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ORIGINAL ARTICLE

Smoking and Drinking Behaviors among Older Adults: A Comparative Analysis of Three Southeast Asian Countries

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Abstract

Studies on the two major health-risk behaviors of smoking tobacco and drinking alcohol among older populations, particularly in Southeast Asia, are limited. This paper provides comparative analyses of the prevalences and correlates of smoking tobacco and drinking alcohol among older people in Myanmar, Vietnam, and Thailand, using data from the latest available national aging surveys in the three countries. The analyses were conducted within a multivariate framework. Gender-specific results show that smoking tobacco and drinking alcohol are more common among older men than women in all three countries. However, the prevalence of smoking and drinking among men declines at older ages. The multivariate analyses reveal that a higher level of education has a significant negative association with smoking and drinking in all three settings, but the magnitude and the direction of associations vary considerably between countries and genders. Area of residence is correlated with smoking among men in all three countries, whereas co-residential arrangements with spouse, children, or both significantly reduce alcohol consumption among men in Myanmar and among men and women in Thailand. In all three settings a significant complementary relationship between smoking and drinking is observed. From a policy perspective this implies that a successful reduction in smoking could be achieved through anti-drinking campaigns and vice versa.

Keywords Smoking · Drinking · Prevalence · Correlates · Older adults · Southeast Asia

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Introduction

Tobacco consumption and excessive alcohol drinking are probably the two most common risk behaviors that adults engage in, although these differ considerably by gender and across cultures. The evidence of the harmful effects of smoking is well documented and incontrovertible (Jamrozik, 2004; US Department of Health & Human Services, 2014). The health impacts of alcohol consumption are more complex, but the harmful effects of excessive drinking are clear (Huu Bich et al., 2009; Thakker, 1998). Together, tobacco and alcohol contribute significantly to the burden of disease in both developing and developed regions (Ezzati et al., 2002).

Previous reviews of research have indicated considerable variation by country and gender within Asia with regard to tobacco and alcohol use (Huu Bich et al., 2009; Sinha et al., 2011). However, these reviews have mainly focused on adolescents and young and middle-aged adults. Relatively little is known about whether the patterns and factors associated with tobacco and alcohol use in these groups are similar in older populations. While most existing studies have been conducted in East Asian countries and Singapore (Hirayama et al., 2008, 2009; Kim et al., 2013; Li et al., 2017; Pang et al., 2016; Yang et al., 2015; Zhang & Wu, 2015), only a few have examined older adults' tobacco and alcohol consumption in the context of Southeast Asia (Aekplakorn et al., 2008; Lincoln, 2016; Mai et al., 2017). The present study used large-scale population-based surveys to examine smoking and drinking among older persons in three Southeast Asian nations: Myanmar, Thailand, and Vietnam. A comparative analysis of these countries is of particular interest because of their different contexts. While they share some cultural features common to Southeast Asia generally, they differ with respect to others. For example, in terms of economic development, Thailand is far ahead of the others. According to the International Monetary Fund, in 2015, Thailand's per capita gross domestic product (at purchasing power parity) was 2.7 times that of Vietnam and 2.9 times that of Myanmar (IMF World Economic Outlook Database, 2017).

The recent Global Health Observatory (GHO) data indicates that, in 2015, smoking tobacco among men aged 15 and over was most prevalent in Vietnam (47.1%) and least prevalent in Myanmar (31.3%), with Thailand falling in between (41.4%). The prevalence of women smoking shows the opposite pattern, with the highest percentage in Myanmar at 6.4%, compared to 2.3% in Thailand and 1.3% in Vietnam (WHO 2015). The corresponding figures for the Southeast Asian region are 32.1% for men and 2.3% for women respectively.

The three countries, like others around the world, have enacted laws to govern the consumption of tobacco products. Thailand appears to have the strictest regulations and Myanmar the least restrictive, with Vietnam falling in between. For example, smoking in indoor public places is forbidden in Thailand, except for designated smoking areas. In Myanmar, smoking is permitted in indoor places such as office buildings, hotels, restaurants, and public transportation terminals. In Vietnam, indoor and outdoor smoking are strictly prohibited in certain public

premises such as hospitals, childcare centers, and schools (WHO 2017). In addition to banning smoking in public places, Thailand has increased the excise tax on cigarettes on 10 separate occasions, from 55% in 1992 to 85% in 2009. Nevertheless, the prevalence of smoking has declined by only 10% (WHO-SEARO, 2011).

In terms of alcohol consumption, the 2016 GHO data shows a sharp difference in the ranking of the three countries in comparison to smoking. The majority of men aged 15 and above in Myanmar (54.6%) and Vietnam (50.0%) reported having drunk alcohol in the past year, compared to just over a third in Thailand (38.3%) which was lower than the regional average of 44.5%. This was also the case for women. The prevalence of consuming alcoholic beverages among women was highest in Myanmar (27.7%) and lowest in Thailand (16.5%), with Vietnam falling in between (23.9%) which is closest to the regional average of 23.1% (WHO (World Health Organization), 2018).

