



Published in final edited form as:

*Tob Control*. 2017 May ; 26(3): 330–333. doi:10.1136/tobaccocontrol-2015-052878.

## Factors influencing cigarette smoking among soldiers and costs of soldier smoking in the work place at Kakiri Barracks, Uganda

Robert Basaza, Ph.D.<sup>1,2</sup>, Emmanuel Otieno<sup>1,3</sup>, Ambrose Musinguzi<sup>3</sup>, Posy Mugenyi<sup>4</sup>, and Christopher K. Haddock, Ph.D.<sup>5</sup>

<sup>1</sup>International Health Sciences University Kampala, Uganda <sup>2</sup>School of Medicine Makerere University Kampala, Uganda <sup>3</sup>Uganda Peoples Defense Forces <sup>4</sup>Centre for Tobacco Control in Africa Makerere University School of Public Health Kampala, Uganda <sup>5</sup>National Development and Research Institutes, Inc., USA

### Abstract

**Background**—Although Uganda has a relatively low prevalence of smoking, no data exists on cigarette use among military personnel. Studies in other countries suggests military service is a risk factor for tobacco use.

**Objectives**—To assess prevalence and risk factors for and costs of smoking among military personnel assigned to a large military facility in Uganda.

**Design**—A mixed methods study including focus groups, interviews, and a cross-sectional survey of military personnel.

**Setting**—Kakiri Barracks, Uganda

**Subjects**—Key informants and focus group participants were purposively selected based on the objectives of the study, military rank and job categories. A multi stage sample design was used to survey individuals serving in Uganda People’s Defense Forces (UPDF) from June–November 2014 for the survey (n = 310).

**Results**—Participants in the qualitative portion of the study reported that smoking was harmful to health and the national economy and that its use was increasing among UPDF personnel. Survey results suggested that smoking rates in the military were substantially higher than in the general public (i.e., 34.8% vs. 5.3%). Significant predictors of smoking included lower education, younger age, having close friends who smoked and a history of military deployment. Estimated costs of smoking due to lost productivity was US\$576,229 and US\$212,400 for excess healthcare costs.

---

Corresponding author: Christopher K. Haddock, Ph.D., National Development and Research Institutes, Inc., Institute for Biobehavioral Health Research, 1920 West 143<sup>rd</sup> Street, Suite 120, Leawood, KS 66224 USA, keithhaddock@hopehri.com.

**Contributorship Statement:** RB, EO, PM, AM planned the study. RB and EO conducted a survey. RB, EO, KD conducted the data analysis. KH consulted on the analyses. All the authors contributed to writing the manuscript. RB, EO, KH are responsible for the overall content as guarantor(s).

**Competing Interests:** None

**Conclusion**—Smoking rates are substantially higher in the UPDF compared to the general public and results in significant productivity costs. Interventions designed to reduce smoking among UPDF personnel should be included in the country's national tobacco control plan.

### Keywords

Disparities; Low/Middle Income country; Priority/special populations; Public Policy

Uganda has a relatively low cigarette smoking prevalence of 5.8% and overall tobacco use prevalence of 7.9%<sup>1</sup>. Nonetheless, it loses 13,500 citizens each year to tobacco related disease and spends approximately US\$ 40.8 million per year on tobacco-related illnesses<sup>2</sup>. Uganda ratified the WHO Framework for Convention of Tobacco Control (FCTC) in 2007<sup>3</sup>. Subsequently, Uganda passed a comprehensive national tobacco control law which requires smoke-free indoor public spaces, graphic health warnings covering 65% of tobacco packaging, and a ban on tobacco advertising<sup>4</sup>. However, the Uganda military does not enforce national clean air legislation.

In the United States (US), tobacco use is higher among military personnel compared to the general population<sup>5</sup>. In fact, it has been argued that military service is a risk factor for tobacco use<sup>6</sup>. The Military profession demands optimum fitness levels of its members. However, cigarette smoking is a known negative marker for military performance,<sup>7</sup> compromises physical fitness,<sup>8</sup> increases medical and training costs,<sup>9</sup> and increases absenteeism, presenteeism and low productivity.<sup>10</sup> Given the military's role in the national defense, the harms of tobacco use are a national security issue and has lead scientists call for the elimination of tobacco use among US military personnel<sup>10, 11</sup>.

