

Patterns of Tobacco Use in the Early Epidemic Stages: Malawi and Zambia, 2000–2002

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As tobacco use has declined in high-income, more-developed countries, increased attention has turned to its growth in middle- and low-income, less-developed countries.^{1,2} Despite facing higher taxes, judicial setbacks, negative publicity, legislative restrictions, and a declining market in the United States and Western Europe, the tobacco industry has maintained its profitability—and its ability to promote the use of tobacco—with global sales and marketing.^{3,4} Calls for global public health efforts against tobacco have, as yet, had limited effect on the global spread of cigarettes,⁵ although future ratification of an international treaty for consistent antitobacco policies around the world has the potential to do more.^{6,7}

A few figures illustrate the global patterns of change. From 1970 to 1990, cigarettes consumed per adult aged 15 years and older fell by 9% in more-developed countries and rose by 64% in less-developed countries.⁸ By 1995, the prevalence of cigarette use had surprisingly reached equality across the 2 groups of nations—29% of adults in less-developed countries and 30% in more-developed countries—but these figures hide gender diversity.² Whereas male prevalence reached 49% in less-developed countries—actually higher than in more-developed countries—female prevalence was only 9%. More so than for men, the use of cigarettes among women in less-developed countries may enter a growth phase. A projection of recent trends suggests that smoking by women in less-developed countries will rise to 20% by 2025.⁹

Largely as a result of the growth in less-developed countries, the 1.3 billion smokers throughout the world today may rise to 1.6 billion by 2025.² Although smoking-related deaths currently number approximately 4.8 million per year, just less than half now occur in developing countries.¹⁰ However, projections indicate that smoking-related deaths may rise from approximately 6% of

Objectives. I examined demographic and socioeconomic patterns of tobacco use in 2 African nations in the early stages of epidemic.

Methods. I used population-based data from the Demographic Health Surveys of men aged 15–59 years (N=5111) and women aged 15–49 years (N=20809) in Malawi (2000) and Zambia (2001/2002) and multinomial logistic regression models to examine tobacco use (nonsmoker, light cigarette smoker, heavy cigarette smoker, and user of other tobacco) as a function of age, residence, education, occupation, marital status, and religion.

Results. Male tobacco users tend to be less educated, urban, household service or manual workers, formerly married, and non-Christian and non-Muslim. Although tobacco use is less common among women, it relates inversely to their education and occupational status. Tobacco users more often reported drinking, getting drunk, and, among men, paying for sex.

Conclusions. Tobacco use patterns in 2 African nations at the early stages of epidemic suggest the need for public health officials to focus on disadvantaged groups to prevent the worldwide spread of tobacco. (*Am J Public Health.* 2005; 95:1009–1015. doi:10.2105/AJPH.2004.056895)

all deaths in 1990 to 12% in 2020,¹¹ of which 70% will occur in less-developed countries.

These trends make smoking and other tobacco use in less-developed countries an important topic of study. To combat rising prevalence of tobacco use, the underlying sources of the problem must be understood and its social distribution must be described.^{12–14} Despite comparative studies across high-income nations¹⁵ and substantial progress in reducing the prevalence of the habit,¹⁶ less knowledge exists about and less progress has been made in fighting tobacco use in less-developed countries.¹⁷ As international organizations such as the World Health Organization and World Bank have done in recent decades,^{2,8,18,19} researchers need to direct further attention to the emergence of this health and social problem where it is less well understood—in the developing world.^{20,21}

Along with public health and policy concerns, patterns of tobacco use in less-developed countries raise important questions about the nature of social differences in this health behavior. Which demographic and socioeconomic status (SES) groups are most

vulnerable to tobacco use? Do social patterns of tobacco use in less-developed countries mirror past patterns in more-developed countries, or do they differ? Such questions have particular relevance to African nations. First, the sub-Saharan African nations are in many ways understudied with regard to tobacco use (and no doubt with regard to other aspects of social life and health). Second, because most African nations have reached only low levels of tobacco use, they allow for study of the early stages of the epidemic. Third, the study of nations at the early stages of the spread of tobacco use allows public health officials to intervene before the problem peaks. Given the low levels of tobacco use in most African nations today, the health consequences may not appear serious, particularly when deaths from AIDS, starvation, and violence more immediately threaten the health of citizens.^{22,23} Still, tobacco use may, in future decades, contribute substantially to mortality and may blunt improvements in longevity from other sources.²⁴ The sooner that programs can address the problem, the more they can do to stop the spread of tobacco.

