Do Muslims smoke more cigarettes? International evidence

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Abstract

A previous study has shown empirically that countries with higher number of Muslim populations are more likely to have higher level of cigarette consumption compared to non-Muslim countries. This paper attempts to employ regression analysis to reanalyze the relationship between the size of Muslim population and smoking behaviour at a cross-country level. Using an alternative dataset from the World Health Organization (WHO), this study establishes that the aforementioned positive association is not robust across countries, especially when the European countries were dropped from the observation. This finding is obtained after having the effect of Muslims controlled for the countries level of intelligence (IQ) income per capita, population density, life expectancy and the percentage of Cristian population. This study concludes that the positive relationship between smoking level and Muslim population that was reported in the previous study is due to the fact that Muslim in the European countries tend to smoke more cigarette than other Muslims from other countries.

Keywords: smoking; religion; Muslim populations

Background

The smoking of cigarettes is harmful to health. Every year, about 6 million people die because of direct smoking of tobacco and inhaling second-hand smoke worldwide. Smoking has led to ten percent of deaths, as it is associated with 42 percent of chronic respiratory diseases, 71 percent of all lung cancer incidents, and about ten percent of cardiovascular diseases (WHO, 2011). Moreover, smoking deteriorates cognitive and physical functioning of an individual in the long-term (North, Palmer, Lewis et al., 2015).

Smoking is deeply entrenched in the culture of various societies although it negatively affects human health. Tobacco has been growing wild in the Americas since 8,000 years ago, and its intake began around 2,000 years ago, in which it was chewed and smoked during cultural and religious ceremonies and events (Cancer Council NSW, 2015). Kanazawa (2006) suggested that cigarette smoking is an evolutionary novel activity although its' harmful effects towards health is crystal clear. In the most recent study, Suhaimi, Burhan, Abdul Rahman and Daud (2019) examined the relationship between level of smoking and the percentage of two religious group namely Muslim and Christian. Through regression analysis, they found that a higher percentage of Muslims in a country was related to more tobacco cigarette smoking on the daily basis, while the Christian population was not significantly associated with the level of smoking.

The purpose of this study is to reanalyse the impact of Muslim populations on the cigarette consumption at a cross-country level. Instead of using data on daily smoking of cigarette as employed in Suhaimi et al. (2019), the current study uses alternative dataset on the 'current' level of smoking of 1) cigarette and 2) all tobacco products obtained from the World Health Organization (WHO). 'Current smoking' includes both daily and non-daily or occasional smoking whereas 'tobacco products' includes cigarettes, cigars, and pipes.

Methods

This study adopts a linear regression model from Suhaimi et al. (2019) as follows:

$$Smoking_i = \beta_0 + \beta_1\,(Muslim)_i + \beta_2(Christian)_i + \beta_3\,(Income)_i + \beta_4\,(Density)_i + \beta_5\,(Health)_i + \beta_6\,(IQ)_i + e_i$$

Where *smoking* is the current level of smoking measured as the percentage (%) of populations who smoke cigarette both on daily and non-daily basis, which includes occasional smoking. The data for the year 2013 was

obtained from the WHO (2017). This variable is divided into two sub indicators, namely *cigar_current* and *tobacco_current*. *Cigar_current* refers to current smoking of cigarette (age-standardized rate), while *tobacco_current* refers to current smoking of any tobacco product. The term 'tobacco' includes cigarettes, cigars, pipes or any other smoked tobacco products, as specified by WHO (2017). *Muslim* and *Christian* are percentages of Muslims and Christians, respectively, who resided within country *i* in 2010. These data were retrieved from Pew Research Center's (2012) report on size and distribution of the world's major religious groups. The effects of *Muslim* and *Christian* were controlled for four independent variables. Specifically, *income* is the log-transformed gross domestic product (GDP) per capita taken from Penn World Table 9.0 (Feenstra, Inklaar & Timmer, 2015), averaged for 2010–2012. On the other hand, *density* is the population density (people per sq. km of land area), why *health* denotes total years of life expectancy at birth. *Density* and *health* data were obtained from World Development Indicator (World Bank, 2017) and averaged for years 2010–2012. Finally, *IQ* is the national average intelligence of country *i*, extracted from Lynn and Vanhanen (2012).

Results

Tables 1 and 2 present the summary of statistics and correlation matrix for all variables used in this study. According to Table 2, variables *cigar_current* and *tobacco_current* were non-significantly ($p>.10$) correlated with both *Muslim* and *Christian*, and *density*. However, both of these smoking indicators were highly correlated with *income*, *IQ* and *health*. These findings show that countries with higher average level of smoking also have more income per capita, higher IQ and better health.

