

## ORIGINAL RESEARCH

# Predictors of cigarette smoking among adolescents in rural Zambia: results from a cross sectional study from Chongwe district

S Siziya<sup>1</sup>, E Rudatsikira<sup>2</sup>, AS Muula<sup>3</sup>, PRT Ntata<sup>3</sup>

<sup>1</sup>University of Zambia, Department of Community Medicine, Lusaka, Zambia

<sup>2</sup>School of Public Health, Loma Linda University, Loma Linda, CA, USA

<sup>3</sup>University of Malawi, Malawi

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**Siziya S, Rudatsikira E, Muula AS, Ntata PRT**

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## ABSTRACT

**Introduction:** Cigarette smoking is a leading cause of morbidity and mortality globally. There are limited data on the prevalence of and factors associated with smoking among in-school adolescents in developing countries. Objectives: To estimate prevalence of those who have smoked cigarettes and to identify associated socio-demographic factors among adolescents in Chongwe district, Lusaka Province, Zambia.

**Methods:** Data used was from the Zambia Global Youth Tobacco Survey, which was conducted using standardized methodology among in-school adolescents in 2002. Data were analyzed to assess if selected socio-demographic variables were associated with having smoked cigarettes. Bivariate and multivariate logistic regression analysis was used to assess the associations.

**Results:** A history of having smoked cigarettes ranged from 20.5% among 15 year olds to 37.2% among males younger than 12 years old. In females, 20.7% of 13 year olds and 37.7% of those less than 12 years old had smoked. Parental smoking, friends smoking, a lack of perception that smoking was harmful, and exposure to pro-tobacco advertisements were associated with having smoked cigarettes. Adolescents who had smoked cigarettes were more likely to allow others smoke in their presence.

**Conclusions:** Many adolescents in rural Luangwa, Zambia had tried cigarette smoking. The identification of predictors for smoking should guide the design and implementation of programs aimed to prevent initiation and maintenance of tobacco use among adolescents.



**Key words:** adolescent health, Chongwe, cigarette smoking, tobacco, Zambia.

## Introduction

Cigarette smoking is the single most common cause of preventable morbidity and mortality globally. It is estimated that by 2020, tobacco-related deaths will be the leading cause of deaths in developing countries<sup>1,2</sup>. While smoking is an important disease risk factor on its own, many adolescents who smoke also have unhealthy lifestyle clusters such as smoking, alcohol use and illicit drug use<sup>3</sup>. Smoking may, therefore, be a marker of other harmful adolescents behaviours.

Research into adolescent cigarette smoking has mostly been conducted with current smoking status as the main outcome. However, the history of previous smoking is an important predictor of current or future smoking<sup>4</sup>. Also, studies into adolescent cigarette smoking have generally reported on the prevalence of smoking without consideration of relevant potential associations with socio-demographic factors. However, the identification of such factors can best inform the design and implementation of public health interventions aimed to reduce adolescent tobacco use. We report on a study aimed to estimate the prevalence of having smoked cigarettes, and its association with relevant socio-demographic characteristics.

## Methods

The data were obtained in a cross-sectional school-based survey conducted under the Zambia Global Youth Tobacco Survey (GYTS) in 2002. The GYTS aimed to enroll students aged 13–15 years in order to estimate the prevalence of various forms of tobacco use and relevant socio-demographic variables. School grades likely to have students within the selected age range (13-15 years) were identified. For Zambia, these

were students in grades 7 to 9. Identification of study participants was conducted through probability sampling using a multistage sample design. Schools were the primary sampling units, while classes were the secondary sampling units. All the students within the selected classes were eligible to participate regardless of their actual ages, therefore some students participated although they were outside the selected age range. The school response rate was 100% while the student response rate was 78.3%. A standardised questionnaire was self-completed anonymously by the students, and this it took between 30 and 40 min. The GYTS core questionnaire collected information on: cigarette smoking (current and ever); knowledge and attitudes of young people towards cigarette smoking; exposure to various media and advertisements on tobacco; access to cigarettes; tobacco-related school curriculum; exposure to environmental tobacco smoke (ETS); and cessation of cigarette smoking. For the purpose of this study, however, only data related to a history of having smoked cigarettes and associated factors were analyzed. A comprehensive description of GYTS methodology has been reported by Warren et al.<sup>5</sup> and the Global Youth Tobacco Surveillance Collaborative Group<sup>6</sup>.