I used population-based survey data to examine the relationships of demographic and SES variables with tobacco use among men and women in 2 African nations in 2000–2002. Such data are rarely available in this region and improve on studies using samples from single provinces, cities, or hospitals or data based on aggregated population averages.

METHODS

Data

The Demographic Health Surveys (DHSs) for 2 African nations—Malawi (2000) and Zambia (2001/2002)—provided the data for the analyses.²⁵ The DHS is designed to provide reliable and nationally representative data on the fertility, family planning, health, and nutrition of populations in developing nations. Since the mid-1980s, approximately 200 surveys have been conducted in 70 countries across the world. The most recent surveys (named MEASURE DHS+) have been carried out by national statistical offices with funding from the US Agency for International Development and with financial and technical assistance from ORC Macro of Calverton, Md, and Johns Hopkins University.²⁶ The surveys select nationally representative samples that appropriately include rural as well as urban residents and low-SES groups as well as high-SES groups. However, given the focus on human reproductive health, most surveys either include only women or do not ask questions about tobacco use. The Malawi and Zambia surveys meet the requirements of surveying both adult men and women and obtaining information on tobacco use but otherwise follow the MEASURE DHS+ sample design.^{27,28}

A stratified, 2-stage cluster design oversamples low-populated provinces, identifies clusters within provinces, and chooses households randomly within clusters. For sampled households, 1 member answers questions about the household in general and provides a list of household residents. Then, all women aged 15–49 years in the household are interviewed, and all men aged 15–59 years are interviewed in approximately every third household.

Interviews of household representatives were completed for more than 98% of selected households in both Malawi and Zambia. Response rates were a bit lower for household members. In Zambia, interviews of adult men were completed for 88.7% of those eligible, and interviews of adult women were completed for 96.4% of those eligible. In Malawi, interviews of adult men were completed for 91.6% of those eligible, and interviews of adult women were completed for 97.7% of those eligible. Interviewers received training and guidance in identifying and interviewing sample respondents, and supervisors followed guidelines to ensure quality control, to minimize nonresponse, and to monitor interviewers.²⁹ Few respondents refused to participate; the major source of nonparticipation instead came from difficulties in contacting men in urban households who were often absent from the home. Excluding cases with missing values on the variables to be analyzed, the samples sizes were 2130 for men and 7614 for women in Zambia and 2981 for men and 13 195 for women in Malawi.

The age ranges of the samples—limited to women aged 15–49 years and men aged 15–59 years because the DHS is designed to study fertility—proved suitable for the study of tobacco use. Because long-term tobacco use brings the greatest harm to health, samples of young and middle-aged persons capture groups of special importance for public health efforts. In addition, because the higher mortality rate of smokers after age 50 leads to understatement of the prevalence, samples of young and middle-aged persons help avoid this source of selection bias.

Variables

Respondents were asked if they smoke cigarettes, pipes, or other tobacco or nothing. Those who smoke cigarettes were asked how many they had smoked in the past 24 hours. The tobacco use questions asked only about current behavior, and the surveys contained no information on age of adoption, former smoking, or age of cessation. For the purpose of analysis, the respondents were divided into current nonsmokers, light smokers of cigarettes (fewer than 5 a day), heavy smokers of cigarettes (5 or more a day), and users of pipe

or noncigarette tobacco. Although US studies find that self-reported smoking is generally accurate,³⁰ the validity of such items in low-income nations is less clear, and the items may reflect differential reporting by SES. Nevertheless, surveys remain the commonly accepted source of nearly all data on global patterns of tobacco use.

