

Risky Health Behaviors: Evidence for an
Emerging Economy

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Risky Health Behaviors: Evidence for an Emerging Economy^{*}

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Abstract

This paper uses the Colombian National Health Survey to analyze the relationship between education and risky health behaviors, namely smoking, heavy drinking, being obese, and unsafe sexual behavior, by estimating the education gradient using *Logit* models. We also provide evidence on the effect of education, socio-economic and knowledge variables on these health behaviors by gender and area of residence. Results indicate that there is a negative and significant effect of years of schooling on the probability of smoking, whereas the probability of heavy drinking and unsafe sexual behaviors increases with education, highlighting the importance of social and cultural factors. Knowledge variables not only reduce the probability of smoking, but also the probability of heavy drinking and being obese, indicating that campaigns and research on the negative effects of these behaviors have raised awareness about how harmful they are.

Key words: Education, risky health behaviors, Colombia

JEL Classification: I1, I12, I20

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Comportamientos riesgosos para la salud: evidencia para una economía emergente*

Resumen

Este artículo utiliza la Encuesta Nacional de Salud de Colombia para analizar la relación entre educación y comportamientos riesgosos para la salud, como fumar, tomar en exceso, ser obeso y tener comportamientos sexuales riesgosos, estimando el gradiente de la educación mediante modelos *Logit*. Adicionalmente, se proporciona evidencia sobre el efecto de la educación, y de variables socioeconómicas y de conocimiento por género y área de residencia. Los resultados indican que existe un efecto negativo y significativo de la educación en la probabilidad de fumar mientras que la probabilidad de beber en exceso y de tener comportamientos sexuales riesgosos aumenta con la educación, destacando la importancia de factores sociales y culturales. Las variables de conocimiento no solo reducen la probabilidad de fumar, sino la de tomar en exceso y ser obeso, lo que indica que campañas dirigidas a destacar los efectos nocivos de estas conductas aumentan la conciencia sobre sus efectos perjudiciales en la salud.

Palabras clave: Educación, comportamientos riesgosos para la salud. Colombia

Clasificación JEL: I1, I12, I20

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1. INTRODUCTION

Risky health behaviors such as smoking, drinking, and being obese are considered a major source of morbidity and mortality associated with cardiovascular diseases, cancer, diabetes, and liver diseases, among other chronic diseases. Additionally, having an unsafe sexual behavior could be a source of sexually transmitted diseases (STD), which in turn could be the cause of severe illnesses, infertility, long-term disability, and even death for millions of people. According to the World Health Organization (WHO, 2014a), chronic diseases are one of the major health and development challenges of this century, particularly for low and middle-income countries. In fact, in 2012 chronic diseases were responsible for 68% of the world's deaths, of which 40% were premature (under the age of 70). Low and middle-income countries accounted for 75% of the world's deaths due to chronic diseases, and 82% of these were premature. Regarding deaths attributed to risky health behaviors, the WHO (2014a) estimated that in 2012 about 6% of deaths worldwide were attributable to alcohol consumption, 11% to tobacco use, and 5.7% to insufficient physical activity. Furthermore, the WHO (2012) estimated that in 2008 there were about 500 million new cases of four STDs in adults between the ages of 15 and 49.

Colombia is not the exception on this matter. According to the Pan American Health Organization (2012), chronic diseases are not only a leading cause of mortality, but also a main source of morbidity and demand for health services. This study also emphasizes that for individuals between 18 and 69 years old, 7.6 % of the population was considered at risk of alcohol dependency, while the prevalence of current smokers was 12.8%. Regarding STDs, on average, every year from 2009 to 2011, 98,423 cases were reported (Ministerio de Salud, undated) while the prevalence rate of HIV for adults aged 15 and up was 0.5% in 2013 (UNAIDS, 2014).

Education has played an important role in preventing risky health behaviors. In general, the theoretical literature has found that there are three main channels through which education affects health, and consequently risky health behaviors. The first two channels date back to Grossman (1972) who studied the demand for health, considering health as a form of human capital. In the productive efficiency channel, education directly affects the health production function, considering that more educated people obtain more health output given a certain amount of inputs. In the allocative efficiency channel, education affects the input mix in the health production function, since more educated people choose a different input mix than less educated people in order to produce more output. The third channel, put forward by Fuchs (1980), establishes that education and health are likely to be affected by the same set of unobserved variables.