In relation to policies and interventions, Thailand and Vietnam have enacted laws to govern the consumption and supply of alcoholic beverages. Although there is no written national policy concerning alcohol use in Myanmar, several measures implemented in Thailand and Vietnam, including measures regulating the minimum age for purchasing alcohol, zoning of alcohol-free areas, and barring the sale of alcohol at certain times, have been enforced by the Myanmar government (WHO (World Health Organization), 2018; Sornpaisarn et al., 2012; Poapongsakorn et al., 2007).

There are many correlates of smoking and drinking alcohol; among them, gender and age differentials are often pronounced. Given that the harmful effects are cumulative, there is considerable interest in examining the situation among older adults, since harmful effects are likely to be increasingly manifested in this group. Since very little is known about tobacco and alcohol use in older adults in the context of developing Southeast Asian countries, exploring the prevalences and correlates of drinking and smoking among older adults is thus important to provide knowledge for policy makers as well as health professionals, in order to ensure that effective measures are taken to reduce smoking and drinking rates and to provide related cessation-support services to promote healthy aging and better quality of life in the years to come.

Materials and Methods

The study data came primarily from three recent nationally representative surveys of older persons: the 2012 Myanmar Aging Survey (MAS), the 2011 Vietnam Aging Survey (VNAS), and the 2014 Survey of Older Persons in Thailand (SOPT). Both the MAS and VNAS are the first national-level surveys of older persons in those countries. The MAS was conducted under the sponsorship of HelpAge International. The sampling was multistage and involved first selecting 60 townships, then 150 rural villages and 90 urban wards within them (Knodel, 2012). The sample consisted of 4,080 persons aged 60 and older throughout Myanmar. Only Kachin state was excluded, for security reasons. However, as Kachin's population represents only

3% of the total national population (Teerawichitchainan et al., 2015), the impact of this omission on the national representativeness of the survey sample is minimal.

The VNAS was carried out under the sponsorship of the Vietnam Women's Union. The sample consisted of 4,007 persons aged 50 and over (69.6% of whom aged 60 and above), residing in 200 communes in 12 provinces representative of Vietnam's six ecological regions. The SOPT was conducted by Thailand's National Statistical Office, and was the fifth in a series of Thai government surveys of older persons,[1] although only the last two asked about smoking and drinking (Pothisiri & Teerawichitchainan, 2019). The 2014 survey sample consisted of 69,894 persons aged 50 and older (55.4% of whom were aged 60 and older), residing in 83,880 households in both urban and rural areas across five regions, including Bangkok. Further details of each survey's methodology are available elsewhere (National Statistical Office, 2014; Myanmar Survey Research, 2012; Vietnam Women's Union 2012).

The sample included in the current study is limited to individuals aged 60 years and above who provided valid information on all variables. Excluded cases with missing information comprised 0.3% for Myanmar, 0.6% for Thailand, and 3.2% for Vietnam. This produced an analytical sample size of 4,069 for Myanmar, 38,479 for Thailand, and 2,745 for Vietnam.

Variable Measurements

The main dependent variables, i.e. smoking and drinking, were derived from questions concerning tobacco and alcohol consumption, which differed somewhat across the surveys, although all three asked about current use and frequency of use. In Myanmar, the question concerning tobacco use referred jointly to smoking and chewing tobacco, while in Thailand and Vietnam, the questions only referred to smoking. In Thailand, the questions about smoking and drinking specified a reference period of the last six months, while reference periods were absent for Myanmar. In Vietnam, a reference period of the last six months was used for drinking only. Given the differences in the question and response categories in each survey, it should be noted that the variables included in this analysis are not necessarily constructed from identical information.

Smoking and drinking are both measured as dichotomous variables indicating whether the older respondent was a current smoker or drinker. For alcohol consumption, as a third of Vietnamese men and a fourth of Thai men indicated that they had drunk sometimes, we further distinguished men's current drinking by frequency. However, although all three surveys had information regarding the frequency of drinking, the scales for responses differed substantially. The Myanmar survey asked about drinking behavior with two questions: whether respondents currently drink, and how often they drink, with the answer scale ranging from 1 (daily) to 5 (only occasionally). The Vietnamese survey included a single question on the frequency of

[1] For Thailand, in addition to the five NSO surveys, two other national aging surveys were conducted in 1986 and 1995 under the auspices of Chulalongkorn University.

drinking, with answers ranging from 1 (none) to 9 (more than twice a day). The Thai survey used three categories for drinking: no, sometimes, and always. To provide a common metric across the three surveys, we recoded the response categories in the Myanmar and Vietnamese surveys to match the Thai one. Therefore, men's alcohol drinking was incorporated as a categorical variable indicating whether respondents were non-drinkers, sometime drinkers (e.g., once a week, less than every week, or occasionally), or frequent drinkers (e.g., more than twice a day, every day, or every few days).