I examined the association of tobacco use with the following SES and demographic variables. Education measures 1 component of SES and was reported as the highest year of completed formal schooling; it ranged from 0 to 18. The other component of SES, occupation, included (1) not working (reference category); (2) agricultural self-employed workers and employees; (3) household, domestic, and service workers; (4) skilled and unskilled manual workers; and (5) professionals, technicians, managers, and clerical and sales workers. In abbreviated form, these categories are referred to as not working, agriculture, service, manual, and nonmanual. Not all these categories can be ranked unambiguously in terms of SES, but nonmanual work most likely represents high SES.

Among the demographic variables, age ranged from 15 to 49 years for women and 15 to 59 years for men. Residence was reported as 1 for those living in cities (urban) and 0 otherwise (rural). Currently married and formerly married defined dummy variables, with never-married as the reference category. Finally, religion included (1) Catholic (reference category), (2) Protestant, (3) Muslim, and (4) other. All these variables were included in the multivariate analyses. Polynomial tests for nonlinearity in the effects of age and education revealed deviations from linearity only for age among males; the use of the natural log of age improved on the linear term and was used in the male equations.

Tobacco use may be associated in noncausal ways with other health-related lifestyle behaviors. The lifestyle variables included the number of days in the past 3 months that the respondent drank alcohol, whether the respondent got drunk anytime in the past 3 months (coded 1 and 0), and (asked to men only) whether the respondent ever paid for sex (coded 1 and 0). Associations of these variables with tobacco use may identify a

more general pattern of some respondents to engage in unhealthy behavior.

Statistical Analyses

I used multinomial logistic regression analyses to contrast light cigarette smokers, heavy cigarette smokers, and other tobacco users with the baseline category of non-tobacco users. Wald tests rejected the hypothesis that the categories can be collapsed into 2 categories for binary logistic regression, and Brant tests rejected the hypothesis of parallel slopes and warranted against the use of ordinal logistic regression.³¹ However, so few women use cigarettes in these countries that it makes sense to combine their light and heavy cigarette smoker categories into a single cigarette smoker category and to use 3

rather than 4 categories. Chi-square tests of model deviance further showed that the coefficients do not vary significantly across nations but do vary significantly across gender. Therefore, pooled models for the 2 nations were estimated with a dummy variable for Zambia, but separate models were estimated for men and women.

Given the stratified 2-stage cluster design, I used sample weights for all the analyses and adjusted for cluster membership in estimating standard errors in the multinomial logistic regressions.³² The multinomial logistic regression tables present odds ratios or the multiplicative change in the odds of belonging to a category relative to belonging to the baseline category of nontobacco users associated with a 1-unit increase in the independent

variables. Separate multinomial logistic regression models are presented here for the relationships between tobacco use and lifestyle variables both with and without controlling for the SES and demographic variables (again adjusting for sample weights and cluster membership).

RESULTS

Table 1 lists descriptive statistics for men and women in Malawi and Zambia. Approximately 75% of males and 97% of females do not use tobacco. Cigarettes are more popular than other forms of tobacco among men, but all forms of tobacco use remain uncommon among women. The populations are young (means: approximately 30 years for men, 28 years for women), have limited education (means: 6–7 years for men and 4–6 years for women), and reside largely in rural areas (60–80%). Most men work in agriculture (42–45%), although household and service workers are more common in Zambia (18%) than Malawi (5%), and nonmanual workers are more common in Malawi (17%) than Zambia (3%). Most women do not work or work in agriculture, but the figures also reflect higher nonmanual workers in Malawi (16%) than Zambia (3%). Such occupational classifications may be biased by different survey coding procedures across the 2 nations rather than reflect major differences in the structure of the labor force. Most respondents are married and Christian, but Malawi has a minority Muslim population.

