

# Smoke and thriving: an ecological study

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## ABSTRACT

Studies suggest a possible inverse correlation between smoking attitude and happiness levels. The present paper investigates the relation between males and females smoking prevalence and happiness levels in 155 countries worldwide. Analyses, after adjusting for socio-economic factors, reveal a different relationship between happiness and prevalence of tobacco smoking in the two genders. Countries with highest prevalence of males smoking show the lowest wellbeing levels (Beta coefficient:  $-0.350$ ; P Value  $<0.001$ ) while countries with highest prevalence of females smoking show the highest levels of wellbeing (Beta coefficient:  $0.144$ ; P Value:  $0.030$ ). The countries with the highest prevalence of people thriving are those with the highest prevalence of women smoking and the lowest prevalence of males smoking.

*Key words: smoke, happiness, lifestyles, gender, tobacco*

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## INTRODUCTION

This study was inspired by the interesting paper of Braillon and Doubois regarding the relationship between tobacco smoke and happiness in US countries. Evaluating the 51 US countries they found an inverse association between the smokers' prevalence and the happiness levels and they noticed that countries with highest smokers' prevalence and lowest happiness levels are the ones producing tobacco. They finally argued that countries tobacco producing are the ones less interested in promoting wellbeing [1].

The connection between happiness and smoke could not depend only on country's

policies, studies highlight that life choices and behaviors seem to affect the happiness individual level at less for 40%, while 50% is due to biological predisposition and 10% to life circumstances [2]. Smoking, as human attitude and behavior, may affect the individual happiness level but the association between smoking and happiness levels is uncertain and has been rarely investigated. A common belief is that smoking helps in coping with stress but the little evidences available on the theme challenge this assumption. Researchers related smoking cessation of highly dependent smokers to lowering of stress [3]. Never smokers seem to be happier than current smokers and, after stopping smoking for one year or

more, ex-smokers increase their happiness level above the current smokers' level [4]. Ex-smokers was also reported to be happier than they were when smoking [5].

The analysis of Braillon and Doubois explores the relationship between smoke and happiness only in US countries and their approach focusing on the role policies affecting this relationship does not consider the effect of demographic factors. But the WHO states that 80% of smokers are from low- and middle-income countries [6], which makes a case for exploring this topic in other countries, and smoking attitude is highly affected by demographic factors [7].

The aim of the study is to evaluate the relationship between happiness levels and the prevalence of males and females smokers in 155 countries worldwide.

## METHODS

The relationship between happiness and smoking was studied following a linear regression approach:

$$y = a + bx$$

where  $y$  = country prevalence of thriving in 2010 [12], and  $x$  = Country-specific data on smoking prevalence in 2009-2010, obtained from the WHO 2009-2010 (Current smoking of any tobacco product age-standardized rate) [8].

In particular, the Well-Being Index and the score indicate the presence of thriving, struggling and suffering.

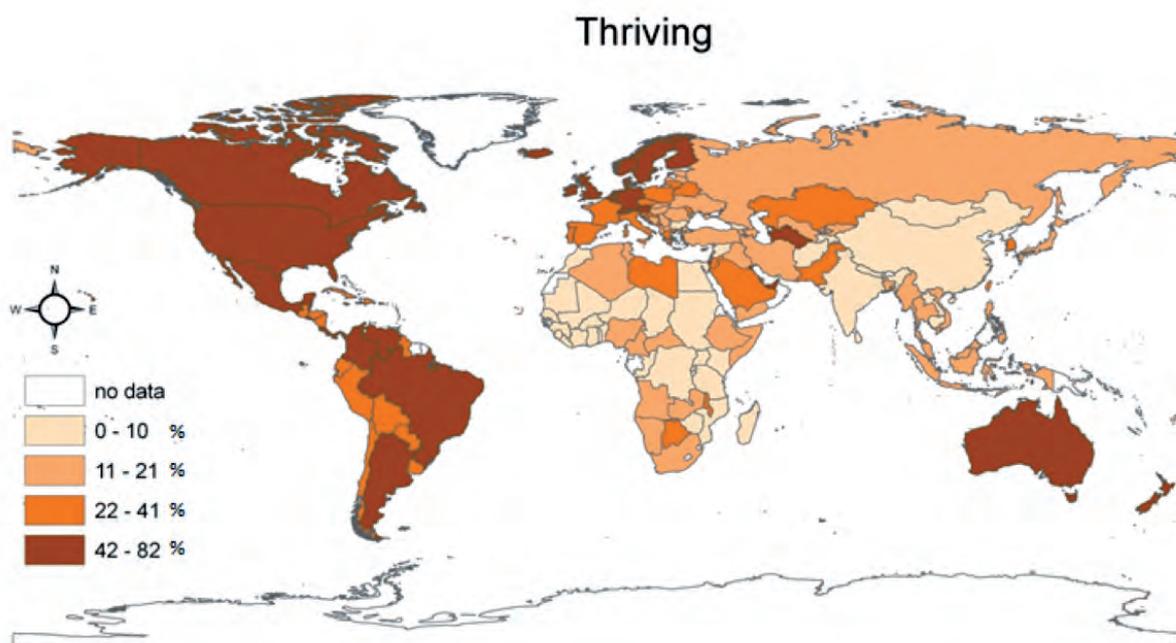
For our purposes we used the country prevalence of thriving as a proxy of happiness. The prevalence of people thriving in the countries included in the study is shown in figure 1.