Specifically, in the case of risky health behaviors, there has been a growing interest in studying empirically the role of education, dating back to Ross and Wu (1995) who evaluate the relationship between education and health in the United States taking into account health lifestyles. The majority of these studies have been carried out for developed countries; they have found that there is a negative relationship between schooling and the prevalence of smoking, heavy drinking, and obesity. For example, Cutler and Lleras-Muney (2010) evaluate the relationship between education and risky health behaviors by means of the education gradient for the United States and the United Kingdom. Buckles *et al.* (2013) study the effect of education on smoking, heavy drinking, and obesity, and Cawley and Ruhm (2011) analyze the relations between education and smoking, alcohol consumption, physical activity, diet, and the use of illicit drugs, also for the United States.

The association between education and health behaviors has also been studied for several European countries. For example, Brunello *et al.* (forthcoming) study the causal effect of education on smoking, drinking, exercising and the body mass index, considering short and long-run mediating effects for 13 European countries. Renner (2011) examines the possible channels through which education affects smoking tobacco, alcohol abuse, and overeating for eleven countries of the European Union. For specific countries, Andersone (2011) evaluates the impact of education on smoking, drinking and physical activity for the United Kingdom; Jones and Etilé (2011) analyze the impact of schooling on smoking in France; Jürges *et al.* (2011) investigate the causal effect of schooling on smoking and obesity in West Germany; Bratti and Braga (2013) investigate the non-pecuniary benefits of education on health-improving behaviors for Italy. For Australia, Li and Powdthavee (2014) estimate the causal effect of schooling on health behaviors and Webbink *et al.* (2010) analyze the causal effect of education on the probability of being overweight.

For developing countries, studies have mainly focused on the effects of education on sexual behavior. For example, the effect of schooling on the use and knowledge of contraception for women has been studied by Andalón *et al.* (2014) for Mexico, by Dinçer *et al.* (2014) for Turkey, and by Mocan and Cannonier (2012) for Sierra Leone. In addition, Agüero and Bharadwaj (2013) find that education has a positive effect on having more knowledge about HIV and a negative effect on the number of sexual partners for women in Zimbabwe. Also, de Walque (2006) finds that education is an important predictor of sexual behaviors in Burkina Faso, Cameroon, Ghana, Kenya, and Tanzania. In the case of Colombia, Varela *et al.* (2011) estimate the prevalence of risky sexual behaviors and analyze their relationship with socio-demographic characteristics in adult population from all regions of the country; Campo-Arias *et al.* (2010) study the prevalence and factors related with risky behaviors for reproductive and sexual health for high school students in the city of Santa

Marta, and Brook *et al.* (2002) identify the relationships between drug use, risky sexual behaviors and early pregnancy in Colombian teenagers.

Given that the empirical literature about this topic has concentrated mainly in developed countries, the aim of this paper is to study the relationship between education and risky health behaviors in Colombia, a middle income economy. The study of this relationship is important given that the burden of premature deaths and diseases caused by these behaviors is heavily concentrated in low and middle-income countries, causing not only distress for those involved, but also high economic costs of health services. Therefore, understanding the factors affecting these risky health behaviors (e.g., smoking, heavy drinking, being obese, and unsafe sexual behavior) is worthwhile.

This paper also provides evidence on the effect of education and other covariates on health behaviors by gender and area of residence (i.e., rural vs. urban). Traditional gender roles may influence the effects of education on risky health behaviors. In addition, the analysis by area of residence is important due to the significant differences observed in years of schooling between urban and rural areas. In general, we found that there is a negative and significant effect of education on the probability of smoking and a positive effect on the probability of heavy drinking and having unsafe sexual behavior, underlining the importance of social and cultural factors. In addition, knowledge variables about the negative effect of these behaviors on health reduce the probability of smoking, heavy drinking and being obese.

This paper is divided into four sections, besides this introduction. The second section presents the empirical strategy used in the estimations. Section three provides information about the data used in the analysis. In the fourth section, we present and discuss the results. The last section concludes.