The independent variables used in the analysis were age, marital status, religion, educational attainment, last year's work status, urban or rural location of residence, financial satisfaction, living arrangement, and community participation. The inclusion of these variables was determined by their likely association with smoking and drinking, their availability in the datasets, and their comparability across the three surveys. Age was incorporated as a categorical variable divided into 10-year age groups up to 80 and over. Marital status was measured as a dichotomous variable indicating whether the respondent was married at the time of the survey. Religion was incorporated as a categorical variable signifying whether the respondent identified as Buddhism, Christian, Muslim, or other. Educational attainment was incorporated as a categorical variable indicating whether the respondent had no education, some primary, completed primary, lower secondary, or upper secondary or higher education.

Financial satisfaction was determined based on a self-assessed question and incorporated as a dummy variable indicating whether respondents were satisfied with their current financial situation. Living arrangement was measured as a mutually exclusive categorical variable indicating detailed living arrangements, including whether the respondent lived (a) alone, (b) with a spouse but no children, (c) with a spouse and at least one child, (d) with at least one child but no spouse, or (e) in other types of living arrangement, such as with only a grandchild or siblings. Community participation was assessed through a measure of involvement in community or religious activities in the year before the survey and incorporated as a dichotomous variable.

Analytic Methods

The following analyses employed both descriptive and multivariate analyses. The descriptive analyses examined the distribution of dependent and independent variables disaggregated by gender and country. Pearson's chi-square test was used to test differences in the dependent and independent variables by gender. The multivariate analysis relied on logistic regression, either binary or multinomial, to identify the socio-economic correlates of smoking and drinking. Binary logistic regressions were used when a dependent variable was treated as a dichomotous variable. In this study, the binary logistic regressions were fitted for smoking among men and women in all three countries, and drinking among women in Thailand and Vietnam. For Myanmar, as the preliminary result indicated a very small proportion of women drinking (i.e. 20 cases out of 2,327 total sample), the binary logistic regression with

Firth's penalized method was used to assess the correlates of drinking in order to minimize small-sample bias (King & Zeng, 2001). Multinomial logistic regression was utilized when a dependent variable had more than two discrete categories. In this analysis of older men's drinking, alcohol consumption consisted of three possible categories: none, sometimes, and frequently. We treated non-drinking as the reference category due to the study's aim to identify the likelihood of alcohol drinking, and because non-drinkers constituted the highest proportion for this variable in all three countries.

The designs of all three surveys required that the results be weighted to be nationally representative. Results are thus based on weighted data. In interpreting the results of the Thai survey, however, it is important to recognize that the large Thai sample size means that small differences are statistically significant even if they reflect relatively minor substantive differences.

Results

Sample Characteristics

The characteristics of the survey samples of persons aged 60 and above for the three countries considered in the present analysis are provided in Table 1. Results are shown separately for men and women since the analysis is gender specific. As evident from the unweighted numbers of persons in the samples, the Thai sample was considerably larger than those of Myanmar and Vietnam. At the same time, in all three countries, the number of women respondents substantially exceeded that of men. This undoubtedly reflects higher male mortality and the higher average age of women respondents.

Gender differences in mortality, along with the fact that women typically marry older men, account for why women were far less likely to be currently married than were men. Although not shown in the table, the large majority of women not currently married were widowed. Religious composition differed little by gender within each country, but differed substantially between Vietnam and the other two countries. In both Myanmar and Thailand, well over 90% of respondents were Buddhist, while in Vietnam, Buddhism accounted for only a little over a quarter of men and a third of women. More than half of both men and women in Vietnam reported practicing ancestor worship and a substantial minority were "free thinkers" (not shown in table).

Differences in education between men and women were substantial in all three countries, with women considerably more likely than men to lack any formal education and far less likely than men to have received secondary education. Overall, older men and women in Vietnam were more likely than those in Thailand and Myanmar to have received secondary education. In all three countries, older men were considerably more likely to be currently working than were older women, although the percentage of both sexes currently working in Myanmar was substantially lower than in Thailand or Vietnam.