No published data exist on tobacco use in the Ugandan military. The Ugandan military, called the Uganda People's Defense Force (UPDF), consists of approximately 45,000 active and 2,000 reserve personnel<sup>12, 13</sup>. Military personnel in Uganda are likely at increased risk for tobacco use due to their military service and predominately male gender. Males in Uganda have nearly three times the rate of tobacco use as females (11.6% versus 4.6%). Given Uganda's commitment to comprehensive tobacco control policy and the fact that military service has been found to be a risk for tobacco in other countries, research on tobacco use in the UPDF is needed. This study provides the first data on attitudes toward smoking, smoking prevalence, risk factors, and costs in the UPDF.

### Methodology

This mixed-methods study was conducted during the period from June to December 2014 at the Kakiri Military Barracks, Wakiso District, Uganda. This is a typical military barracks with soldiers of similar ranks and job classifications to other barracks, with approximately 6,000 UPDF military personnel. The primary purpose of the study was to assess attitudes toward smoking, prevalence of smoking, and factors influencing cigarette smoking among Uganda military personnel. Assessment methods included qualitative interviews and a cross-sectional survey.

## Qualitative Methods

Qualitative data were collected through two focus group discussions and 17 key informant interviews using an interview guide. Key informants and focus group participants were purposively selected based on the objectives of the study, expertise in health, job category, and ranks. Focus group discussion respondents were also conveniently selected based on location of residence in the barracks. To our knowledge, this is the only existing qualitative data on how Uganda military personnel think about the impact of tobacco in the tobacco control literature. Topics for discussion included general issues about the prevalence and health effects of smoking and impact of smoking on the UPDF. Given space limitations, data from focus groups and interviews are presented together.

## Survey Methods

A 48-item survey was developed for use in this study. The survey was a printed self-administered questionnaire with items adapted from previous studies<sup>14, 15</sup>. The survey items were pretested for content and reliability with 21 soldiers (5% of the total sample size) prior to use in the larger study. Survey items assessed demographics, frequency and quantity of smoking, sick days, smoking breaks, and history of deployment. Current smokers were defined as those who smoked cigarettes regularly or occasionally while nonsmokers included former and never smokers. Eligible participants in the survey were military personnel age 18–54 years. A multistage cluster sampling strategy was used to develop the survey sample. Simple random sampling was done to select Kakiri military barracks out of the total five regional barracks in 1<sup>st</sup> stage. Next, sampling was stratified by the two primary units at Kakiri, General Army (GA) and Specialized Forces (SF), in 2<sup>nd</sup> stage. Then in 3<sup>rd</sup> stage systematic random sampling was done in the respective categories and sample was drawn from each category. Based on the total number of soldiers in each category we drew 80% and 20 % of the sample size from the specialized forces and general army population respectively. Proportionate to the size of each survey strata in stage 2, our recruitment target was 340 respondents from the SF and 86 respondents from GA. Barracks were numbered and even numbers were visited to solicit participants.

## Statistical Modeling

Economic analyses were modeled after procedures presented in Berman et al<sup>16</sup>. Cross sectional data was used to estimate the annual cost of smoking. Cost analysis assumed that factors other than smoking impacting costs impacted smokers and nonsmokers equally. Data entry and analysis were conducted using Epidata info 2000 and then exported to SPSS software version 16. Chi-square tests and logistic regression were used for modeling of discrete data and Pearson correlation was used for quantitative variables. Univariate logistic regression models were developed to test the impact of education, age, number of friends who smoked, military rank, and history of military deployment on smoking. Results were considered statistically significant at p-value < 0.05.

## Ethical considerations

Ethical approval was obtained from the Research and Ethics Committee of the International Health Science University.

## Results

### Qualitative Data

Participants generally believed that smoking is increasing among military personnel. Referring to personnel at the Kakiri Barracks, one participant said “All time is cigarette time. Sometimes smokers abandon work in preference to smoking”. Participants were divided on whether the culture within the UPDF promoted tobacco use. For instance, one participant noted that “not everybody smokes in the military so if it was culture everyone would be smoking” while another noted that “we smoke to stay awake, alert, and concentrate on duty...smoking is our companion that soothes our stress”. All participants noted that quitting tobacco was difficult. In fact, one participant said that “cigarette smoking is an invisible commander on its own victims”. Thus, although participants in the focus groups and interviews were divided on whether the military culture encouraged use, they generally believed that tobacco is harmful to health and the national economy, that use is increasing in the military and that nicotine addiction was difficult to overcome.

### Survey Data

**Smoking Prevalence and Risk Factors**—Out of the 426 military personnel solicited, 73.4% (n = 310) completed the survey (see Table 1). Current smoking was reported by 35.7% of males and 25.0% of females; prevalence rates dramatically higher than those found in the general Uganda population. Risk factors for smoking included lower educational attainment, younger age, having close friends who smoked, and previously being deployed abroad.