2. EMPIRICAL STRATEGY

In order to analyze the effect of education on an individual's risky health behaviors, we follow the empirical strategy proposed by Cutler and Lleras-Muney (2010)¹. Specifically, we first estimate the basic equation, including education and a set of basic controls, that is:

$$H_i = \alpha_0 + \alpha_1 E_i + \alpha_2 X_i + \varepsilon_i \quad (1)$$

¹ The gradient methodology has also been used by Adler, Boyce, Chesney, Choen, Folkman, Kahn, and Syme (1994), Ross and Wu (1995), Banks, Marmot, Oldfield, and Smith (2006, 2009), Cutler and Lleras-Muney (2006); Kimbro, Bzostek, Goldman, and Rodríguez (2008); Conti, Heckman, and Urzua (2010); Andersone (2011), Renner (2011), and Conti and Hansman (2013), among others.

where: H_i is the risky health behavior of individual i (i.e., current smoker, heavy drinking, obesity, and unsafe sexual behavior); E_i is the education of individual i , measured as the years of schooling; X_i is a set of basic controls, such as age, gender and ethnic group; and ε_i is the error term which is assumed to be normally distributed.

From this estimation we obtain the education gradient, given by the education coefficient (α_1), which measures the effect of schooling on the risky health behavior.

The second step consists of re-estimating equation (1) adding a set of income and socio-economic variables in order to identify if the effect of education is mediated by these type of variables. That is,

$$H_i = \alpha_0 + \alpha_1 E_i + \alpha_2 X_i + \alpha_3 Y_i + \varepsilon_i \quad (2)$$

where Y_i is a set of socio-economic explanatory variables (e.g., income, marital status, geographical location of the individual, social security regime, labor participation, and overcrowding). From this estimation we can obtain the education gradient (α_1), once this set of explanatory variables is added to the basic equation. This procedure allows us to calculate the percentage change in the education coefficient from the addition of these variables.

Next, we re-estimate equation (1) adding a set of knowledge variables. These variables could play a mediating role in explaining the relationship between education and risky health behaviors. It is important to bear in mind that people with different education backgrounds can obtain information about health behaviors from several sources and can understand it in different ways. That is,

$$H_i = \alpha_0 + \alpha_1 E_i + \alpha_2 X_i + \alpha_4 Z_i + \varepsilon_i \quad (3)$$

where Z_i is a set of knowledge variables about health risks (e.g., if an individual knows if smoking increases the chance of developing cancer, if smoking is harmful for unborn children and pregnant women, if alcohol is harmful for health, if individuals know that exercise is good for health, if individuals have heard about condoms).

Finally, in the same equation we estimate the effect of years of schooling and all the covariates considered above on each risky health behavior, according to the following equation:

$$H_i = \alpha_0 + \alpha_1 E_i + \alpha_2 X_i + \alpha_3 Y_i + \alpha_4 Z_i + \varepsilon_i \quad (4)$$

Since the risky health behavior variables of individual i (H_i) are binary, the estimations are carried out using *logit* models.

3. DATA SOURCE AND VARIABLES

The data used in this paper come from the Colombian National Health Survey (NHS) carried out by the Ministry of Health during 2007. The survey has national coverage and provides information on the assessment of general health and the main problems faced by the population. The survey also includes information on socio-demographic, economic and cultural characteristics of the population.

The NHS survey was applied to 164,474 individuals from all regions in the country and comprises 4 modules, each addressed to a specific group of people. The first module gathers socio-economic information for all individuals in the household and knowledge about tropical diseases. The second module was aimed at individuals older than 6 years old. It contains questions about education, employment, perceived morbidity, demand and utilization of health services, chronic conditions and risk factors, and physical activity. The third module was applied to children under the age of 6. The fourth module, intended for individuals 18 years and older, includes questions on assault and assault injuries, sexually transmitted diseases, perception and knowledge about HIV/AIDS, and psychoactive substances.

Our empirical analysis comprises information from all modules but module three, for individuals 18 years and older. The resulting sample will depend on the number of individuals who answered the relevant questions about risky health behaviors. Specifically, we consider four risky health behaviors, namely: current smoker, heavy drinking, being obese, and unsafe sexual behavior. These variables were defined as dummy variables, based on the information provided by the NHS, where a current smoker takes the value of 1 if the individual smokes cigarettes every day or some days of the week, and 0 otherwise; heavy drinking takes the value of 1 for those who have drunk more than 5 glasses of any alcoholic beverage a day during any of the last 15 days, and 0 otherwise; being obese takes the value of 1 if the individual's body-mass index is greater than or equal to 30, and 0 otherwise; and unsafe sexual behavior takes the value of 1 for those who have had more than one sexual partner during the last 30 days, and 0 otherwise.²

² The definitions of risky health behaviors are based on the information provided by the NHS, which are closed to the international definitions. In the particular case of unsafe sexual behavior, there are several variables that could measure this behavior, such as condom use, unwanted pregnancies, and sexually transmitted diseases, among others. However, given the availability of data in the NHS, we consider having more than one sexual partner in the last month as an indicator of risky sexual behavior.