Table 1 Demographic and socioeconomic characteristics of included adults aged 60 and over in Myanmar, Vietnam, and Thailand

	Myanmar		Thailand		Vietnam	
	Men	Women	Men	Women	Men	Women
Age (%)	$p<0.010$		$p<0.001$		$p<0.001$	
60–69	52.9	50.8	58.7	54.6	50.8	41.6
70–79	34.8	33.1	29.4	30.4	30.1	32.2
80+	12.3	16.1	11.9	15.0	19.1	26.2
Mean age	70.1	70.8	69.2	70.1	70.1	71.2
Marital status (%)	$p<0.001$		$p<0.001$		$p<0.001$	
Currently married	77.0	34.9	81.7	48.5	89.4	52.8
Religion (%)	$p<0.010$		$p<0.010$		$p<0.001$	
Buddhist	94.3	95.6	96.1	96.4	26.5	34.7
Christian	3.5	2.9	3.0	3.0	10.8	11.8
Muslim	1.1	1.3	0.9	0.6	0.0	0.0
Others incl. none	1.1	0.2	0.0	0.0	62.6	53.6
Education (%)	$p<0.001$		$p<0.001$		$p<0.001$	
No education	7.4	34.6	6.8	14.4	10.0	25.0
Some primary education	51.8	39.0	7.9	8.8	20.5	40.0
Primary education	14.8	15.0	67.4	67.2	20.1	16.1
Lower secondary education	13.0	6.9	5.1	2.6	23.2	11.0
Upper secondary or higher	13.0	4.5	12.7	7.0	26.2	7.9
Work status (%)	$p<0.001$		$p<0.001$		$p<0.001$	
Currently working	10.7	4.6	49.1	29.7	46.2	33.0
Area of residence (%)	$p=0.505$		$p<0.050$		$p=0.858$	
Urban	30.9	31.9	40.3	41.4	32.7	32.9
Financial satisfaction (%)	$p=0.905$		$p<0.001$		$p<0.314$	
Inadequate	18.0	18.5	13.8	15.5	23.8	26.0
Sometimes inadequate	26.7	26.2	21.4	21.3	38.0	34.6
Adequate or better	55.3	55.4	64.8	63.2	38.2	39.4
Living arrangement (%)	$p<0.001$		$p<0.001$		$p<0.001$	
Alone	2.6	6.9	6.6	10.1	1.6	8.0
With spouse but no children	14.6	7.0	37.4	22.0	23.1	12.6
With spouse and 1+children[(a)]	61.6	27.1	41.3	24.2	57.7	34.1
With 1+children but no spouse[(a)]	17.9	48.0	10.8	32.5	8.4	31.8
Other	3.3	10.9	3.9	11.2	9.2	13.6
Community participation (%)	$p<0.001$		$p=0.717$		$p<0.001$	
Participating	87.6	80.0	68.1	67.9	42.0	28.3
Unweighted number	1,742	2,327	17,020	21,459	1,058	1,639

Sources: The 2012 Myanmar Aging Survey, 2011 Vietnam Aging Survey, and 2014 Survey of Older Persons in Thailand

(a) Includes cases where other persons could also be present

Table 2 Percentages smoking tobacco and drinking alcohol by age and gender among included adults aged 60 and older in Myanmar, Thailand, and Vietnam

	Myanmar		Thailand		Vietnam	
	Men	Women	Men	Women	Men	Women
Smoking	$p < 0.001$		$p < 0.001$		$p < 0.001$	
Total	45.5	29.8	26.5	2.8	40.6	5.6
60–69	47.8	29.0	31.7	3.1	50.4	5.8
70–79	45.6	32.5	21.4	2.6	34.1	6.3
80+	35.5	26.3	13.6	1.9	24.8	4.4
Drinking sometimes	$p < 0.001$		$p < 0.001$		$p < 0.001$	
Total	7.9	0.3	25 .2	3.4	33.6	7.2
60–69	11.4	0.4	33.8	4.6	39.3	7.7
70–79	4.1	0.1	15.3	2.6	31.0	5.9
80+	3.9	0.0	6.9	0.9	22.3	7.9
Drinking frequently	$p < 0.001$		$p < 0.001$		$p < 0.001$	
Total	4.5	0.6	5.0	1.0	19.7	1.6
60–69	5.9	0.5	6.3	1.2	20.6	1.6
70–79	3.4	0.8	3.5	0.9	20.1	1.8
80+	1.3	0.3	2.2	0.5	16.6	1.3

Sources: The 2012 Myanmar Aging Survey, 2011 Vietnam Aging Survey, and 2014 Survey of Older Persons in Thailand

In all three countries, the majority of the older population lived in rural areas. In both Myanmar and Vietnam, around a third of older persons lived in urban areas, like around 40% of respondents in Thailand. There was little gender difference in this respect in any of the countries. Self-assessed satisfaction concerning respondents' financial situation was the most favorable in Thailand and least favorable in Vietnam. The higher ratings in Thailand coincided with the better economic situation described, but the subjective nature of these judgments makes interpretation difficult.

Both gender- and country-specific differences were apparent with respect to living arrangements. In all three countries, only a modest minority of older persons lived alone, although this was noticeably higher in Thailand than in the other two countries. In all three countries, women were more likely than men to live alone. This undoubtedly reflects the much higher percentage of women who are widowed compared to men. Living only with a spouse and no children was also distinctively highest in Thailand. Vietnam was intermediate in this respect, with Myanmar showing the lowest prevalence. In all countries, the majority of older persons lived with at least one child. The percentage of older persons participating in community activities differed considerably across the countries. The highest prevalence was found in Myanmar and the lowest in Vietnam. However, the questions soliciting information about community participation were not fully equivalent in the three surveys.