Further, we used a multivariate approach adding some potential confounder factors in the analysis, including Gross Domestic Product (year 2010) from OECD data [9], unemployment rate, life expectancy at birth, infant mortality rate from World Bank data [10], and daily experience from the Global Well Being Index [11]. The latter variable is calculated on responses to 10 items (feeling well-rested, being treated with respect, smiling/laughter, learning/interest, enjoyment, physical pain, worry, sadness, stress, and anger).

A simple linear regression model, shown in figure1, was built in order to verify the influence on the variable "Thriving" (dependent variable) of the following explanatory variables separately:

FIGURE 1

PERCENT PREVALENCE OF PEOPLE THRIVING IN WORLD COUNTRIES



- Male tobacco prevalence
- Female tobacco prevalence

Moreover, a multiple linear regression model was built in order to verify the influence on the variable “Thriving” (dependent variable) of the following explanatory variables:

Male tobacco prevalence, Female tobacco prevalence, GDP, daily experience, unemployment rate, life expectancy at birth, infant mortality rate.

The results, depicted in table 1, are presented as beta coefficient. The goodness of fit of the models is calculated using the R<sup>2</sup>.

The statistical significance was set at  $p < 0.05$ . The statistical analysis was conducted using SPSS for Windows, release 19.0.

The analysis was conducted using data from 155 Countries, 43 from Asia, 41 from Europe, 41 from Africa, 3 from Oceania and 27 from America.

## RESULTS

The association between smokers' prevalence and thriving prevalence differs substantially in the two genders: it is direct for females and inverse for males. Countries with highest prevalence of females smoking are the ones showing the highest thriving levels while countries with highest male smoking prevalence show the lowest thriving levels.

As shown in table 1 the adjustment of the models significantly increases the goodness of fit (R<sup>2</sup>), and confirms the direction of the association between male and female tobacco prevalence and percentage of thriving (the p value of Beta coefficient for the model for males passes from non-significant to significant levels after adjustment).

FIGURE 2

COUNTRY-SPECIFIC PREVALENCE OF CIGARETTE SMOKING IN 2009-2010 (ORDINATE AXIS) VS GALLUP E PREVALENCE OF THRIVING (WELL-BEING INDEX IN 2010 (ABSCISSA AXIS)