To characterize individual's risky health behaviors, our analysis evaluates the role played by socio-economic variables and some indicators about the knowledge on these risky behaviors, as mentioned in the previous section. These variables were divided into three groups, besides education. First, we have a group of control variables (X_i), including age, gender and ethnic group; second, the socio-economic variables (Y_i) include household total income (in logs), overcrowding, and a set of dummy variables indicating marital status, the geographical location of the individual, labor participation, and whether the individual belongs to the contributory or subsidized social security regime. Third, a set of knowledge variables about health risks was considered (Z_i). In the case of smoking, dummy variables were added indicating whether individuals consider the following statements to be true: smoking increases the risk of cancer, smokers become chronic coughers, smoking while pregnant affects the unborn child, and it is forbidden to broadcast cigarette advertising on television before 11 pm. For heavy drinking, a dummy variable was included indicating if the individual considers that drinking alcohol is detrimental for his/her health; also the age at which the individual started drinking or first drank was considered, since early initiation of alcohol consumption could be associated with increased risk for alcohol dependence at later ages (WHO, 2014b). In the case of being obese a dummy variable for the individual performing vigorous exercise was included, which not only is an indicator of knowledge about the importance of physical activity, but also suggests actual practice. Lastly, for unsafe sexual behavior a dummy variable about his/her knowledge on condoms was considered. Tables A1 and A2 in Appendix A present the definition and the descriptive statistics of the variables included in the analysis.

4. RESULTS

In this section, for each risky health behavior we first present the prevalence rates and the predicted probabilities of the effect of years of schooling on them, after controlling for age and gender. Table 1 presents prevalence rates by gender of risky health behaviors of the population under consideration. In all cases except being obese, male prevalence rates are higher than female ones.³ For example, in the case of males, the prevalence of current smoking is 21.1%, while for females this rate is 8.1%. For heavy drinking, the difference between males and females reaches more than 22 percentage points, whereas the prevalence of having more than one sexual partner during the last 30 days is almost 14 percentage points higher for males.

³ Regarding obesity, Case and Menendez (2009) report based on WHO statistics that in 138 out of 194 countries the prevalence of obesity for women is 50% higher than for men.

The relationship between education and risky health behaviors is illustrated in Figure 1 by means of the predicted probabilities of the effect of years of schooling on current smoker, heavy drinking, being obese, and unsafe sexual behavior, controlling for age and gender. The effect of years of education on these behaviors is mixed. In general, there is a negative relationship between years of education and smoking; a positive relation with heavy drinking, and no particular pattern in the cases of being obese and unsafe sexual behavior. In particular, each additional year of education reduces the probability of being a current smoker from 23% for individuals without education to 12% for those individuals with 18 or more years of schooling. Conversely, the probability of drinking heavily increases with each additional year of schooling up to 10 years, where this probability is 35%; beyond this level of education, the probability remains around this level. In the case of being obese, this probability remains around 12% independently of each additional year of education. Similarly, the probability of having more than one sexual partner during the last month does not present significant changes with each additional year of education, remaining at about 15%.

Next, for each risky health behavior, we present the education gradient and the percentage change in the schooling coefficient from the addition of each set of explanatory variables (namely, socio-economic variables (equation 2) and knowledge variables (equation 3)). In a second exercise, we characterize each risky health behavior based on the estimation of equation (4). The analysis is carried out for the complete sample and also by gender and area of residence, where the latter splits the sample depending on whether the individual lives in an urban or rural area.

4.1 Education Gradient

Table 2 presents the effect of socio-economic and knowledge variables on the education gradient for the four risky health behaviors under consideration. First, we estimate the basic equation (1) for the complete sample. Results indicate that there is a negative and significant effect of education on smoking. That is, the probability of smoking reduces with each additional year of education. On the contrary, the probability of heavy drinking increases with education, since alcohol appears to be a normal good (Cutler and Lleras-Muney, 2012). Similarly, the probability of having unsafe sexual behavior increases with education. Meanwhile, education does not affect the probability of being obese; hence, in this case it is not possible to calculate the education gradient.

