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Agricultural Workers and Urinary Bladder Cancer Risk in Egypt

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Abstract

We examined the associations between farming and the risk for squamous cell (SCC) or urothelial (UC) carcinoma of the urinary bladder among Egyptians. We used data from a multi-center case-control study (1525 male and 315 female cases, and 2069 male and 547 female age-, and residence-matched, population-based controls), to calculate adjusted odds ratios (AOR) and 95% confidence interval (CI). Men in farming and who never smoked had increased risk for either SCC or UC (AOR and (95% CI): 4.65 (2.59-8.36) and 6.22 (3.82-10.15), respectively); If they ever smoked, their risks were 2.27 (1.75-2.95) and 1.93 (1.58-2.35), respectively). Women in farmer households were at increased risk for SCC (1.40 (0.93-2.09) and UC (1.25 (0.82-1.89), although not statistically significant. Occupational and environmental exposures to farming increased the risk for bladder cancer among Egyptians.

Introduction

Tobacco smoke and occupational exposures to chemicals are well-established risk factors for urinary bladder cancer¹⁻⁶ a malignancy that affects more men than women worldwide.⁷⁻⁹ In addition, in areas where *Schistosoma hematobium* is endemic, chronic infection with the parasite is associated with increased risk⁹⁻¹² of squamous cell carcinoma (SCC) of the bladder, a histological type that is rare (5%) in Europe and the US where the predominant type (90%) is the urothelial carcinoma (UC) also known as transitional cell carcinoma (TCC).

Despite antismoking campaigns and implementation of safety and control measures for chemicals in the workplace, the incidence of bladder cancer has only slightly changed over the last 30 years.^{8,9,13,14} In search of other factors associated with increased bladder cancer risk, investigators have examined the relationships between farming and bladder cancer risk.¹⁵⁻²⁸ Ecological studies showed associations between farming and increased bladder cancer risk;^{18,23,25} whereas several epidemiological studies^{15-17,19,21-22,24,26,28} as well as meta-analyses^{20,27} found either no association,^{19,21,27} an increased,^{22,26,28} or a decreased risk.^{15-17,20,24,27} Most of these studies were conducted in Europe or the US and thus mainly addressed UC type of bladder cancer.

In Egypt, urinary bladder cancer incidence is among the highest worldwide,^{9,29} and SCC currently represents approximately 30% of all current cases;³⁰⁻³¹ this is a significant shift from 60-70% of bladder cancer cases reported before the 1980's and *Schistosoma hematobium* eradication campaigns.⁹ Furthermore, a large portion of Egypt's population is employed in farming. Considering all the above, we examined the associations between occupational and environmental exposures to farming and bladder cancer risk among Egyptians in our case-control study for the two main histological types of bladder carcinoma, SCC and UC, separately.

Methods

We analyzed data from a multicenter case control study conducted in Egypt between 2006 and 2011. The study was approved by the Institutional Review Boards of the three recruitment sites, Egypt's Ministry of Health, the University of Maryland Baltimore, and Georgetown University.

Study Population

As previously described,³⁰⁻³² the study participants were recruited from three referral cancer centers that serve a large area of Egypt: the National Cancer Institute of Cairo University, the Minia Oncology Center, and the South Egypt Cancer Center in Assiut. Presumed bladder cancer cases referred to the recruitment sites' departments of urology, chemotherapy, radiation therapy, or surgery were approached for participation in the study. Eligibility criteria for cases included diagnosis within one year and self-identification as capable of completing a 20 minute interview. One of the study's two pathologists ascertained the diagnosis of urinary bladder cancer for all participants by reviewing each case report as well as any tissue specimens from cystoscopic biopsies, transurethral lesion resections, or simple or radical cystectomies. Tumors originating from other sites of the body and metastasizing to the bladder were excluded. For the present study we included only SCC and UC cases.

As detailed in earlier reports,³⁰⁻³² healthy controls were randomly selected to frequency-match the cumulative groups of cases by sex, five-year age groups, governorate (province) of current residence, and urban/rural place of residence. Two methods were used to recruit controls: (i) random sampling of households; and (ii) random sampling of family health records with the permission of the ministry of health. For the first method, the recruiters randomly selected a street in the village and approached residents. If none of the house occupants matched the required control, the recruitment team moved to the next house. For the second method, the recruitment team went directly to the house of the potential control selected from the medical records, and moved to another control if the intended subject was absent.