### *Study setting*

Chongwe district is a rural area and spans for about 100 km from the outskirts of Lusaka, Zambia's capital city. Chongwe's population is approximately 148 000. Agriculture and charcoal production are the main sources of livelihoods, with the Chongwe district being the largest source of charcoal for Lusaka. The district is served by 15 health centers and a mission hospital;



some of the health centers are located over 40 km from main roads<sup>7</sup>.

## ***Data analysis***

Data were analysed using SPSS v 14.0 (SPSS Inc; Chicago, IL, USA). It was aimed to assess the prevalence of having smoked cigarettes, stratified by sex. Bivariate logistic regression analyses were conducted to obtain an unadjusted odds ratio between having smoked and explanatory variables of interest (Model 1). Model 2 was multivariate analysis with the explanatory variable of interest as the main exposure controlling for the other variables.

## ***Ethical considerations***

Permission to conduct this study was obtained from the Zambian Ministry of Education. Parents and guardians were informed of the study. Parents who did not want their children to participate were asked to inform their children not to participate. All students were informed that they were free not to participate or not to answer any questions on the questionnaire. The questionnaire was completed in class time. Students who did not want to participate remained in class but could submit an uncompleted questionnaire, because excluding them from the class was potentially stigmatizing. To preserve individual confidentiality, the questionnaires were self-completed anonymously by the student. School teachers were not in the classrooms at the time of questionnaire completion.

## **Results**

### ***Distribution of having smoked cigarettes by socio-economic variables***

The prevalence of a history of having smoked cigarettes - even a single puff - was assessed. The results are

presented (Table 1). Overall, the proportion of adolescents who reported having smoked was 27.0% (26.8-27.2). Generally all age groups had a prevalence exceeding 20%. However, the extremes of the age group had the highest history of having smoked. A similar distribution was observed for class grades where the lowest and highest grades had higher prevalence than the middle grade. Adolescents whose parents were smokers or whose friends were smokers were themselves more likely to have smoked.

### ***Attitudes towards smoking***

It was also aimed to assess attitudes towards smoking. In general, study participants had negative attitudes towards tobacco or smoking. There were, however, exceptions: for instance, the finding that favouring banning smoking in public and the perception that environmental exposure was harmful were associated with having smoked. The other results are presented (Table 2).

### ***Tobacco advertisements and smoking***

It was also aimed to determine if having smoked was associated with exposure to different forms of tobacco advertisements, owning a cigarette-logo branded item, and exposure to pro-tobacco advertisements at sports or social events. Exposure to both forms of advertisements were associated with having been a smoker. Detailed results are presented (Table 3).

## **Discussion**

Our study found that the prevalence of having smoked cigarettes among in-school adolescents in Chongwe district, Zambia was 27%. This prevalence is lower than the 31% reported by Mpabulungi and Muula for Arua, rural Uganda<sup>8</sup>, and the reason for this is unknown. One



possible explanation is that Arua's economy largely depends on tobacco farming, while Chongwe's does not, and so there may be a greater tolerance of tobacco use in Arua. Other unknown country-level factors may account for the differences between the two districts (eg in the Greek GYTS, Kyrlesi et al.<sup>9</sup> reported a 32.2% prevalence of having smoked among 13-15 year-old

adolescents). While the present study revealed no gender differences, another study of Zambian adults identified a higher prevalence among males<sup>10</sup>.

**Table I: Demographic factors associated with having tried cigarette smoking among school going adolescents in Chongwe district, Zambia**