Results suggest that education has helped reducing the incidence of smoking in Colombia, but not that of alcohol consumption, which can be linked to cultural and social factors and/or to the failure to recognize the damage that alcohol abuse causes to an individual's health, as has been done

in the case of cigarette smoking. Nowadays, cigarette smoking generates social rejection, since it is forbidden to smoke in public places, while it has not been the same with alcohol consumption, which historically has been a social activity and whose "... consumption and behavior have been subject to self-imposed social controls" (The Social Issues Research Centre, 1998, p. 6). Moreover, there is a lack of awareness about the impact of alcohol consumption in everyday life; namely, the development of chronic diseases, mental disorders, alcohol dependence, as well as the injuries caused by traffic accidents and violence. To this extent, actions intended for reducing the prevalence of this risky behavior may be aimed at increasing taxation to reduce demand, and placing restrictions on advertising and on the availability of alcoholic beverages (WHO, 2014b). The positive effect of education on unsafe sexual behavior may also be linked to cultural and social factors. More educated people may not only have a greater knowledge on risky sexual behaviors, but also on how to avoid their negative effect on health. According to de Walque (2006) and Cutler and Lleras-Muney (2012), education increases the use of protection, but at the same time predicts more infidelity and less abstinence.

Next, income and other socio-economic variables were added to the basic equation (equation 2). The results show that these variables account for some of the education effect. For instance, the coefficient on years of education in the current smoking equation falls by 28%. In addition, the coefficient on education in the heavy drinking equation falls by 58%, which is much higher than the result obtained by Cutler and Lleras-Muney (2010) for the United States (13%), indicating that, in Colombia, more than half of the effect of education on the probability of heavy drinking is mediated by income and other socio-economic variables. The education coefficient on the equation for unsafe sexual behavior falls by 68%, indicating that almost two-thirds of the effect education has on the probability of having more than one sexual partner during the last month is mediated by income and other socio-economic variables. The high reduction in the education gradient for heavy drinking and risky sexual behavior highlights the importance of socio-economic variables. As explained above, in Colombia, these behaviors could be strongly influenced by social and cultural factors, even more after taking into account the positive effect education has on these two risky behaviors in the basic equations.⁴

Lastly, knowledge variables were added to the basic equation. In the case of smoking, the survey asks about their knowledge on the risk of cancer, chronic cough, the effect on unborn children and advertising. Results indicate that adding these four variables reduces the coefficient on years of education in the current smoking equation by 8%, indicating that the probability of smoking is mediated by knowledge variables. In the case of heavy drinking, the survey includes

⁴ See Varela *et al.* (2011).

information on the age at which the individual started drinking or first drank, which may have an impact on alcohol dependence. Also, the survey asks about the awareness of individuals on the harmful effects of alcohol consumption. Conversely to the case of smoking, including these variables increases the coefficient on education by 9%, indicating that these knowledge variables have the opposite effect of education on the probability of heavy drinking, contributing to reduce its incidence. In the case of unsafe sexual behavior, the survey asks about the individual's knowledge on the use of condoms. Adding this variable to the basic equation reduces the coefficient on education by 37%, indicating that some of the variation in education affecting the probability of having more than one sexual partner in one month is related to the knowledge about condoms. As mentioned, in this behavior, unlike the others, knowledge variables could increase the likelihood of engaging in unsafe sexual behaviors such as having more than one sexual partner. In particular, knowledge and use of condoms could prevent negative health effects.

4.1.1 Results by Gender

In this section we present the education gradient for females and males (Table 3). In the case of smoking, the results by gender are very similar to those obtained by using the complete sample. In the case of being obese, education affects, negatively and significantly, this likelihood. Also, each additional year of education reduces the probability of unsafe sexual behavior.

For males, results indicate that education negatively affects the probability of smoking. On the contrary, the probability of heavy drinking, being obese and having more than one sexual partner during the last 30 days increases with education. This positive effect could indicate a strong influence of cultural factors on these behaviors. It is worth pointing out that we found contrasting results for males and females regarding the impact of each additional year of education on the probability of being obese and having more than one sexual partner during the last 30 days. For females these effects are negative, whereas for males they are positive, highlighting the importance of education to reduce the incidence of these behaviors in women.

