made for increasing excise duty on cigarettes from the current 51% of total price to nearer the 75% employed by countries with progressive tobacco control policies such as Canada.^[12]

The recent increase in smoking rates among young people and girls from 2008 to 2011, seen in the Global Youth Tobacco Surveys,^[4] has occurred despite the initial success of tobacco control legislation and public health policies of the past 20 years that resulted in a 30% reduction in smoking prevalence among school learners during that time. This suggests that the strategies the tobacco industry uses to encourage young people (particularly girls) to smoke have been successful. Research shows that tobacco use is most often initiated and established during adolescence and young adulthood, with nearly nine out of ten smokers starting the habit by the age of 18 years, and 99% starting by the age of 26.^[13]

Surprisingly few current smokers (29.3%) reported that they had been advised to quit the use of tobacco products. Health professionals therefore need to escalate their efforts in advising users to quit, so as to avoid missed opportunities for prevention (in over 70% of smokers). Of current smokers, 47.8% had tried to quit and 49.9% reported that the health warning labels on tobacco packages made them think about quitting, suggesting that health warning labels may be effective in encouraging smoking cessation. This effect may be augmented when combined with plain packaging, as is done in Australia. Those who noticed warning labels on tobacco packages were 1.7 times more likely to attempt to quit smoking than those who did not notice warning labels.

Respondents who received advice to quit smoking from a healthcare provider were 3.8 times more likely to attempt to quit than those who did not receive advice. Women received advice to quit smoking much more often than men.

Of concern is the high prevalence of non-smokers who are exposed to environmental tobacco smoke (ETS). It is estimated that of the six million deaths that tobacco causes annually, 10% (600 000 deaths) occur among non-smokers who have been exposed to ETS.^[14] ETS is particularly harmful for children who live in homes with smokers. Notably, the SA government has introduced legislation to ban smoking in cars in which children under the age of 12 are travelling.

Conclusion

The efficacy and cost-effectiveness of a well-tested set of tobacco control policies and interventions have been clearly established over several decades in many countries around the world, at various income levels and in many different cultures. SANHANES-1 shows that this is also true of SA, where national smoking prevalence rates fell from 32% in 1994 to 16.4% in 2011,^[6] during a time when the government was introducing a host of tobacco control legislation and hiking excise duties on cigarettes. However, research and

monitoring of tobacco control must continue to develop policies and interventions to decrease smoking prevalence rates further. In addition, research is needed to counter the ever-evolving strategies the tobacco industry uses to market its products, especially to young people and girls.

Lastly, longitudinal studies such as SANHANES-1 should be repeated at regular intervals in the future to monitor the course of the tobacco epidemic, in accordance with the guidelines of the World Health Organization's Framework Convention on Tobacco Control,^[15] to which SA is a signatory. These studies should form part of comparative datasets with other LMICs and HICs aimed at strengthening transnational co-ordination in tobacco control while facing an industry that is transnational in structure and marketing methods.

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