Table 2 lists the odds ratios from the multinomial logistic regression models for men. For cigarette use, the pattern of coefficients for light and heavy smokers is similar. The positive effects of the logarithm of age indicate a decreasing rate of increase in cigarette use; the leveling off of the increase may reflect both the tendency of people to quit as they grow older and lower rates of starting to smoke among older cohorts. Education has a linear negative effect on smoking. The odds of light and heavy smoking for a 1-year increase in education are reduced, respectively, by 8.0% and 11.0%. Otherwise, smokers tend to live in urban rather than rural areas, work in household service or manual occupations, be formerly married, and be non-Christian

TABLE 1—Descriptive Statistics^a from Demographic Health Surveys of Men and Women in Malawi (2000) and Zambia (2001/2002)

	Men		Women	
	Malawi (n = 2981)	Zambia (n = 2130)	Malawi (n = 13 195)	Zambia (n = 7614)
Tobacco use, %				
None	76	74	98	97
Cigarettes, light use (<5/d)	10	10	1	1
Cigarettes, heavy use (≥5/d)	8	6	^b	^b
Other products	5	11	1	2
Age (SD), y	29.33 (10.76)	30.27 (11.30)	27.87 (9.37)	27.54 (9.24)
Educational level (SD), y	5.63 (3.64)	7.35 (3.54)	3.99 (3.54)	5.87 (3.56)
Residence, %				
Rural	82	60	84	60
Urban	18	40	16	40
Occupation, %				
Not working	18	21	39	43
Agriculture	45	42	41	33
Household service	5	18	1	18
Manual	15	14	3	3
Nonmanual	17	5	16	3
Married, %				
Never	35	36	17	25
Currently	61	58	71	61
Formerly	4	5	12	14
Religion, %				
Catholic	24	24	23	23
Protestant	59	72	62	75
Muslim	13	0	13	0
Other	4	3	2	2

^aEstimates were based on weighted data.

^bLight and heavy cigarette use categories were combined.

TABLE 2—Odds Ratios (ORs) and 95% Confidence Intervals (CIs) From Multinomial Logistic Regression Models^a of Tobacco Use: Men in Malawi and Zambia

	Cigarettes, Light Use (<5/d)	Cigarettes, Heavy Use (≥5/d)	Other Tobacco
Nation			
Malawi	1.00	1.00	1.00
Zambia	1.08 (0.85, 1.39)	0.70* (0.51, 0.97)	3.24*** (2.28, 4.61)
Age (logged), y	3.04*** (2.00, 4.64)	6.45*** (4.00, 10.38)	10.15*** (6.13, 16.80)
Educational level, y	0.92*** (0.89, 0.95)	0.89*** (0.85, 0.93)	0.85*** (0.82, 0.89)
Residence			
Rural	1.00	1.00	1.00
Urban	1.23 (0.93, 1.65)	1.85*** (1.33, 2.58)	0.20*** (0.09, 0.43)
Occupation			
Not working	1.00	1.00	1.00
Agriculture	1.50 (0.99, 2.28)	1.57 (0.96, 2.56)	1.84* (1.08, 3.14)
Household service	2.52*** (1.53, 4.16)	2.96*** (1.65, 5.31)	1.28 (0.63, 2.60)
Manual	2.03** (1.26, 3.27)	2.60** (1.50, 4.52)	0.90 (0.45, 1.82)
Nonmanual	1.30 (0.74, 2.29)	2.01* (1.11, 3.62)	0.51 (0.16, 1.57)
Married			
Never	1.00	1.00	1.00
Currently	1.74* (1.12, 2.69)	1.22 (0.74, 2.00)	1.91 (0.88, 4.13)
Formerly	4.28*** (2.46, 7.46)	3.79*** (1.96, 7.35)	5.95*** (2.42, 14.63)
Religion			
Catholic	1.00	1.00	1.00
Protestant	0.68** (0.51, 0.89)	0.80 (0.57, 1.11)	0.70* (0.53, 0.94)
Muslim	1.16 (0.79, 1.71)	0.93 (0.55, 1.55)	0.49* (0.26, 0.93)
Other	1.45 (0.84, 2.50)	2.05* (1.11, 3.80)	1.89 (0.96, 3.74)

Note. Nonsmokers serve as baseline category in ORs. Estimates were based on use of sample weights and adjustment for cluster membership.