Prevalence of Tobacco Smoking and Alcohol Consumption

The prevalence of smoking tobacco and drinking alcohol among men and women in the three countries is shown by age in Table 2. In all three countries, women were considerably less likely than men to smoke or drink. However, women in Myanmar were substantially more likely to smoke than in Thailand or Vietnam. Overall, 30% of women aged 60 and over reported smoking in Myanmar compared to only 3% in Thailand and 6% in Vietnam. In both Thailand and Vietnam, the percentages of men who smoke declined substantially with age. In both countries, the prevalence of smoking among men was approximately only half as high among those aged 80 and older compared to those in their 60 s. Although there was also a decline in smoking with age among men in Myanmar, it was far less pronounced. Among women, the relationship between smoking and age was irregular, although in all three countries, smoking among women 80 and older was the lowest among the three age groups.

With respect to alcohol consumption among both men and women, drinking sometimes or on a daily or frequent basis was highest in Vietnam. In all three countries, drinking among men clearly declined with increased age. At much lower levels, the same was true among women in Thailand. In Myanmar and Vietnam, the age patterns of drinking for women were more erratic.

Correlates of Smoking

In Table 3, we used binary logistic regressions to examine the correlates of smoking among older persons in the three countries. For each country, two adjusted models in which all covariates were considered simultaneously are presented: one for men and the other for women. Model coefficients are expressed as odds ratios relative to the reference category, which has a value of 1.0. Statistical significance levels of 0.05, 0.01, and 0.001 are also reported.

In all three countries, all else being equal, education, current work status, area of residence, and drinking alcohol were statistically associated with the likelihood of smoking among men. For women, education, financial satisfaction, and drinking alcohol had significant associations with smoking. Education showed a gradient correlation with smoking for both men and women in Myanmar and Vietnam. Older people in both countries were less likely to smoke if they had higher education. For Thailand, although education was a very strong correlate of smoking for both men and women, the gradient pattern existed for only men. In addition, we found that the odds of smoking increased significantly if men were engaged in economic activity. A similar association was apparent among women but had no statistical significance. Area of residence was another strongest predictor of smoking for men in all three countries. Living in an urban area reduced the chance of smoking among men. For women, however, urban residence was significantly and negatively associated with smoking only in Myanmar. Financial satisfaction was also related to the chance of smoking in Myanmar and Thailand:

Table 3 Odds ratios from binary logistic regressions predicting smoking among men and women aged 60 + in Myanmar, Thailand, and Vietnam

Independent variables	Myanmar		Thailand		Vietnam	
	Men	Women	Men	Women	Men	Women
Age (continuous)	0.990	0.993	0.981***	0.982**	0.942***	0.973
Currently married (ref. = not married)	0.360	1.779	1.023	0.594	0.994	1.153
Religion (ref.=Buddhist)						
Christian	0.924	0.415*	1.785***	1.127	1.179	0.338**
Muslim	0.455	0.210*	0.904	0.769	n.a	n.a
Others incl. none	0.365	1.731	n.a	n.a	1.071	0.444***
Education (ref. = no education)						
Some primary education	0.774	0.971	0.754**	0.657*	1.0 74	0.8 57
Primary education	0.793	0.678*	0.629***	0.394***	0.647	0.276**
Lower secondary education	0.705	0.454**	0.466***	0.155***	0.581*	0.246**
Upper secondary or higher education	0.333***	0.198***	0.226***	0.271***	0.471**	0.206
Currently working (ref. = not working)	1.391*	1.325	1.362***	1.000	1.652***	1.210
Urban (ref. = rural)	0.568***	0.587***	0.671***	0.869	0.663**	0.742
Financial satisfaction (ref. = adequate or better)						
Sometimes inadequate	1.655***	1.642***	1.375***	1.365**	1.041	2.052*
Inadequate	1.287	2.062***	1.425***	1.242*	0.848	2.825***
Living arrangement (ref. = alone)						
With spouse but no children	2.001	0.546	0.899	1.228	0.428	0.945
With spouse and 1 + children (incl. other)	1.923	0.427	0.831	1.536	0.378	0.820
With 1 + children but no spouse (incl. other)	0.535	0.886	0.926	0.837	0.374	1.037
Other	0.856	0.926	1.037	1.373	0.463	0.448
Community participation (ref. = no)	1.149	0.998	1.167***	1.279*	0.965	1.622*
Drinking alcohol (ref. = no)	3.216***	8.619***	5.342***	21.149***	1.371**	2.280**
Unweighted number	1,742	2,327	17,020	21,459	1,058	1,639

n.a. = not applicable (no cases); *p < 0.05; **p < 0.01; ***p < 0.001

Sources: The 2012 Myanmar Aging Survey, 2011 Vietnam Aging Survey, and 2014 Survey of Older Persons in Thailand

men and women who were financially stressed were more likely to smoke than those who were not. This was also true for Vietnamese women.