Next, income and other socio-economic variables were added to the basic equation. The results show that these variables account for some of the education effect. For females, in the case of current smoking, results are similar to those obtained for the complete sample. The differences arise in the case of heavy drinking, where the coefficient of education becomes not different from zero when adding these variables, which could be due to correlation between income and education. In the case of being obese and unsafe sexual behavior, including socio-economic variables in the basic equation increases the education gradient by 13% and 71%, respectively, indicating an opposite

effect to that of education. For males, the reduction in the education gradient for smoking, heavy drinking and unsafe sexual behavior is similar to the one found for the complete sample. Meanwhile, the inclusion of socio-economic variables in the equation for obesity makes the education coefficient insignificant. This could be the result of correlation between these variables and education.

Then, knowledge variables were added to the basic equation. For women, the effect of education on the probability of current smoking and being obese is mediated by knowledge variables, since the coefficients reduce by 22% and 6%, respectively. On the contrary, the inclusion of these variables in the heavy drinking and unsafe sexual behavior equations does add little to the explanation of the education effect. For males, in the case of smoking, the education gradient reduces by 5%. For obesity and heavy drinking, for which education has a positive effect, adding knowledge variables increases the education gradient, offsetting the positive effect of education on the probability of being obese and heavy drinking.

4.1.2 Results by Area of Residence

In this section we present the results by area of residence, namely, urban and rural.⁵ This analysis is important given the significant differences observed in years of schooling between the two areas. In particular, in our sample, the average years of education in urban areas is 8 years, while in rural areas it is 5 years. Table 4 shows the education gradient for urban and rural areas. Regarding the basic equation, results indicate that for individuals in both urban and rural areas, education has a negative effect on the probability of smoking and a positive effect on the probability of heavy drinking. The main differences are observed in obesity and unsafe sexual behavior. While for individuals in urban areas education negatively affects the probability of being obese, education is not significant in rural areas. In the case of unsafe sexual behavior, in urban areas education does not affect the probability of having more than one sexual partner during the last 30 days, whereas in rural areas its effect is positive.

As in the complete sample, adding income and other socio-economic variables reduces the education gradient for both urban and rural individuals in the current smoking equation. However, the mediating effect of the socio-economic variables is higher in the case of individuals living in urban areas. The presence of socio-economic variables in the heavy drinking equation renders the education variable insignificant, in both urban and rural areas. In urban areas, the education gradient

⁵ Interesting differences are observed when analyzing the results by area of residence and gender (see Appendix C). For example, for men, education has a positive impact on the probability of being obese for individuals who live in rural areas. For urban women, by contrast, education reduces the likelihood of obesity.

increases after socio-economic variables are added, emphasizing the role of these variables on the probability of being obese. In rural areas, socio-economic variables reduce the positive effect education has on the probability of having more than one sexual partner during the last 30 days.

Next, we add knowledge variables to the basic equation. These variables reduce the education gradient in the smoking equation in urban and rural areas. In the case of heavy drinking, in both areas, the education gradient increases with the inclusion of knowledge variables. Thus, these variables offset the positive effect of education on the probability of heavy drinking, highlighting the importance of the age at which the individual started drinking or first drank and of the knowledge about the detrimental effect of heavy alcohol consumption on one's health. Regarding obesity, the education gradient reduces 26% in urban areas, indicating the importance of exercising in reducing the probability of being obese.⁶ For unsafe sexual behavior the education gradient reduces by 29%, indicating that knowledge about condoms increases the probability of this risky behavior.

4.2 The Effect of Education and other Covariates

In this section we analyze the effects of the socio-economic and knowledge variables on each risky health behavior by estimating equation (4) for the complete sample, by area of residence and by gender.⁷

4.2.1 Smoking

When including socio-economic and knowledge variables, education remains negative and significant, except in the case of women (Table 5). The probability of current smoking is higher for men than for women in both urban and rural areas. In all cases, this probability increases with age until about 53 years old, when it starts to decrease. In rural areas, this probability begins to decline later in life (60 years old); this could be partly explained by the lack of effect of the knowledge variables, highlighting the importance of education to reduce the incidence of this risky behavior.

Being married reduces the probability of current smoking in all cases; this result could be influenced by the negative effect secondhand smoke exposure has on the partner's health, which

⁶ Some authors have recognized that obesity could be associated with sedentary lifestyles brought about by technological progress (e.g., Lakdawalla and Phillipson, 2009; Atella and Kopinska, 2014; Cutler *et al.*, 2003).