Table 1 *Summary statistics for all variables (N=104).*

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
Cigar_ Current	19.13	19.25	36.50	3.80	7.67
Tobacco_ Current	23.06	23.60	43.40	4.70	8.32
IQ	87.43	88.00	107.10	60.10	10.94
Income	4.11	4.20	4.96	2.95	.48
Density	233.74	85.86	7508.20	1.81	764.69
Health	72.82	74.58	83.00	48.80	8.51
Muslim	22.26	3.90	99.90	.00	34.51
Christian	56.30	69.65	99.50	.06	36.46

Table 2 *Correlation matrix for all variables employed in the models (N=104).*

	Variable	1	2	3	4	5	6	7	8
1	*Cigar_*	1.000							

2	*Current Tobacco_ Current*	.967***	1.000						
3	*IQ*	.504***	.387***	1.000					
4	*Income*	.349***	.246**	.813***	1.000				
5	*Density*	-.044	-.062	.187*	.177*	1.000			
6	*Health*	.373***	.261***	.821***	.818***	.152	1.000		
7	*Muslim*	-.010	.038	-.310***	-.186*	.008	-.178*	1.000	
8	*Christian*	-.076	-.102	.002	.073	-.153	.014	-.694***	1.000

Note: *p<.10, **p<.05, *** p<.01

Tables 3 and 4 present the summary of regression analysis, where *cigar_current* and *tobacco_current* were regressed on the six independent variables. As shown in Model 1 of both tables, the study found that only *Muslim*, *density* and *IQ* were highly significant towards both dependent variables, while *Christian, income* and *health* were non-significant even at the p<.10 level. The direction of the relationship is positive for both Muslim and IQ, but negative for density. These findings indicate that higher IQ and percentage of Muslim population are associated with higher level of smoking across countries.

Moreover, this study also examined whether the significant effect of *Muslim* and other controlled variables are influenced by geographical factor. Based on Barro and Lee (2013), this study excluded one of the seven world regions at a time from the regression analysis. The results are presented in Models 2–8 (Tables 3 & 4). As shown in Table 3, the variable Muslim was significant at 5% level in Models 2, 3 and 6 only. However, the significant level was reduced to p<.10 when countries of Latin America and the Caribbean, East Asia and the Pacific, and advanced economies were excluded from the analysis. Ultimately, Muslim become non-significant at the 10% level when this study excluded the Europe and Central Asia. Furthermore, the results of regression are similar in Table 4, where the positive effect of Muslim towards the current level of smoking is non-significant when European and Central Asian countries were omitted from the sample.

Conclusion

This paper attempted to re-examine the effects of Muslim populations on the level of smoking at a cross country level. This study found that the positive effect of percentage of Muslims towards smoking is not robust across geographical region. This finding differs to those reported in Suhaimi et al. (2019) using different dataset. In particular, the positive relationship between these two variables diminished as a few regional countries were excluded from the regression, especially the European and Central Asian countries. Therefore, this study proposes that the positive Muslim-smoking association is greatly due to the fact that only Muslims of this region smoke more cigarettes and other tobacco products compared to Muslims of other region. In sum, this study concludes that the significant relationship between percentage of Muslim populations and level of smoking is rather weak.

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Table 3 *Summary of regression analysis after excluding one region at a time.*

Dependent variable: Current smoking of cigarettes (age-standardised rate), percentage (%) of population, *Cigar_Current*.								
Excluded Region	Model 1: No region excluded	Model 2: Middle East and North Africa[a]	Model 3: Sub-Saharan Africa[b]	Model 4: Latin America and the Caribbean[c]	Model 5: East Asia and the Pacific[d]	Model 6: South Asia[e]	Model 7: Europe and Central Asia[f]	Model 8: Advanced Countries[g]
IQ	.603*** (5.038)	.609*** (4.980)	.644*** (4.732)	.529*** (3.972)	.608*** (4.531)	.628*** (4.805)	.409*** (3.086)	.653*** (5.268)
Income	-3.172 (-1.417)	-2.336 (-1.024)	-5.055 (-1.462)	-3.571 (-1.597)	-2.956 (-1.329)	-3.769 (-1.568)	-1.155 (-.489)	-1.728 (-.708)
Density	-.001*** (-3.409)	-.002*** (-6.055)	-.001*** (-2.888)	-.001*** (-3.048)	.000 (.106)	-.001** (-2.607)	-.001** (-2.209)	-.002*** (-4.561)
Health	-.092 (-.556)	-.144 (-.842)	-.177 (-.586)	.008 (.041)	-.092 (-.501)	-.103 (-.590)	-.027 (-.164)	-.112 (-.647)
Muslim	.062** (2.101)	.067** (2.157)	.075** (2.186)	.059* (1.927)	.058* (1.885)	.068** (2.134)	.031 (.910)	.063* (1.885)
Christian	.023 (.956)	.023 (.888)	.035 (1.384)	.037 (1.488)	.023 (.879)	.019 (.753)	-.011 (-.373)	.029 (1.111)
N	104	94	84	90	94	99	83	82
R^2	.321	.362	.212	.312	.328	.328	.291	.395
Adj. R^2	.279	.318	.151	.262	.282	.284	.235	.346

Note: Regression coefficients are unstandardised betas. All regressions are estimated using White's heteroskedasticity correction. The t-statistics are in parentheses. *** $p<.01$, ** $p<.05$, and * $p<.10$.