The relationship between living arrangement and smoking varied substantially between men and women and across the three countries. In Thailand, for example, living with others, except non-family members, decreased the likelihood of smoking for men, whereas for women, the presence of a spouse either with or without children increased the chance of smoking. Conversely, in Myanmar, living with a spouse and children was positively associated with smoking for men,

Table 4 Odds ratios from multinomial regressions predicting alcohol drinking among men aged 60 + in Myanmar, Thailand, and Vietnam

Independent variables	Myanmar		Thailand		Vietnam	
	Drinking sometimes	Drinking daily	Drinking sometimes	Drinking daily	Drinking sometimes	Drinking daily
Age (continuous)	0.921***	0.913***	0.926***	0.946***	0.967***	1.034**
Currently married (ref. = not married)	3.564	4.463	1.310*	1.064	0.477	0.420
Religion (ref. = Buddhist)						
Christian	1.264	4.326***	1.685***	3.328***	0.956	2.758***
Muslim	0.527	2.078	0.044***	0.115***	n.a	n.a
Others incl. none	n.a	n.a	n.a	n.a	1.519	6.214***
Education (ref. = no education)						
Some primary education	0.482*	0.364**	1.826***	1.327	8.097***	11.039***
Primary education	0.383*	0.418	1.441***	1.171	4.547***	11.624***
Lower secondary education	0.317**	0.340*	2.018***	1.252	5.107***	6.344***
Upper secondary or higher education	0.904	0.553	1.908***	1.543*	9.173***	10.365***
Currently working (ref. = not working)	1.434	1.64	1.906***	2.152***	0.601***	0.274***
Urban (ref. = rural)	1.208	1.319	1.052	1.001	0.91	0.900
Financial satisfaction (ref. = adequate or better)						
Sometimes inadequate	0.966	0.764	0.781***	1.162	0.653*	1.449
Inadequate	1.776**	1.700	0.93	0.935	0.861	1.360
Living arrangement (ref. = alone)						
With spouse but no children	0.197	0.079*	0.493***	0.574*	5.798*	4.514
With spouse and 1 + children (incl. other)	0.280	0.067**	0.481***	0.605*	5.102**	4.196
With 1 + children but no spouse (incl. other)	1.270	0.613	0.605***	0.714	3.985	5.116
Other	0.369	0.144	0.498***	0.817	5.449*	5.684
Community participation (ref. = no)	1.004	0.687	1.292***	0.960	1.444**	1.978***
Smoking (ref. = no)	2.757***	4.690***	4.947***	8.277***	1.237	1.841***
Unweighted number	149	85	4,096	811	336	241

The reference category of the dependent variable is non-drinking; n.a. = not applicable (no cases); *p < 0.05; **p < 0.01; ***p < 0.001

Sources: The 2012 Myanmar Aging Survey, 2011 Vietnam Aging Survey, and 2014 Survey of Older Persons in Thailand

with the opposite observed among women. However, none of the associations between living arrangement and smoking were statistically significant. Participation in community activities appeared to be associated with smoking among Thai men and women as well as Vietnamese women. When all other demographic

Table 5 Odds ratios from binary logistic regressions predicting drinking among women aged 60 + in Myanmar, Thailand, and Vietnam

Independent variables	Myanmar	Thailand	Vietnam
Age (continuous)	0.9606	0.955***	1.018
Currently married (ref. = not married)	8.112	1.217	1.176
Religion (ref. = Buddhist)			
Christian	11.167***	0.579*	0.292**
Muslim	4.434	0.282	n.a
Others incl. none	7.210	n.a	1.111
Education (ref. = no education)			
Some primary education	0.216*	0.772	1.3 35
Primary education	0.444	1.005	0.842
Lower secondary education	0.208	0.564	2.254**
Upper secondary or higher education	0.225	1.203	4.462***
Currently working (ref. = not working)	1.328	1.902***	1.261
Urban (ref. = rural)	1.063	0.820*	0.771
Financial satisfaction (ref. = adequate or better)			
Sometimes inadequate	2.079	1.196*	0.641
Inadequate	2.013	2.072***	0.694
Living arrangement (ref. = alone)			
With spouse but no children	0.375	0.573*	0.8 83
With spouse and 1 + children (incl. other)	0.081	0.509**	0.962
With 1 + children but no spouse (incl. other)	0.849	0.612***	0.758
Other	0.797	0.607***	0.276**
Community participation (ref. = no)	1.379	1.151	0.805
Smoking (ref. = no)	6.854***	21.137***	2.420**
Unweighted number	2,327	21,459	1,639

The reference category of the dependent variable is non-drinking; n.a. = not applicable (no cases); *p < 0.05; **p < 0.01; ***p < 0.001

Sources: The 2012 Myanmar Aging Survey, 2011 Vietnam Aging Survey, and 2014 Survey of Older Persons in Thailand

and social characteristics were controlled for in the models, men and women who drank alcohol showed a higher likelihood of smoking in all three countries.