After consenting, cases and controls were questioned face-to-face by trained interviewers, who collected data on socio-demographic characteristics, occupational histories, environmental exposure histories including exposure to tobacco smoke, and medical histories including history of schistosomiasis and other urinary tract infections (UTI). The women in the study were asked about the main job of their husband/head of household (H/HH), because the majority did not work outside the home, and only seldom reported farming as their occupation.

Variables

The independent variable of primary interest was the occupation of each participant or each participant's H/HH (farming versus other occupations). Other occupations included manual and mechanical work, clerical work, trading, and a mixture of unclassified type of job such

as minibus driver, carrier for hire, parking or building attending. The outcome variable was bladder cancer case or control. Covariates that were examined included marital status, education, smoking (cigarette and waterpipe), history of schistosomiasis, history of UTI other than schistosomiasis, and environmental tobacco smoke (ETS) exposure either in or outside the home. Egypt has 27 governorates that are relatively homogenous within the broad regions (North and South). Because we had few cases from some of them, we grouped the area of residence in two categories, north and south, for the analyses.

Statistical Analyses

To assess the relationship between farming as an occupation and bladder cancer risk, we conducted separate analyses for men and women. We examined the associations between each variable and cancer risk using bivariate analyses, and we tested any variable that was significantly associated with the outcome for its potential effect modification or confounding of the association between cancer and farming as an occupation. We performed multiple analyses after stratification by different variables. We used unconditional logistic regression to fit multivariable models that included ETS, schistosomiasis, and education (significant covariates), and the matching variables age (continuous) and area of residence (North versus South and urban versus rural). To simultaneously compare SCC, UC and controls we used a polytomous logistic regression model. We generated adjusted odds ratios (AOR) and 95% confidence intervals (95% CI) as estimates of associations. Chi-square test and Student's t-test were used to compare categorical and continuous variables, respectively. In additional analyses, we fit conditional logistic regression models, conditioning on governorate and age group. All statistical analyses were performed using SAS version 9.2 software.

Results

The study sample consisted of 1525 male cases confirmed as primary urinary bladder carcinomas and 2069 frequency matched controls. Among these men, 510 cases were SCC (33%) and 1015 were UC (67%). Only 29 men (14 cases and 15 controls) reported not working outside the home. Nearly 70 percent of all SCC and 60 percent of UC cases worked in farming compared to less than 50 percent of the controls. The characteristics of the participants and the distributions of other bladder cancer risk factors are summarized in Table 1.

Eighty nine percent of the female participants (315 cases and 547 controls) did not work outside the home. Table 2 illustrates their socio-demographic characteristics and medical histories. The majority had no formal education and resided in south Egypt. More than 50% reported exposure to ETS, but only 13 were ever smokers of either cigarettes (6) or waterpipes (7). We excluded those 13 from the analyses of associations.

Among men, the bivariate analyses revealed significant associations between bladder cancer risk and farming as an occupation, schistosomiasis, cigarette smoking, waterpipe smoking among those who did not smoke cigarettes, exposure to ETS among those who never smoked, history of UTI other than schistosomiasis, and education (Table 3). Stratification by different variables revealed smoking as the only variable that appeared to modify the association between farming and bladder cancer. Therefore we fit a multivariable regression model that included smoking as a dichotomous variable (ever versus never smoking of either cigarettes or waterpipes), significant covariates (schistosomiasis, ETS, and education), the matching variables, and an interaction term (occupation*smoking). There was a significant interaction between ever smoking and farming as an occupation ($p < 0.0001$, $p = 0.02$, $p = 0.0001$, for all cases, SCC and UC respectively) (Table 4). This implies a difference between smokers and non-smokers with respect to the association between farming and bladder cancer. Among non-smokers the risk for either malignancy was 4 to 6-fold higher

among farmers than among non-farmers. Among smokers, the associations between farming and bladder cancer were attenuated. Schistosomiasis and ETS were independent bladder cancer risk factors (Table 4). In secondary analyses, we fit a corresponding model using conditional logistic regression, conditioning on region and age group. These analyses produced similar results.