⁷ We also carried out the estimations by gender taking into account the area of residence (urban and rural). See Appendix C.

could affect an individual's decisions about smoking (see for example, United States Department of Health and Human Services, 2006). Also, being affiliated to the contributory health regime reduces this probability in all cases, except for individuals who live in rural areas where it is more common to be affiliated to the subsidized regime, which, by the time the survey was carried out, had a basket of services that was different to that of the contributory regime.

Interesting differences are observed among regions of the country. For example, in the full sample, inhabitants of the Caribbean region are less likely to be current smokers than individuals living in the rest of the country. The same behavior is observed when the analysis is performed for individuals in urban areas and for men. In the case of women, only those living in the Andean region and the capital of the country (Bogotá) have a higher probability of smoking than those living in the rest of the country.

Regarding knowledge variables, they negatively affect the probability of current smoking, indicating that campaigns and studies on the negative effects of smoking have raised awareness about how harmful smoking is. For example, in the case of women, campaigns on the harmful effects of smoking during pregnancy seem to have been quite effective, reducing this probability significantly (e.g., Cornelius and Day, 2000). Moreover, the WHO (2013) highlights the importance of campaigns against smoking since "... health warnings are intended to change social norms about tobacco use, which will reduce tobacco use and increase support for tobacco control measures (p. 63)." However, when estimations are carried out by area of residence and gender, it is observed that for women living in rural areas these knowledge variables do not have a significant effect on reducing the probability of smoking.⁸ This result can be explained by the difference in education levels between urban and rural areas. Lastly, it is worth mentioning that individual income does not significantly affect the probability of current smoking. Since it is a bad habit, its consumption might not be tied to income.

4.2.2 Heavy Drinking

Results do not show significant differences when the estimations are carried out by gender and area of residence. Education has a positive and significant effect on the probability of heavy drinking for the complete sample, for individuals living in urban areas, and for males (Table 6). Similarly to smoking, men are more likely to be heavy drinkers than women, due mainly to cultural factors (see The Social Issues Research Centre, 1998).

⁸ See Appendix C.

Contrary to the case of current smoking, income and labor force participation have a positive and significant effect on the probability of heavy drinking.⁹ Similarly, for developed countries, the WHO (2014b) mentions that there are more drinkers in higher socio-economic groups; moreover, this report also suggests that in lower socio-economic groups people are more susceptible to the consequences of alcohol abuse. Results also indicate that ethnicity is an important factor in determining the probability of heavy drinking, which is consistent with other studies that find differences in alcohol consumption between ethnic groups within countries (WHO, 2014b).

The probability of heavy drinking is lower for married individuals. Alcohol consumption can have both health and social consequences not only for the drinker, but also for other individuals (such as family members or friends). Hence, the possible negative consequences of heavy drinking on others may reduce the probability of drinking for individuals living with a partner. In addition, individuals living in the Caribbean region have a higher likelihood of heavy drinking than those in the rest of the country, when the estimations are carried out for the complete sample, for individuals living in urban areas and for males.

The age at which an individual started drinking has a negative and significant effect on the probability of heavy drinking. That is, the younger the individual started drinking, the higher the probability of becoming a heavy drinker. Regarding this, the WHO (2014b) states that "... early initiation of alcohol use (before 14 years of age) is a predictor of impaired health status because it is associated with an increased risk for alcohol dependence and abuse at later ages..., alcohol-related motor vehicle crashes..., and other unintentional injuries (p. 7)." In turn, despite the fact that education increases the probability of heavy drinking, knowing about the harmful effects of alcohol reduces this probability.

4.2.3 Obesity

The analysis of this health behavior is important given that it is a major risk factor for some chronic diseases, including diabetes, cardiovascular diseases, and hypertension. According to the WHO (2014b), worldwide incidence of obesity almost doubled between 1980 and 2014, when 15% of women and 11% of men were considered obese. Moreover, the prevalence of obesity is not restricted to developed countries. Its incidence has been increasing in low and middle income countries, particularly in urban areas (WHO, 2015).

⁹ It is worth mentioning that in the heavy drinking variable it is not possible to distinguish whether the individual is an alcoholic or an occasional drinker. In the former, since it is a bad habit, its consumption might not be affected by income; in the latter, on the contrary, its consumption might be dictated by income availability.