Correlates of Drinking Alcohol

The multivariate results of the correlates of alcohol consumption among men and women are presented in Tables 4 and 5 respectively. Due to the different nature of dependent variables, we used multinomial logistic regression to examine the associations between the possible correlates and categories of drinking frequency of alcohol for men, and binary logistic regression for women. The multinomial results in Table 4 are expressed as odds ratios that represent the likelihood of older men drinking sometimes or frequently, as opposed to not drinking—the omitted reference

category. Statistically significant odds ratios above 1 indicate a greater likelihood of drinking sometimes or frequently than the reference category, whereas odds ratios below 1 indicate the opposite.

Table 4 shows that age was negatively and statistically significantly associated with men's alcohol consumption in all three countries. Religion appeared to be significantly associated with drinking behavior. In all three countries, Christianity significantly increased the likelihood of drinking daily, while in Thailand, being Muslim significantly decreased the likelihood of drinking alcohol. Education was another strong correlate of alcohol consumption among men. In Vietnam and Thailand, the chance of alcohol consumption increased with education level. However, in Myanmar, being more highly educated reduced the likelihood of drinking alcohol. Engaging in economic activity was positively associated with alcohol consumption for Myanmar and Thailand but statistically significant only among Thai men. An opposite association was observed in Vietnam, with those currently working less likely to consume alcohol. The results show that having financial strain had no statistically significant impact on frequent drinking behavior in all three countries. Interestingly, Thai and Vietnamese elders were significantly less likely to drink when they sometimes encountered financial problems. Only in Myanmar did financial problems increase the likelihood of sometimes drinking alcohol.

The results further show a significant, yet inconsistent, effect of living arrangement on alcohol consumption among Thai and Vietnamese men. Thai men who resided with either family members or others were less likely to drink alcohol compared to those living alone, while in Vietnam, elders living with family or others were much more likely to drink sometimes compared to those living alone. In Myanmar, living with a spouse with or without children significantly reduced the chance of daily alcohol consumption. Drinking alcohol was significantly related to social participation in community activity among Thai and Vietnamese men. Lastly, smoking was consistently and strongly associated with alcohol drinking among men in all three countries.

For women, the logistic results in Table 5 show mixed correlates of alcohol drinking in the three settings. Only in Thailand did increased age significantly decrease the likelihood of alcohol consumption. In Vietnam and Thailand, Christianity was significantly associated with lower odds of drinking alcohol in women whereas the opposite was observed for Myanmar. Education had no significant impact in Thailand, while in Vietnam, women with secondary education or higher were significantly more likely to drink alcohol. Work status was a strong correlate of drinking alcohol in Thailand but not in Vietnam. Likewise, only in Thailand did urban residence decrease the chance of drinking alcohol among women. Living arrangement appeared to be associated with a lower likelihood of alcohol consumption in both countries. In Thailand, living with family or others significantly reduced the chance of drinking alcohol. In Vietnam, the relationship between alcohol consumption and living alone compared to with a spouse and/or children was not statistically different. Only those living with non–family members were significantly less likely to drink alcohol. In the three settings, smoking had a significant association with alcohol consumption, with a higher likelihood among Thai women.

Discussion

This study provides a comparative picture of smoking tobacco and drinking alcohol among older populations in three countries with different levels of economic development and social and cultural settings. The empirical evidence obtained from this study adds to the existing body of literature on each country, especially Myanmar, where little is known about smoking and drinking among its older population. For Vietnam and Thailand, although the literature on the levels and influences of smoking tobacco and drinking alcohol is much more extensive, studies specific to these issues in the older population are lacking.

Our results show the overall prevalence of smoking tobacco among both men and women is highest in Myanmar compared with Thailand and Vietnam, while the prevalence of alcohol consumption in both men and women is highest in Vietnam compared to other countries. Our results indicate further that elderly men in all three countries, like in many others, smoked tobacco and consumed alcohol more than elderly women (Kim et al., 2013; Lim et al., 2016; Mai et al., 2017; Zhang & Wu, 2015). Tobacco use and alcohol consumption among elderly men declined with age. There is no clear age pattern for women, except for Thailand, where tobacco and alcohol use decreased with age.