The majority of participants (85%) reported that smoking is harmful to both users and non-smokers. Among smokers 34.8% believed smoking was harmful compared to 65.2% of non-smokers. The majority of the participants (90.6%) believed smoking is a burden on the national economy. Also, 92.5% of smokers and 97.5% of nonsmokers agreed that current UPDF smoking policy has weak to average effectiveness.

### Costs of Smoking to the UPDF

**Absenteeism**—Smokers reported a substantially higher average number of days absent from work than nonsmokers (11.6 versus 3.2). Thus, the excess days absent due to smoking was 8.4. Given a rate of average of Ugshs 403 per hour<sup>17</sup> and 9 hour work day (which included the standard 8 hrs work and one hour for unpaid overtime), this calculates to a cost of 30,466.8 Ugshs. per soldier per year.

**Lost productivity**—Based on survey responses, we estimated average time for a smoking break among smokers was 13.96 minutes. Smokers reported consuming, on average, approximately 10 cigarettes per day. We conservatively assumed that half (i.e., 5; consistent

with Berman et al.<sup>16</sup>) of the cigarettes were smoked during work hours. All personnel are provided three sanctioned breaks per duty day. We assumed that smokers took an additional two non-sanctioned breaks per day to smoke, consistent with Berman and colleagues.<sup>16</sup> Given these assumptions, personnel who smoke spend 27.92 minutes per day in additional breaks. Military personnel in Uganda work, on average, 235 days per year (i.e., calendar year less weekends and public holidays). Thus, excess breaks due to smoking costs Ugshs. 88,138.8 per smoker per year (i.e., 2 breaks  $\times$  (27.92min/60)  $\times$  Ugshs. 403  $\times$  235 days). We excluded the costs of premature death given it typically does not result in employer costs, particularly for the military where personnel are relatively young.

**Presenteeism**—Presenteeism is lower productivity and performance at work due to nicotine addiction<sup>16, 18, 19</sup>. Although no studies have been done in Uganda, studies investigating the impact of smoking on presenteeism have reached similar conclusions; namely, smoking results in lost productivity due to presenteeism of 1% to 4% per year<sup>16</sup>. Thus, we conservatively assumed a 1% decrease in productivity due to presenteeism. The lost productivity due to presenteeism was UgShs 8,523.45 (1%  $\times$  403 UgShs per hour  $\times$  9 hours  $\times$  235 days).

**Excess Health Care Costs to UPDF**—According to Berman et al.<sup>16</sup> the excess health care costs due to smoking per smoking employee can be calculated as: (Employer Health Care Expenditure  $\times$  Adjusted Smoking Attributable Fraction (SA%))/Number of Smoking Employees. The estimated health care costs per person per year in Uganda is \$US59.<sup>20</sup> There are approximately 45,000 active duty soldiers in the UPDF. Thus, total health care costs is estimated as US\$59  $\times$  45,000 or US\$2,655,000. We found a current smoking rate of 34.8%. According to Berman and colleagues<sup>16</sup>, it is reasonable to assume an 8% SA% in the calculation of excess health care costs. Thus, the excess costs of healthcare due to smoking is estimated as (\$2,655,000  $\times$  0.08)/15,660 = \$13.56 per smoker, or US\$212,400 in total.

**Overall Costs of Smoking to UPDF**—Lost productivity due to smoking (absenteeism + smoking breaks + presenteeism) costs the UPDF Ugshs.127,129.05 per year per smoker or Ugshs.1,990,840,923 total (127,129.05  $\times$  45,000  $\times$  0.348) for active duty personnel. This is approximately US\$576,229. Adding the excess costs of healthcare due to smoking to this figure results in a total cost of smoking to the UPDF of US\$788,629.

## Conclusion

Smoking among UPDF personnel was substantially higher than rates among the general Uganda population. Risk factors for smoking included lower age and education, close friends who smoke, and a history of military deployment. Smokers reported substantially more days absent from work, time away from work due to smoke breaks, and lower presenteeism than nonsmokers. Furthermore, smoking resulted in significant financial costs due to lost productivity and increased health care costs among smokers compared to nonsmokers. These data suggest that interventions and policy targeted toward UPDF personnel should be integral part of Uganda's national tobacco control plan so as to reverse the substantial loss in the economy in terms of lost productivity that is presented as absenteeism, presenteeism and smoking breaks. Finally, cigarette smoking poses a national