^aPseudo- $R^2 = .146$, $n = 5111$.

* $P < .05$; ** $P < .01$; *** $P < .001$.

and non-Muslim. The educational and occupational pattern thus reflects use of cigarettes by lower SES groups of men. Those using pipes and other tobacco differ from never smokers in that the practice is more common in Zambia than Malawi, less common in urban than rural areas, and similar across occupations. However, much like cigarettes, other tobacco is still used less often by those with higher education.

Table 3 presents results for women but with a truncated set of smoking categories. Although smoking is much less common among women, the models show similar (if somewhat weaker) results. Education (the odds ratio for 1-year increase = .82) and nonmanual work (the odds ratio relative to nonworking = .37) lower cigarette smoking; agri-

cultural work, Zambian residence, and other religion increase the use of other tobacco; and urban residence lowers use of other tobacco.

Table 4 shows the relationships—without and with controlling for the variables in Tables 2 and 3—between tobacco use and other health-related behaviors. For men, positive and significant associations appear for heavy smoking with drinking, getting drunk, and paying for sex, as well as for light smoking and other tobacco use with getting drunk. The results for women also indicate associations between alcohol use and tobacco use.

DISCUSSION

My analysis of the data from the DHSs in 2 African nations showed that cigarettes are

used most in urban areas, other forms of tobacco are used most in rural areas, and all forms of tobacco are used most by men. In addition, education has clear negative relationships with tobacco use in any form for both genders. Although occupation is less consistent than education in its influence, higher-SES nonmanual workers tend to smoke less than lower-SES workers in manual and household service jobs. In addition, tobacco use has modest associations with alcohol use and non-Christian or non-Islamic religion.

The population-based estimates of smoking prevalence in Malawi and Zambia sometimes differ from those reported by other sources. The Tobacco Control Country Profiles reported adult smoking prevalence of men and women to be 20% and 9%, respectively, in Malawi and 40% and 7%, respectively, in Zambia.³³ The *Atlas of Heart Disease and Stroke* reported percentages of 31% and 7% for Malawi and 21% and 9% for Zambia for men and women, respectively.³⁴ The cigarette-use figures obtained from the DHS (16–18% for men and 1% for women) fall below those reported elsewhere. Perhaps respondents in the DHS were not forthcoming about their use of tobacco or the limited age ranges hid cigarette use among those younger than 15 years. More likely, however, the representative sample better reflects actual usage. Otherwise, the multivariate results concerning SES differences in tobacco use in Malawi and Zambia confirm findings reported for Uganda and South Africa³⁴ and many non-African nations.³⁵

Despite their similarity in the prevalence and determinants of smoking, the 2 nations differ in social and economic context. Malawi, one of the most impoverished nations in the world, has an economy that depends substantially on tobacco exports.³⁶ Perhaps because government officials benefit from the tobacco economy and viable export alternatives have not been developed, Malawi lacks regulations or restrictions on tobacco use.³³ Zambia has a higher national income than Malawi and more regulations on the purchase of tobacco by youth, smoking in public buildings, and the use of warning labels on cigarette packages.³³ However, neither country has signed the World Health

TABLE 3—Odds Ratios (ORs) and 95% Confidence Intervals (CIs) From Multinomial Logistic Regression Models^a of Tobacco Use: Women in Malawi and Zambia