Several socioeconomic factors were found to have significant associations with smoking and drinking when all other variables were adjusted in the multivariate models. Education seemed to have the strongest associations with smoking and drinking in all three countries, but the magnitude and the direction of associations varied considerably between countries and genders. Overall, education was negatively correlated with smoking in all three countries, for both men and women. Unlike the findings for smoking, the negative correlation between education and alcohol consumption was observed only in Myanmar. Education attainment significantly increased the likelihood of drinking alcohol for Vietnamese men and women and Thai men. One possible explanation for this inverse relationship is that those with higher education are more likely to have higher socioeconomic status and thereby can afford alcoholic beverages. In a study examining various aspects of alcohol consumption in Vietnam, Lincoln (2016) explained the high prevalence of drinking among Vietnamese men by increased wealth as well as cultural factors including social expectation and local norms demonstrating masculinity and hospitality. For Vietnamese women, the author suggested a shift in norms and expectations regarding gender roles and gendered behaviors could contribute to an increasing trend of alcohol drinking. An important implication can be drawn here: given that the future older population in all three countries will be different from the current generation in terms of education, the levels of alcohol consumption in Vietnam and Thailand will likely increase.

With respect to area of residence, this study lends support to previous research suggesting that geographical area is correlated with tobacco smoking. Our study found rural male elders in all three settings to have a significantly higher risk of smoking tobacco than their urban counterparts. The result is partially in line with those reported by Lim et al. (2016), who found that rural Malaysian elders were

more likely to smoke, and Sharma et al. (2013), who found a similar result among North Indian elders. In Vietnam, Mai et al. (2017) explained the high prevalence of smoking among rural elder men with socialization and the perception that smoking is a relaxing activity. Another plausible explanation is that urban areas are likely to have more public places where smoking is prohibited by law. Environmental restrictions were observed in the study of Yang et al. (2011) to discourage smoking among Chinese urban residents.

Our results indicate that co-residential arrangements have a protective effect against alcohol consumption among the older population in Myanmar and Thailand. In Myanmar, living with a spouse with or without children significantly reduced the chance of daily alcohol consumption for elder men. In Thailand, living with a spouse and/or children or with others was found to decrease the likelihood of drinking alcohol, compared with living alone. This association was true for both genders and was similarly reported in the Chinese study of Zhang and Wu (2015). In Vietnam, on the other hand, living with a wife, with or without children, was associated with a higher likelihood of sometimes drinking alcohol for men. This result contradicts earlier findings regarding the effective power of wives in restraining husbands' health-risk behaviors (Tucker & Mueller, 2000).

The complementary relationship between smoking and drinking is noteworthy. When all other variables are controlled for in the model, drinking alcohol is strongly associated with smoking tobacco for men and women in all three countries, particularly for Thai women. Because both smoking and drinking are considered detrimental health behaviors for older adults, any public campaign to reduce either one or both of these habits could potentially generate enormous health benefits for the aging population overall.

The results of this study are subject to some limitations. First, similar to other cross-sectional studies, the causality between the health-risk behaviors and the set of explanatory variables of interest could not be determined. For example, our study found correlations between community participation and alcohol drinking in Vietnam and Thailand, such that participating in community activities may induce the elderly to drink alcohol. However, there is a possibility that alcohol drinkers may decide to participate in community activities where alcoholic beverages are provided. Another important limitation concerns the information on frequency of smoking and drinking. The responses were self-reported and thus subject to several biases, including recall bias, social desirability bias, and self-rating bias, all of which often lead to underestimation of levels of smoking and drinking. Since our study did not limit the analytical sample to the elderly who responded to the survey themselves, the validity of information might be also affected by the responses of proxies. In addition, our study did not distinguish different types of alcoholic beverages (e.g. wine, beer, or liquor) or the amount of alcohol being consumed when we measured drinking behavior, as these data were not available in any survey. Lastly, while considerable efforts were made in this study to minimize comparability problems stemming from the complexity and subjectivity of language and different linguistic and cultural contexts, as in other comparative studies (Angel, 2013; Teerawichitchainan et al., 2015), we acknowledge that these challenges cannot be entirely discounted.

Conclusion

Based on recent nationally representative surveys of older persons in Myanmar, Vietnam and Thailand, this study is among the first to compare situations of smoking tobacco and alcohol consumption among older persons in Southeast Asian developing countries. Our results show that smoking tobacco among both men and women is most prevalent in Myanmar while alcohol consumption in both genders is most common in Vietnam. The study indicates further that older men smoke tobacco and consume alcohol more than older women in all three countries. However, the decline of such activities with increasing age is observed for older men only. The multivariate analyses reveal that several socioeconomic factors, including level of education, area of residence, and living arrangement have significant associations with smoking and drinking. As the future cohort of older adults in these countries will be different from the current one particularly in terms of education, the levels of alcohol consumption, particularly among older men in Vietnam and Thailand, will likely be increasing. This will inevitably lead to elevation in tobacco use. There is clearly a need for policy makers and health professionals to extend the focus of smoking tobacco and alcohol consumption from young and middle-aged adults to older populations and to take into account the demographic and socioeconomic characteristics of older adults when designing interventions and measures.

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Declarations

Conflict of Interest The authors declare that there is no conflict of interest.

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