Factor	Male				Female			
	Total	n (%)	Model 1	Model 2	Total	n (%)	Model 1	Model 2
			OR (95% CI)				OR (95% CI)	
Age (years)	<i>p</i> = 0.015				<i>p</i> = 0.079			
<12	78	29 (37.2)	1.38 (0.91, 2.09)	-	77	29 (37.7)	1.74 (1.14, 2.64)	-
12	77	25 (32.5)	1.12 (0.73, 1.72)		95	24 (25.3)	0.97 (0.64, 1.48)	
13	115	34 (29.6)	0.98 (0.68, 1.41)		140	29 (20.7)	0.75 (0.51, 1.10)	
14	133	34 (25.6)	0.80 (0.56, 1.15)		152	35 (23.0)	0.86 (0.60, 1.23)	
15	176	36 (20.5)	0.60 (0.43, 0.84)		147	34 (23.1)	0.87 (0.60, 1.24)	
16	191	58 (30.4)	1.02 (0.75, 1.37)		141	31 (22.0)	0.81 (0.56, 1.18)	
≥17	209	77 (36.8)	1		141	31 (31.3)	1	
Grade	<i>p</i> = 0.379				<i>p</i> < 0.001			
7	416	125 (30.0)	1.00 (0.84, 1.21)	-	383	125 (32.6)	1.52 (1.28, 1.94)	1.63 (1.24, 2.14)
8	322	88 (27.3)	0.88 (0.72, 1.07)		283	45 (15.9)	0.61 (0.48, 0.79)	0.62 (0.45, 0.86)
9	251	82 (32.7)	1		190	46 (24.2)	1	1
Parents smoked	<i>p</i> < 0.001				<i>p</i> < 0.001			
None	593	144 (24.3)	0.72 (0.62, 0.84)	-	548	88 (16.1)	0.50 (0.42, 0.60)	0.58 (0.47, 0.72)
Either parent smoked	286	109 (38.1)	1		227	98 (43.2)	1	1
Closest friends smoke	<i>p</i> < 0.001				<i>p</i> < 0.001			
None	610	120 (19.7)	0.38 (0.31, 0.48)	0.45 (0.34, 0.58)	585	104 (17.8)	0.42 (0.34, 0.53)	0.47 (0.35, 0.64)
Some of them	126	126 (43.4)	1.20 (0.96, 1.51)	1.09 (0.83, 1.43)	184	64 (34.8)	1.04 (0.81, 1.35)	1.02 (0.72, 1.43)
Most or all of them	81	47 (58.0)	1	1	82	44 (53.7)	1	1



**Table 2: Attitudes about smoking, and factors associated with having tried cigarette smoking among school going adolescents in Chongwe district, Zambia**

Factor	Male				Female			
	Total	n (%)	Model 1	Model 2	Total	n (%)	Model 1	Model 2
			OR (95% CI)				OR (95% CI)	
Cigarette smoking is harmful to health	<i>p</i> = 0.040				<i>p</i> < 0.001			
Definitely not	307	95 (30.9)	1.00 (0.80, 1.25)	1.40 (1.03, 1.90)	301	75 (24.9)	0.99 (0.77, 1.26)	1.48 (1.06, 2.06)
Probably not	135	45 (33.3)	1.11 (0.83, 1.49)	1.06 (0.71, 1.58)	128	40 (31.3)	1.35 (0.99, 1.84)	0.99 (0.64, 1.54)
Probably yes	143	51 (35.7)	1.23 (0.93, 1.64)	0.96 (0.65, 1.40)	135	30 (22.2)	0.85 (0.61, 1.18)	0.59 (0.36, 0.97)
Definitely yes	397	98 (24.7)	1	1	282	65 (23.0)	1	1
Smoking makes people comfortable	<i>p</i> = 0.132				<i>p</i> = 0.350			
More comfortable	386	124 (32.1)	1.10 (0.91, 1.33)	-	308	68 (22.1)	0.85 (0.68, 1.07)	-
Less comfortable	409	107 (26.2)	0.83 (0.68, 1.00)		359	90 (25.1)	1.01 (0.81, 1.25)	
No difference from non-smokers	187	60 (32.1)	1		176	49 (27.8)	1	
Smoke from other people's cigarettes is harmful to health	<i>p</i> = 0.016				<i>p</i> = 0.112			
Definitely not	367	88 (24.0)	0.69 (0.55, 0.87)	0.57 (0.42, 0.77)	341	78 (22.9)	0.84 (0.66, 1.07)	-
Probably not	156	54 (34.6)	1.16 (0.88, 1.53)	1.00 (0.68, 1.47)	166	44 (26.5)	1.02 (0.76, 1.37)	
Probably yes	132	47 (35.6)	1.22 (0.91, 1.63)	1.14 (0.78, 1.67)	124	41 (33.1)	1.40 (1.03, 1.91)	
Definitely yes	331	105 (31.7)	1	1	221	50 (22.6)	1	
Would let someone smoke in their presence	<i>p</i> < 0.001				<i>p</i> = 0.054			
Yes	224	95 (38.9)	1.36 (1.17, 1.59)	1.31 (1.08, 1.58)	211	62 (29.4)	1.28 (1.14, 1.44)	-
No	721	185 (25.7)	1	1	627	141 (22.5)	1	
Favours public smoking ban	<i>p</i> = 0.045				<i>p</i> = 0.041			
Yes	353	119 (33.7)	1.16 (1.01, 1.34)	-	350	100 (28.6)	1.19 (1.01, 1.39)	-
No	624	171 (27.4)	1		496	110 (22.2)	1	