We performed separate analyses for male never smokers (N=667; data not shown) and found the AOR and 95% CI for having either type of bladder cancer for farmers to be 4.73 (3.03-7.40) after adjustment for covariates including ETS, schistosomiasis, education, and the control matching variables. ETS was an independent risk factor among these non-smokers (AOR and (95% CI) (1.89 (1.22-2.92))). We also evaluated whether or not indirect exposure to farming was associated with increased bladder cancer risk by examining the latter among women who did not work outside the home but whose husband/head of household (H/HH) did. We included in the analyses only those women who reported never smoking. In the bivariate analyses, the associations between H/HH occupation and risk of bladder cancer were borderline statistically significant for SCC, but not significant for UC (crude OR and 95% CI: 1.52 (1.03-2.23) and 1.11 (0.75-1.64), respectively) (Table 5). We further examined the associations between H/HH occupation and women's risk of having either type of carcinoma in multivariable regression models as shown in table 5. The risk for either type of cancer remained elevated but not statistically significant after adjustment for other covariates.

Discussion

We found positive and statistically significant associations between working as a farmer and the risk of having either type, SCC or UC, of bladder cancer among Egyptian men; these associations retained significance even after adjustment for known risk factors such as smoking and history of schistosomiasis. Additionally, we found that among women, indirect exposure to farming – by living with a husband/head of household who worked as a farmer – was associated with increased odds of having bladder cancer, although it was not statistically significant.

Farming, among several other occupations, was investigated previously for its contribution to bladder cancer risk. Several ecological^{18,23,25} and epidemiological^{3,22,28} studies, including a metaanalysis,³ have suggested a positive association. More recently, an increased risk of this malignancy was reported for female market farmers and crop growers in New Zealand, albeit not statistically significant,²⁶ presumably because of the small sample size. Our data are consistent with these previously reported results, and they are the first to show an association between farming and SCC bladder cancer. Indeed, most of the studies that reported an association between bladder cancer and farming were conducted in Western or highly developed countries where UC is the predominant type of cancer.

On the other hand, our results conflict with other studies that did not find any association between working as a farmer and bladder cancer risk^{19, 21, 27} or found a decreased risk.^{15-17,20,24,27} The study by Alavanja²⁴ was a prospective cohort conducted in the United States (where UC is most prevalent) with a limited follow-up period that might have not been long enough for the manifestation of bladder cancer that is known to occur later in life; and the numbers of farmers in the other studies were relatively small.

Further evidence for a positive significant association between farming and bladder cancer in Egypt is provided by our finding that women, who lived with an H/HH working in farming, were at risk for having this cancer, even if the AORs were not statistically significant. . In 1996, Folson³³ reported a lower bladder cancer risk among women living on

the farm; although these women are likely to be exposed to hazards associated with farming through residues from chemicals and other materials brought home on the farmers' clothes or shoes,³⁴⁻³⁶ and by virtue of their traditional responsibility for cleaning the clothes and house. Furthermore, farmers and their families live in communities close to the farm where they work, and therefore family members may be further exposed to pesticides and other hazards through polluted air and contaminated food or drink.^{23,37}

Smoking is a known risk factor for the UC type of bladder cancer. We did observe that ever smoking, either cigarettes or waterpipes, was associated with increased odds of having UC, and to a lesser extent SCC; and smoking both cigarettes and waterpipes further increased the risk observed with cigarette smoking only (Table 3). Associations between smoking and SCC were reported earlier by Fortuny.³⁸

We found that smoking modifies the relationship between occupation and bladder cancer risk. Among those who never smoked, the associations between farming and bladder cancer were much higher than among those who smoked. Similar associations were observed for both SCC and UC type of cases. This finding is novel. One possible explanation for this is that farmers who smoke appear to smoke less than non-farmers who smoke. For example, we found that among farmers, 42% of former and 39% of current smokers reported smoking half a pack of cigarettes or less per day; whereas among non-farmers the respective percentages were 28 % and 27%. This might result in a lower impact of smoking on bladder cancer risk among farmers than among non-farmers, i.e, farming modifies the effect of smoking. Mathematically, this induces a corresponding effect modification between smoking and farming, i.e., smoking modifies the effect of farming on bladder cancer risk. Another possible explanation is that farmers who never smoked were performing tasks that increase their risk of being exposed to occupational hazards, such as chemicals (pesticides) used or biological agents (zoonoses or fungi) encountered in agriculture. Another possibility is that farmers are exposed to chemicals that compete with those present in smoking, and as such they inhibit the metabolic transformation of smoking toxicants into carcinogens as it was previously demonstrated in vitro.³⁹ Furthermore, in a recent study of lung cancer the authors showed the effect of smoking to be attenuated by the exposures to diesel exhaust among miners.⁴⁰ Ultimately, the difference in risk between smokers and non-smokers among farmers could be due to unknown factors inherent to other health behavior or to an environmental exposure yet to be identified among Egyptians.