security risk because of the negative effect on combat readiness. We recommend that the UPDF: (1) introduce tobacco cessation services in the Uganda health care system serving military personnel with an emphasis on training tobacco cessation counselors and mental health professionals in tobacco cessation treatment. (2) Develop comprehensive military tobacco control strategies and smoke free policies for the UPDF. (3) Require military academies and officer training programs to be tobacco-free. There are limitations to this study. First, the study was conducted at one large military barracks in Uganda. Although Kakiri is a typical barracks in the UPDF, additional research is needed to ensure the results generalize the military as a whole. Also, social desirability bias may have resulted in smokers understating the number of smoking breaks and absent days. However, this suggests our cost calculations are likely conservative.

## Acknowledgments

The authors are most grateful to all individuals and respondents who participated in the study.

**Funding:** This work was supported by United States National Institute on Drug Abuse grant R01DA036507 (Barriers to Effective Tobacco Control in the US Military; Christopher K Haddock and Ruth Malone, Principal Investigators).

## References

1. Ministry of Health. [accessed 23 October 2015] Report of Global Adult Tobacco Survey in Uganda, 2013. 2013. [http://global.tobaccofreekids.org/files/pdfs/en/GATS\\_uganda\\_summary\\_2013.pdf](http://global.tobaccofreekids.org/files/pdfs/en/GATS_uganda_summary_2013.pdf)
2. Uganda Bureau of Statistics, ICF International I. [accessed 23 October 2014] Uganda Demographic and Health Survey 2011. 2012. <https://dhsprogram.com/pubs/pdf/FR264/FR264.pdf>
3. World Health Organization. WHO report on Joint national capacity assessment on the implementation of effective tobacco control policies in Uganda. 2012. [http://apps.who.int/iris/bitstream/10665/76701/1/9789241504577\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/76701/1/9789241504577_eng.pdf)
4. Tobacco Free Kids. [accessed 23 October 2015] Uganda sets powerful example with comprehensive tobacco control law. 2015. [http://global.tobaccofreekids.org/en/global\\_updates/detail/2015\\_07\\_30\\_uganda](http://global.tobaccofreekids.org/en/global_updates/detail/2015_07_30_uganda)
5. Barlas, FM., Higgins, WB., Pflieger, JC., et al. 2011 Health Related Behaviors Survey of Activity Duty Military Personnel. 2013. DTIC Document <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA582287>
6. Smith EA, Malone RE. Mediatory myths in the U.S. military: tobacco use as “stress relief”. *American journal of health promotion : AJHP*. 2014; 29(2):115–22. [PubMed: 24359178]
7. Hussain NA, Akande M, Adebayo ET. Prevalence of cigarette smoking and knowledge implications among Nigerian soldiers of its health. *East African journal of public health*. 2010; 7(1):81–3. [PubMed: 21413579]
8. Woodruff SI, Conway TL, Shillington AM, et al. Cigarette smoking and subsequent hospitalization in a cohort of young U.S. Navy female recruits. *Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco*. 2010; 12(4):365–73. [PubMed: 20156886]
9. Smith EA, Malone RE. “Everywhere the soldier will be”: wartime tobacco promotion in the US military. *American journal of public health*. 2009; 99(9):1595–602. [PubMed: 19608945]
10. Bondurant, S., Wedge, R., editors. Institute of Medicine Committee on Smoking Cessation in Military and Veteran Populations. *Combating Tobacco Use in Military and Veteran Populations*. Washington (DC): National Academies Press (US); 2009. Copyright 2009 by the National Academy of Sciences. All rights reserved
11. Smith EA, Jahnke SA, Poston WS, et al. Is it time for a tobacco-free military? *The New England journal of medicine*. 2014; 371(7):589–91. [PubMed: 24988299]