[a] Middle East and North Africa: Bahrain, Egypt, Iran, Israel, Jordan, Lebanon, Malta, Morocco, Oman, and Saudi Arabia.

[b] Sub-Saharan Africa: Cameroon, Congo (Zaire), Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mali, Mauritius, Mozambique, Namibia, Nigeria, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Uganda, and Zambia.

[c] Latin America and the Caribbean: Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Honduras, Jamaica, Mexico, Panama, Paraguay, and Uruguay.

[d] East Asia and the Pacific: China, Fiji, Indonesia, Laos, Malaysia, Mongolia, New Zealand, Philippines, Singapore, South Korea, Thailand, and Vietnam.

[e] South Asia: Bangladesh, India, Nepal, Pakistan, and Sri Lanka.

[f] Europe and Central Asia: Albania, Armenia, Azerbaijan, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, and Ukraine.

[g] Advanced Countries: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and USA.

Table 4 *Summary of regression analysis after excluding one region at a time.*

Dependent variable: Current smoking of any tobacco product (age-standardised rate), percentage (%) of population, *Tobacco_Current*.

Excluded Region	Model 1: No region excluded	Model 2: Middle East and North Africa[a]	Model 3: Sub-Saharan Africa[b]	Model 4: Latin America and the Caribbean[c]	Model 5: East Asia and the Pacific[d]	Model 6: South Asia[e]	Model 7: Europe and Central Asia[f]	Model 8: Advanced Countries[g]
IQ	.595*** (4.457)	.609*** (.4.461)	.655*** (4.428)	.479*** (3.197)	.619*** (4.074)	.607*** (4.046)	.384** (2.623)	.657*** (4.739)
Income	-3.353 (-1.223)	-2.555 (-.878)	-5.534 (-1.527)	-3.606 (-1.322)	.001 (.426)	-3.530 (-1.176)	-1.501 (-.502)	-1.773 (-.586)
Density	-.002*** (-3.099)	-.002*** (-5.995)	-.001** (-2.547)	-.001*** (-2.814)	-.158 (-.693)	-.001*** (-2.650)	-.001* (-1.898)	-.002*** (-4.148)
Health	-.151 (-.731)	-.217 (-1.011)	-.258 (-.787)	-.012 (-.051)	-3.274 (-1.219)	-.162 (-.742)	-.072 (-.345)	-.181 (-.838)
Muslim	.066** (2.129)	.070** (2.165)	.081** (2.318)	.058* (1.847)	.062* (1.955)	.069* (1.876)	.037 (1.059)	.069** (2.017)
Christian	.018 (.713)	.018 (.687)	.033 (1.201)	.034 (1.274)	.020 (.711)	.016 (.529)	-.015 (-.476)	.021 (.761)
N	104	94	84	90	94	99	83	82
R^2	.226	.261	.188	.197	.233	.223	.180	.304
Adj. R^2	.178	.210	.125	.139	.181	.173	.116	.249

Note: Regression coefficients are unstandardised betas. All regressions are estimated using White's heteroskedasticity correction. The t-statistics are in parentheses. *** $p<.01$, ** $p<.05$, and * $p<.10$.

[a] Middle East and North Africa: Bahrain, Egypt, Iran, Israel, Jordan, Lebanon, Malta, Morocco, Oman, and Saudi Arabia.

[b] Sub-Saharan Africa: Cameroon, Congo (Zaire), Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mali, Mauritius, Mozambique, Namibia, Nigeria, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Uganda, and Zambia.

[c] Latin America and the Caribbean: Argentina, Barbados, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Honduras, Jamaica, Mexico, Panama, Paraguay, and Uruguay.

[d] East Asia and the Pacific: China, Fiji, Indonesia, Laos, Malaysia, Mongolia, New Zealand, Philippines, Singapore, South Korea, Thailand, and Vietnam.

[e] South Asia: Bangladesh, India, Nepal, Pakistan, and Sri Lanka.

[f] Europe and Central Asia: Albania, Armenia, Azerbaijan, Bosnia, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, and Ukraine.

[g] Advanced Countries: Australia, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and USA.