	Cigarettes ^b	Other Tobacco
Nation		
Malawi	1.00	1.00
Zambia	0.64 (0.38, 1.07)	2.86*** (1.89, 4.33)
Age, y	1.14*** (1.11, 1.17)	1.13*** (1.11, 1.14)
Educational level, y	0.82*** (0.76, 0.87)	0.77*** (0.73, 0.81)
Residence		
Rural	1.00	1.00
Urban	1.88 (0.98, 3.60)	0.59* (0.36, 0.98)
Occupation		
Not working	1.00	1.00
Agriculture	0.66 (0.44, 1.01)	2.15*** (1.45, 3.18)
Household service	0.80 (0.25, 2.56)	1.00 (0.54, 1.87)
Manual	1.00 (0.44, 2.28)	1.33 (0.64, 2.79)
Nonmanual	0.37* (0.16, 0.82)	1.42 (0.74, 2.71)
Married		
Never	1.00	1.00
Currently	0.79 (0.20, 3.15)	1.37 (0.61, 3.07)
Formerly	1.41 (0.30, 6.57)	1.72 (0.72, 4.11)
Religion		
Catholic	1.00	1.00
Protestant	0.83 (0.51, 1.36)	0.96 (0.71, 1.31)
Muslim	0.63 (0.32, 1.24)	0.54* (0.31, 0.93)
Other	2.38 (0.94, 6.05)	2.53** (1.41, 4.54)

Note. Nonsmokers serve as baseline category in ORs. Estimates were based on use of sample weights and adjustment for cluster membership.

^aPseudo- $R^2 = .224$, $n = 20\,809$.

^bLight and heavy cigarette use categories were combined.

* $P < .05$; ** $P < .01$; *** $P < .001$.

Organization Framework Convention on Tobacco Control.

The greater use of tobacco by low-SES groups in these nations contrasts with the experiences of most developed nations, where tobacco use emerged earliest among high-SES groups, but eventually the relationship reversed and became negative.^{37–39} Tobacco use in Malawi and Zambia instead appears to have begun with low-SES groups rather than diffusing to them after adoption by high-SES groups. The cross-sectional surveys do not provide data for previous decades, but given the low levels and early stage of cigarette use, it appears unlikely that a major reversal in SES patterns has occurred. Moreover, additional analyses not included in the tables compared results for younger men (aged 15–29 years) with those of older men (aged

30–59 years) who likely began smoking in earlier decades. These results showed negative relationships of education with smoking for both age groups. Thus, the historical pattern of tobacco diffusion in high-income nations at advanced stages of the tobacco epidemic likely does not provide a model to understand the experiences of these low-income African nations today.

Low-SES groups in low-income nations may lack either the knowledge of the harm of tobacco use or confidence in the claims that tobacco use harms health. Even if less-educated people accept the harm of tobacco use, they may perceive implicitly that, because other risks tend to result in premature death, they have little to lose from tobacco use.⁴⁰ Like the use of alcohol, the use of tobacco may provide a short-term pleasure or

form of self-medication to deal with difficult circumstances.⁴¹ In addition, despite their inability to afford most consumer products used in affluent nations, low-SES groups in middle- and low-income nations (other than the most destitute) can often afford 1 Western product—cigarettes. During recent decades of globalization and trade liberalization, penetration of markets by multinational tobacco corporations has led to price cuts, widespread advertising, escalating competition for sales, and the promotion of positive images of smokers.^{42,43}

Public health officials dealing with tobacco use in low-income nations, much like those in high-income nations, need to focus on disadvantaged groups. However, efforts to target these groups confront special problems in developing nations. The poor face a variety of problems that may pose more immediate threats to health than tobacco use—malnutrition, violence, AIDS, other infectious diseases. Without changes in tobacco use, however, the long-term benefits of other public health improvements may be limited. With the adoption of tobacco use by lower-status groups, price increases, along with government restrictions, could do much to limit tobacco use in these nations.² Because low-income groups are generally responsive to price increases, tobacco taxes may be particularly effective in reducing tobacco use in low-income nations such as Malawi and Zambia, particularly when combined with limitations on marketing and advertising of tobacco products. If raising prices limits tobacco use, it also could prevent the diversion of limited funds of poor families away from food, education, and health care.