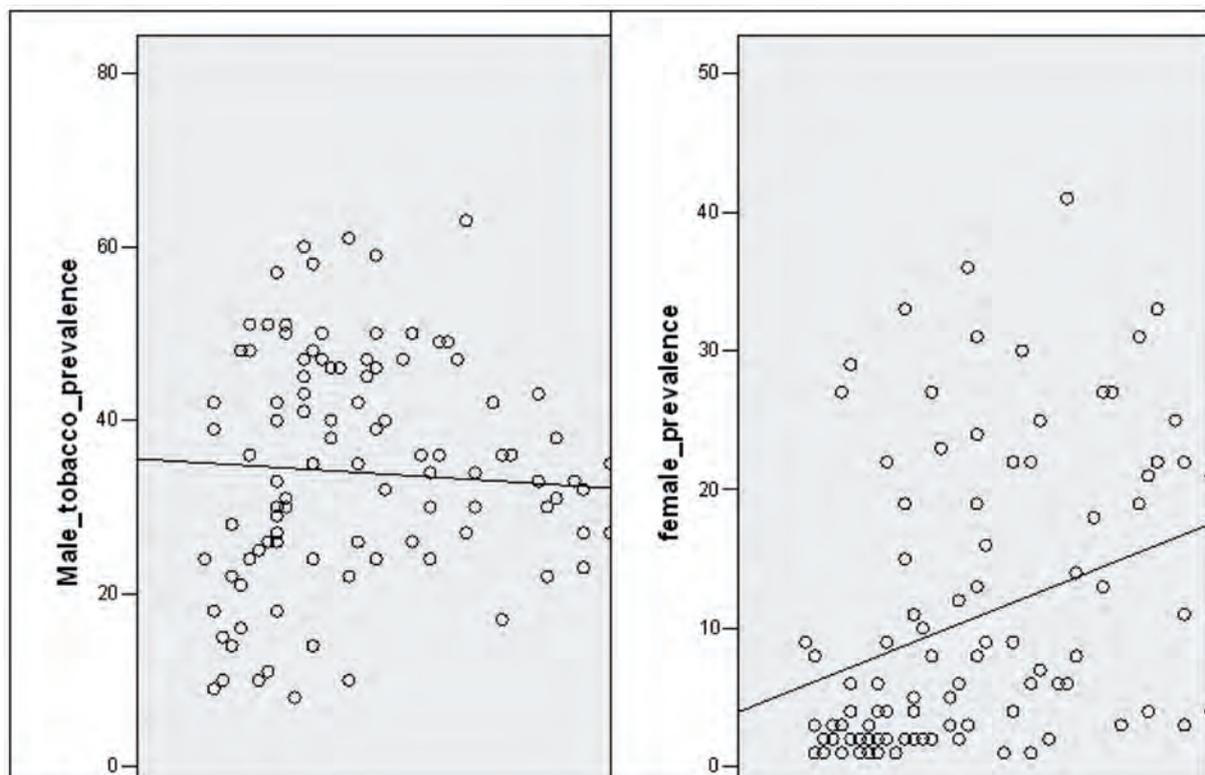


TABLE 1

| CRUDE AND ADJUSTED BETA COEFFICIENTS OF THE VARIABLE “THRIVING” |                                  |                |                                      |                |
|---|----------------------------------|----------------|--------------------------------------|----------------|
| DEPENDENT VARIABLE  | CRUDE BETA COEFFICIENT (P-VALUE) | R <sup>2</sup> | ADJUSTED* BETA COEFFICIENT (P-VALUE) | R <sup>2</sup> |
| MALE TOBACCO PREVALENCE   | -0.064 (0.291)                   | 0.010          | -0.350 (<0.001)                      | 0.482          |
| FEMALE TOBACCO PREVALENCE                                       | 0.259 (<0.001)                   | 0.213          | 0.144 (0.030)                        | 0.364          |

\*adjusted by GDP, daily experience, unemployment rate, life expectancy at birth, infant mortality rate

## DISCUSSION

The analysis suggests that countries with highest prevalence of thriving people are the ones with the highest prevalence of women smoking and the lowest of males smoking.

The study design doesn't allow speculating on a possible impact of smoking attitude on the emotional state of men and women.

The epidemic trend of tobacco consumption provides a possible explanation for these results. The most developed countries, as shown in figure 1, are the ones with the highest prevalence of people thriving. In those countries the prevalence of female smoking has increased in the last 40 years while the prevalence male smoking has decreased [7], nowadays the most developed European countries show similar smokers' rates among males and females. The country with the highest prevalence of thriving worldwide is the Denmark where the smokers' prevalence in the two genders differs for only one percent point. Studies demonstrate that prevalence of smoking females correlates with female employment rate, a strong indicator of female emancipation, and national income per capita while the highest males smoking prevalence is in low developed countries [7,12]. These evidences seem to suggest that both happiness levels and smoking rates are mainly due to the socio-economic country level but the difference in correlation pattern between smoking and happiness in the two genders increases after adjustment for economic and social factors (GDP, unemployment rate and

infant mortality and life expectancy at birth) thus the correlation is independent by external factors. Braillon and Dubois assume that thriving rate is influenced by country policies and explain the inverse correlation between smoking and happiness in the US claiming that countries actively promoting citizens wellbeing are the same involved in fighting tobacco consumption.

According with this politic interpretation we can conclude that countries promoting wellbeing worldwide are those more attentive to gender equality and female condition interpreting the increase of female smokers as a dramatic side effect of female emancipation.

Important studies, conducted with a cross-sectional approach, demonstrate a correlation between smoking attitude and low levels of personal happiness but do not evaluate gender differences among the smoking population [13].

We approached the theme through an ecological approach but studies utilizing different designs could reveal gender differences in the association between smoking and happiness independently by country policies and socio-economic development.

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