We found exposure to ETS to be associated with bladder cancer among men in the unadjusted odds ratios (Table 3); and we were able to confirm this result by examining ETS among never-smokers. Exposure to ETS was an independent risk factor for bladder cancer after adjustment for occupation (farmer vs. others), schistosomiasis, education, age and area of residence. Among women, both crude and adjusted OR for ETS were elevated but not statistically significant.

Although ETS is known as a lung carcinogen, its association with bladder cancer has yet to be established. Epidemiological studies yielded conflicting results; some reported an increased bladder cancer risk;⁴¹⁻⁴³ whereas other studies failed to demonstrate any association.^{44,45} In Egypt, the magnitude of ETS exposure can be far greater than that of western societies, due to large and extended families living in relatively small quarters, the general lack of household bans on indoor smoking by males, water pipe smoking as a common social activity, and the lack of tobacco control campaigns.

Associations between history of schistosomiasis and bladder cancer are well known and previously reported mainly with SCC.⁹⁻¹² We found similar associations, not only with

SCC, but also with UC. This is a finding that is relatively novel. Very few studies addressed schistosomiasis and UC risk in the past.

The present report is based on a case-control study, which relied on self-reported information about social (smoking among women) and medical (schistosomiasis and UTI) histories. Therefore misclassification of the exposure could have biased the estimates. Furthermore, in selecting our controls, it is possible that we introduced selection bias by recruiting those subjects who were home and available at the time of the team visit; therefore our random design to select matched controls resulted in a somewhat conveniently recruited sample. We had a large sample size, and thus adequate numbers of SCC and UC, that allowed us to examine farming and adjusted risk for either type of cancer. Further, case status was confirmed by two study pathologists, and population controls were frequency-matched to cases on age, and area of residence.

In conclusion, we found that Egyptian men working in farming, especially those who have never smoked, had increased odds of having bladder cancer, for both SCC and UC. To a lesser extent, women living in households where male farmers live had increased risk for this malignancy. Further studies are needed to determine what exposure(s) associated with farming in Egypt are potentially contributing to bladder cancer risk.

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Table 1

Socio-demographic Characteristics and Medical Histories of Egyptian Men Bladder Cancer Cases and Controls

Characteristic	SCC# Cases N=510	UC# Cases N=1015	Controls N=2069
Mean age $\pm$ SD (years)	57.2 $\pm$ 10.4	61.1 $\pm$ 10.5	57.6 $\pm$ 11.7
	N (%)		
Area of residence			
North Egypt	19 (3.8)	156 (15.4)	136 (6.6)
South Egypt	476 (93.3)	859 (84.6)	1933 (93.4)
Urban	44 (8.6)	194 (19.1)	182 (8.8)
Rural	466 (91.4)	821 (80.9)	1887 (91.2)
Marital Status			
Married	477 (93.5)	957 (94.3)	1938 (93.7)
Widowed	21 (4.1)	45 (4.4)	96 (4.6)
Divorced/separated	2 (0.4)	5 (0.5)	8 (0.4)
Not married	10 (2.0)	8 (0.8)	27 (1.3)
Education			
None	408 (80.0)	678 (66.8)	1056 (51.1)
Primary school	81 (15.9)	243 (24.0)	561 (27.1)
Preparatory, high, or technical	21 (4.1)	81 (8.0)	376 (18.1)
College or university	0	12 (1.2)	75 (3.6)
Occupation			
Farmer	350 (69.6)	603 (59.7)	881 (42.9)
Other	153 (30.4)	407 (40.3)	1173 (57.1)
Schistosomiasis history			
Yes	278 (54.5)	547 (53.9)	984 (47.6)
No	193 (37.8)	413 (40.7)	963 (46.5)
Do not know	39 (7.7)	55 (5.4)	122 (5.9)
UTI*			
Yes	96 (18.8)	199 (19.6)	326 (15.8)
No	414 (81.2)	816 (80.4)	1741 (84.2)
Smoking (cigarette/waterpipe)			
Both	63 (12.4)	149 (14.7)	162 (7.8)
Cigarette only	287 (56.3)	634 (62.5)	1180 (57.0)
Waterpipe only	73 (14.3)	107 (10.5)	272 (13.2)
Neither	87 (17.0)	125 (12.3)	455 (2.0)
Exposure to ETS ^{\$} among non-smokers			

Characteristic	SCC [#] Cases N=510	UC [#] Cases N=1015	Controls N=2069
Yes	70 (80.5)	97 (77.6)	304 (66.8)
No	17 (19.5)	28 (22.4)	151 (33.2)

[#] SCC: squamous cell carcinoma; UC: Urothelial carcinoma.