**Table 3: Associations between advertisements and having tried cigarette smoking among school-going adolescents in Chongwe district, Zambia**

Factor	Male				Female			
	Total	n (%)	Model 1	Model 2	Total	n (%)	Model 1	Model 2
			OR (95% CI)				OR (95% CI)	
Had an item with a cigarette brand logo	$p < 0.001$				$p < 0.001$			
Yes	209	108 (51.7)	1.87 (1.59, 2.19)	1.61 (1.32, 1.96)	193	79 (40.9)	1.72 (1.44, 2.04)	1.54 (1.24, 1.92)
No	759	177 (23.5)	1	1	630	120 (19.0)	1	1
Exposure to cigarette advertisements at sports or at other social events	$p = 0.002$				$p = 0.007$			
Never attend the events	290	73 (25.2)	0.77 (0.61, 0.97)	0.68 (0.51, 0.92)	262	58 (22.1)	0.84 (0.64, 1.08)	-
A lot	196	74 (37.8)	1.38 (1.08, 1.77)	1.47 (1.07, 2.00)	197	62 (31.5)	1.35 (1.04, 1.76)	
Sometimes	187	66 (35.3)	1.24 (0.96, 1.60)	1.08 (0.79, 1.48)	152	46 (30.3)	1.28 (0.95, 1.71)	
Never	298	75 (25.2)	1	1	230	44 (19.1)	1	

Our study identified that having a parent who smoked was associated with the adolescent having smoked. Ornelas et al.<sup>11</sup>, in their US study on parental influence on adolescent physical activity, found that parent-child communication and family cohesiveness were important influencing factors. Although that study found that parental monitoring was not a good predictor of adolescent physical activity, Arredondo et al.<sup>12</sup> reported that parental monitoring was a good predictor of adolescent healthy eating and physical activity. Factors involved in parents influencing adolescents' smoking may include permissiveness, the availability of cigarettes in the home and role modeling, and this should be investigated further.

Thomas et al.'s systematic review of family-based tobacco-control programs aimed at preventing adolescent smoking<sup>13</sup>, suggested that well-conducted programs were effective. School-based programs may also be effective<sup>14</sup>.

In our study, adolescents who perceived tobacco smoke to be harmful to their health were less likely to have smoked than those who were not concerned about the harmful effects of tobacco. This was also reported by Rodriguez et al.<sup>15</sup>. This suggests an opportunity to change adolescents' beliefs about smoking, by using the media to reduce smoking behavior.

It has been established that tobacco promotion directed at adolescents encourages the uptake and maintenance of smoking<sup>16,17</sup>. Gritz et al. reported that exposure to pro-tobacco advertisements was a strong predictor of being a smoker among US adolescents<sup>18</sup>. Our study supports this trend among adolescents in Chongwe.

Many previous studies have reported the association between adolescent smoking and having a friend who smokes. Bricker et al. found that smoking among adolescents' friends could influence both the initiation of smoking and maintenance of the habit<sup>19</sup>. Our results





suggested that adolescents who had smoked were likely to have had friends who were smokers. Whether friends influenced the initiation of smoking, or whether adolescent smokers are more likely to choose other smokers as friends requires further study.

In our study, 15 year olds had the lowest prevalence of smoking (20.5%), compared with younger and older adolescents. This was an unexpected finding and the reasons should be explored further.

Limitations to the present study include that participants may have under-reported their smoking status, as was demonstrated in a Tanzanian adult-smoking study<sup>20</sup>. And, in our study, as the sample was drawn from schools, the findings may not be applicable to out of school adolescents.

## Conclusions

Many adolescents in rural Chongwe, Zambia, have tried cigarette smoking, and associated factors among in-school adolescents in Chongwe have been identified. The identification of predictors of smoking should guide the design and implementation of programs aimed to prevent the initiation and maintenance of tobacco use among adolescents.

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**Correction:** Changes were made to the title and text on 3 October 2007, as follow: (1) In the title, "Luangwa" was changed to "Chongwe"; (2) in the abstract introduction, "Luangwa" was changed to "Lusaka", and in the abstract conclusion, "Luangwa" was changed to "Chongwe"; (3) in the legends of Tables 1,2,& 3, "Chongwe and Luangwa" was changed to "Chongwe"; (4) in the Conclusions, "Luangwa" was changed to "Chongwe".