12. DefenseWeb. [accessed 23 Oct 2015] Uganda Peoples Defense Force. 2015. [http://www.defenceweb.co.za/index.php?option=com\\_content&view=article&id=37705:uganda-peoples-defence-force&catid=119:african-militaries](http://www.defenceweb.co.za/index.php?option=com_content&view=article&id=37705:uganda-peoples-defence-force&catid=119:african-militaries)
13. Global Fire Power. [accessed 23 Oct 2015] Uganda military strength. 2015. [http://www.globalfirepower.com/country-military-strength-detail.asp?country\\_id=uganda](http://www.globalfirepower.com/country-military-strength-detail.asp?country_id=uganda)
14. World Health Organization. [accessed 11 March 2016] Economics of tobacco toolkit: assessment of the economic costs of smoking. 2011. [http://apps.who.int/iris/bitstream/10665/44596/1/9789241501576\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/44596/1/9789241501576_eng.pdf)
15. Musiello, T. An investigation into the effects of the Scottish smoking ban. Queen Margaret University; 2009.
16. Berman M, Crane R, Seiber E, et al. Estimating the cost of a smoking employee. *Tobacco control*. 2013; 23(5):428–33. [PubMed: 23733918]
17. Besamusca, J., Tijdens, K., Kahyarara, G., et al. [accessed 11 March 2016] Wages in Uganda: Wage Indicator Survey 2012. 2012. [http://www.wageindicator.org/documents/publicationslist/publications-2012/AIAS\\_WI\\_countryreports\\_f2f\\_report\\_Uganda\\_final\\_20121211.pdf](http://www.wageindicator.org/documents/publicationslist/publications-2012/AIAS_WI_countryreports_f2f_report_Uganda_final_20121211.pdf)
18. Halpern MT, Shikar R, Rentz AM, et al. Impact of smoking status on workplace absenteeism and productivity. *Tobacco control*. 2001; 10(3):233–8. [PubMed: 11544387]
19. Bunn WB 3rd, Stave GM, Downs KE, et al. Effect of smoking status on productivity loss. *Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine*. 2006; 48(10):1099–108.
20. Bank, W. [accessed 10 March 2016] Health expenditure per capita (current US\$). 2016. <http://data.worldbank.org/indicator/SH.XPD.PCAP>

### What This Paper Adds

- The smoking rates among the general population in Uganda is relatively low (5.3%). Uganda ratified the WHO Framework for Convention of Tobacco Control (FCTC) in 2007 and passed national comprehensive tobacco control legislation.
- No previous research has been conducted on tobacco use among Uganda military personnel. Studies in other countries suggests military service is a risk factor for tobacco use and the Uganda military does not enforce clean indoor air laws.
- We found that over one-third of Uganda military personnel smoke. Risks for smoking included lower age and education, having close friends who smoke, and previous military deployment.
- UPDF personnel had higher costs due to days absent from work, smoke breaks, lower presenteeism, and higher estimated health care costs.
- This research suggests an urgent need for health promotion and anti-tobacco education for Uganda military personnel and the development of military tobacco control policy to reduce the costs of smoking to the Uganda military.

**Table 1**

## Smoking Prevalence Stratified by Demographics and Risk Factors

| Variable                          | Smoking Rate (%) | Odds Ratio (95% CI) | p-value  |
|-----------------------------------|------------------|---------------------|----------|
| All Personnel (n = 310)           | 34.8             |                     |          |
| Gender                            |                  |                     |          |
| Male (n = 286)                    | 35.7             | 1.66 (0.63–4.32)    | 0.30     |
| Female (n = 24)                   | 25.0             | Ref                 |          |
| Education                         |                  |                     |          |
| Primary (n = 28)                  | 50.0             | 3.45 (1.45 – 8.24)  | 0.005    |
| Senior (n = 165)                  | 38.8             | 2.19 (1.26 – 3.80)  | 0.005    |
| College (n = 107)                 | 22.4             | ref                 |          |
| Other (n = 10)                    | 60.0             | 5.18 (1.35 – 19.8)  | 0.015    |
| Age (years)                       |                  |                     |          |
| 18–34 (n = 155)                   | 57.0             | 9.19 (3.07 – 27.47) | < 0.001  |
| 35–44 (n = 123)                   | 38.0             | 4.32 (1.42 – 13.12) | 0.010    |
| 44–54 (n = 32)                    | 13.0             | Ref                 |          |
| Rank                              |                  |                     |          |
| Private (n = 220)                 | 37.3             | 2.37 (0.11 – 8.94)  | 0.280    |
| Non commissioned officer (n = 52) | 36.5             | 2.30 (0.44 – 11.98) | 0.321    |
| Junior Officer (n = 28)           | 17.9             | 0.86 (0.14 – 5.40)  | 0.881    |
| Senior Officer (n = 10)           | 20.0             | Ref                 |          |
| Close Friend Smokes               |                  |                     |          |
| Yes (n = 199)                     | 46.7             | 5.61 (3.04 – 10.35) | < 0.0001 |
| No (n = 111)                      | 13.5             | Ref                 |          |
| Deployment History                |                  |                     |          |
| Yes (n = 70)                      | 60.0             | 3.95 (2.26 – 6.89)  | < 0.0001 |
| No (n = 240)                      | 27.5             | Ref                 |          |