^{*} Urinary tract infection other than schistosomiasis.

^{\$} Environmental tobacco smoke.

Table 2

Socio-demographic Characteristics and Medical Histories of Egyptian Women Who did not Work Outside the Home

Characteristic	SCC# Cases N=158	UC# Cases N=157	Controls N=547
Mean age $\pm$ SD (years)	53.3 $\pm$ 10.8	59.6 $\pm$ 10.8	55.3 $\pm$ 12.3
	N(%)		
H/HH @ Occupation			
Farmers	65 (41.4)	57 (36.3)	181 (33.1)
Other	87 (55.1)	95 (60.5)	348 (63.6)
Missing	6 (3.8)	5 (3.2)	18 (3.3)
Area of residence			
North Egypt	17 (10.8)	20 (12.7)	47 (8.6)
South Egypt	141 (89.2)	137 (87.3)	500 (91.4)
Urban	12 (7.6)	28 (17.8)	67 (12.2)
Rural	146 (92.4)	129 (82.2)	480 (87.8)
Marital Status			
Married	101 (63.9)	87 (55.4)	352 (64.3)
Widowed	46 (29.1)	65 (41.4)	183 (33.5)
Divorced/separated	8 (5.1)	4 (2.6)	5 (0.9)
Not married	3 (1.9)	1 (0.6)	7 (1.3)
Education			
None	146 (92.4)	139 (88.5)	436 (79.7)
Literacy class/primary school	12 (7.6)	15 (9.6)	80 (14.6)
Preparatory, high, or technical	0	2 (1.3)	29 (5.3)
College or university	0	1 (0.6)	2 (0.4)
Schistosomiasis history			
Yes	34 (21.5)	33 (21.0)	68 (12.4)
No	110 (69.6)	113 (72.0)	449 (82.1)
Unknown	14 (8.9)	11 (7.0)	30 (5.5)
UTI *			
Yes	31 (19.6)	35 (22.3)	75 (13.7)
No	127 (80.4)	122 (77.7)	472 (86.3)
Smoking (cigarette/waterpipe)			
Both	0	0	0
Cigarette only	3 (1.9)	2 (1.3)	1 (0.2)
Waterpipe only	1 (0.6)	2 (1.3)	4 (0.7)
Neither	154 (97.5)	153 (97.4)	542 (99.1)

Characteristic	SCC [#] Cases N=158	UC [#] Cases N=157	Controls N=547
Exposure to ETS ^{\$}			
Yes	103 (65.1)	85 (54.1)	316 (57.8)
No	55 (34.8)	72 (45.9)	231 (42.2)

[#] SCC: Squamous Cell Carcinoma; UC: Urothelial Carcinoma.

[@] Husband/head of household

^{*} Urinary Tract Infection other than schistosomiasis.

^{\$} Environmental tobacco smoke

Table 3

Unadjusted Associations Between Potential Risk Variables and Bladder Cancer Among Egyptian Men