Although the DHS has the advantage of representative samples and comparable questions, it suffers from a lack of detail on tobacco use. The 2001 Global Youth Tobacco Survey of 13- to 15-year-olds in 2 major cities of Malawi revealed early initiation; 22.3% and 28.6% of the boys and 7.8% and 10.1% of the girls had ever used cigarettes.⁴⁴ Measures of the ages of starting in surveys of adults would help identify the point of highest risk for initiation of tobacco use and measures of cessation would help identify the source of current prevalence. Such data would be most useful if it were available for other developing nations at the early stages of the tobacco epi-

TABLE 4—Odds Ratios (ORs) and 95% Confidence Intervals (CIs) for Health-Related Lifestyle Variables From Multinomial Logistic Regression Models of Tobacco Use: Men and Women in Malawi and Zambia

	Cigarettes, Light Use (<5/d)	Cigarettes, Heavy Use (≥5/d)	Other Tobacco
Men—no controls			
Days drank alcohol past 3 mos	1.00 (0.99, 1.01)	1.02 (1.01, 1.02)***	0.99 (0.98, 1.00)
Been drunk past 3 mos (1 = yes; 0 = no)	4.04 (3.17, 5.15)***	4.10 (3.09, 5.44)***	5.62 (4.17, 7.58)***
Ever paid for sex (1 = yes; 0 = no)	1.43 (1.12, 1.83)**	2.03 (1.53, 2.71)***	0.97 (0.72, 1.30)
Men—with controls ^a			
Days drank alcohol past 3 mos	1.00 (0.99, 1.01)	1.02 (1.01, 1.03)***	1.00 (0.99, 1.01)
Been drunk past 3 mos (1 = yes; 0 = no)	4.36 (3.28, 5.80)***	4.59 (3.33, 6.34)***	4.64 (3.29, 6.54)***
Ever paid for sex (1 = yes; 0 = no)	1.26 (0.97, 1.63)	1.89 (1.42, 2.50)***	0.94 (0.68, 1.31)
Women—no controls			
Days drank alcohol past 3 mos	1.05 (1.03, 1.08)***	^b	1.03 (1.01, 1.05)*
Been drunk past 3 mos (1 = yes; 0 = no)	7.05 (4.62, 10.77)***	^b	8.80 (6.51, 11.89)***
Women—with controls ^a			
Days drank alcohol past 3 mos	1.04 (1.02, 1.07)**	^b	1.02 (1.00, 1.05)*
Been drunk past 3 mos (1 = yes; 0 = no)	5.41 (3.36, 8.72)***	^b	5.07 (3.81, 6.74)***

Note. Nonsmokers serve as baseline categories in ORs. Estimates were based on use of sample weights and adjustment for cluster membership. No. men = 5107; no. women = 20 752.

^aControl variables included nation, age, urban residence, educational level, occupation, marital status, and religion (as in Tables 2 and 3).

^bLight and heavy cigarette use categories were combined.

* $P < .05$; ** $P < .01$; *** $P < .001$.

demic. Malawi and Zambia, while offering valuable insight into patterns of tobacco use, are by no means representative of the continent. Still further, validation studies of self-reported tobacco use in developing countries are needed.

The DHS cross-sectional data also limit causal inferences. Questions on work, religion, residence, and marital status measure current characteristics rather than those at the time a person begins to smoke. Current characteristics affect the propensity for current smokers to continue but otherwise affect past tobacco use only if they reflect, at least to some extent, the characteristics at the time of earlier initiation or cessation. To the extent that the characteristics change, it may attenuate contemporaneous relationships. Longitudinal data on tobacco use over the life course would provide more reliable causal inferences, but these data are rarely available in developing nations. ■

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Human Participant Protection

The human research committee at the University of Colorado, Boulder, approved the project as exempt from further review.

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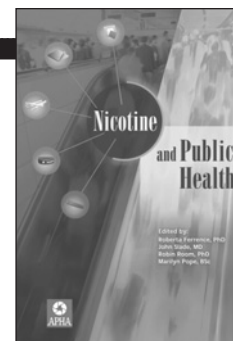
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Nicotine and Public Health

Edited by Roberta Ferrence, PhD,
John Slade, MD, Robin Room, PhD,
and Marilyn Pope, BSc

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