Variables	Crude Odds Ratios (95% Confidence Interval)		
	All Cases	SCC [#] Cases	UC [#] Cases
Occupation			
Other	Ref	Ref	Ref
Farmer	2.36 (2.06-2.71)	3.20 (2.57-3.98)	2.03 (1.73-2.37)
Smoking			
Neither	Ref	Ref	Ref
Waterpipe only	1.47 (1.11-1.83)	1.33 (0.93-1.91)	1.39 (1.02-1.89)
Cigarette only	1.69 (1.40-2.03)	1.25 (0.95-1.64)	1.95 (1.55-2.44)
Both	2.88 (2.21-3.76)	1.98 (1.35-2.91)	3.35 (2.48-4.57)
Smoking (cigarette or waterpipe)			
Never	Ref	Ref	Ref
Ever	1.76 (1.47-2.11)	1.34 (1.03-1.74)	1.99 (1.60-2.49)
ETS ^{\$} among non-smokers			
No	Ref	Ref	Ref
Yes	1.69 (1.43-2.07)	1.56 (1.21-2.02)	1.74 (1.43-2.13)
Schistosomiasis			
No	Ref	Ref	Ref
Yes	1.36 (1.19-1.55)	1.41 (1.15-1.73)	1.30 (1.11-1.51)
UTI [*] other than schistosomiasis			
No	Ref	Ref	Ref
Yes	1.33 (1.12-1.59)	1.29 (0.99-1.68)	1.34 (1.10-1.64)
Married			
No	Ref	Ref	Ref
Yes	1.12 (0.61-2.05)	0.69 (0.32-1.49)	1.61 (0.72-3.57)
Education			
None	Ref	Ref	Ref
Some	0.42 (0.36-0.48)	0.26 (0.20-0.33)	0.50 (0.43-0.59)
Residence			
North	Ref	Ref	Ref
South	1.06 (0.81-1.40)	1.81 (1.10-3.00)	0.84 (0.63-1.14)
Urban	Ref	Ref	Ref
Rural	0.54 (0.44-0.67)	1.09 (0.76-1.56)	0.43 (0.34-0.54)

[#] SCC: Squamous Cell Carcinoma; UC: Urothelial Cell Carcinoma.

^{\$} Environmental tobacco smoke.

* Urinary Tract Infection other than Schistosomiasis.

Table 4

Multivariable Logistic Regression Models for Urinary Bladder Cancer Risk Among Egyptian Men

Independent Variable	Adjusted [@] Odds Ratios (95% Confidence Interval)		
	All Cases	SCC [#] Cases	UC [#] Cases
Occupation among Smokers			
Non-farmer	Ref	Ref	Ref
Farmer	2.08 (1.75-2.47)	2.27 (1.75-2.95)	1.93 (1.58-2.35)
Occupation among Non-Smokers			
Non-farmer	Ref	Ref	Ref
Farmer	5.62 (3.75-8.36)	4.65 (2.59-8.36)	6.22 (3.82-10.15)
Smoking among Farmers			
Never	Ref	Ref	Ref
Ever	1.12 (0.87-1.44)	0.97 (0.70-1.37)	1.17 (0.87-1.57)
Smoking among Non-Farmers			
Never	Ref	Ref	Ref
Ever	3.03 (2.17-4.22)	1.99 (1.18-3.37)	3.77 (2.49-5.71)
Schistosomiasis			
No	Ref	Ref	Ref
Yes	1.46 (1.25-1.69)	1.44 (1.15-1.79)	1.44 (1.22-1.71)
ETS ^{\$}			
No	Ref	Ref	Ref
Yes	1.61 (1.34-1.93)	1.50 (1.14-1.96)	1.64 (1.32-2.03)
Occupation * Smoking (Interaction term)	p<0.0001	p=0.02	P<0.0001

[@] Models included age (continuous), residence (North vs. South and urban vs. rural), education, ETS, schistosomiasis,

^{*} and the interaction term for smoking occupation.

[#] SCC: Squamous cell carcinoma; UC: Urothelial carcinoma.

^{\$} Environmental tobacco smoke

Table 5

Adjusted Associations Between Living in Households with Farmers and Having Bladder Cancer Among Egyptian Women who did not Work Outside the Home.

Independent variable	Adjusted [@] Odds Ratio (95% confidence interval)		
	All Cases	SCC [#] Cases	UC [#] Cases
Occupation of H/HH [*]			
Other	Ref	Ref	Ref
Farmer	1.25 (0.92-1.17)	1.40 (0.93-2.09)	1.25 (0.82-1.89)
Schistosomiasis			
No	Ref	Ref	Ref
Yes	2.12 (1.46-3.09)	2.01 (1.24-3.25)	2.09 (1.28-3.41)
Exposure to ETS ^{\$}			
No	Ref	Ref	Ref
Yes	1.01 (0.75-1.37)	1.21 (0.81-1.82)	0.92 (0.62-1.36)

[#] SCC: Squamous cell carcinoma; UC: Urothelial cell carcinoma.

[@] Models included age (continuous), residence (North vs. South and urban vs rural) and the independent variables listed in the first column.

^{*} Husband/Head of Household.

^{\$} Environmental tobacco smoke.