Regarding the effect of education, each additional year reduces the probability of becoming obese for the complete sample, in urban areas and for women (Table 7), while for rural areas and men it is not statistically significant. The likelihood of becoming obese is higher for women than for men. This probability increases with age until about 51 years old for the complete sample, which could be related to muscle loss due to aging. However, differences are observed by gender. For women, the probability of being obese starts to decrease at 58 years old, whereas for men it starts to decline at 49 years old. In addition, results differ by ethnic group; this coefficient is only significant for women.

The probability of being obese also increases with income in the case of men.¹⁰ This probability is higher for married individuals than for singles, widows/widowers, or divorced. Conversely, this likelihood is lower for individuals living in overcrowded conditions and for those living in Bogotá and the Andean Region, which could be related with differences in lifestyles.

Lastly, vigorous exercise reduces the probability of becoming obese. This result is consistent with the findings of the WHO (2010) pointing out that physical activity is a key determinant of weight control; it also helps reducing the risk of heart disease and stroke, diabetes, hypertension, some types of cancer and depression.

4.2.4 Risky Sexual Behavior

Risky sexual behaviors could increase the incidence of sexually transmitted diseases (including HIV), cervical cancer, and unwanted pregnancies. Interestingly, only in the case of women, every additional year of education reduces the probability of engaging in risky sexual behavior (Table 8). Consequently, education is an important tool to enhance female sexual and reproductive health, which could also result in lower maternal and neonatal mortality and morbidity rates.

The probability of having more than one sexual partner during the last month is higher for men than for women¹¹ and lower for married individuals. There are also differences by ethnic group and region of residence. For example, residents in the Caribbean and Pacific regions have a higher likelihood of risky sexual behavior, especially in the case of urban areas and males. Furthermore, income has a positive and significant effect on this risky behavior, whereas for those living in urban areas and males, being affiliated to the contributory health social security regime has a negative

¹⁰ In the literature, the evidence about the relationship between income and obesity is not conclusive. For example, Pampel *et al.* (2012) mention that socio-economic status and obesity are positively correlated in lower-income countries, but negatively associated in higher-income countries.

¹¹ These results are consistent with the findings of Varela *et al.* (2011). They state that men expose themselves more than women to risky sexual situations, and have a rate of sexual partners twice that of women.

effect on the probability of this risky behavior. This last result could be associated with more effective campaigns aimed at reducing the incidence of disease and unwanted pregnancies. As mentioned, the knowledge about condoms increases the probability of this risky behavior, once again highlighting the importance of cultural factors.

5. FINAL REMARKS

This paper analyses the relationship between education and four risky health behaviors, namely smoking, heavy drinking, being obese, and unsafe sexual behavior, for Colombia, using the Colombian National Health Survey. To study the effect of education on these risky health behaviors, we assess the effect of socio-economic variables and some indicators about the knowledge on these risky behaviors by means of the education gradients. We also provide evidence on the effects education and other covariates have on health behaviors by gender and area of residence.

The education gradient results indicate that years of schooling negatively and significantly affect the probability of smoking. Conversely, the probabilities of heavy drinking and having unsafe sexual behavior increase with education; meanwhile, there is no significant effect of education on the probability of being obese. These findings suggest that in Colombia, education has helped reducing the incidence of smoking, but not that of alcohol consumption, which could be explained by cultural and social factors and/or by the failure to acknowledge the harmful effect alcohol abuse has on health. The positive effect of education on unsafe sexual behavior may also be related to cultural and social factors. More educated people may have not only more knowledge on risky sexual behaviors, but also on how to avoid its negative influence on health.

When adding income and other socio-economic variables, results show that these variables account for some of the education effect. In particular, there is a large reduction in the education gradient for heavy drinking and risky sexual behavior highlighting the importance of socio-economic variables in Colombia. Moreover, when knowledge variables are included, results indicate that the coefficients of education in the smoking and unsafe sexual behavior equations fall. Conversely, the inclusion of knowledge variables in the heavy drinking equation increases the coefficient on education, indicating that these variables contribute to reduce its incidence.

There are important differences by gender and area of residence. For instance, while for women education reduces the likelihood of being obese and having unsafe sexual behavior, for men these probabilities increase. This positive effect could indicate a strong influence of cultural factors on men's behaviors. Moreover, in the case of women, knowledge variables mediate the effect of

education on the probability of smoking and being obese, whereas, in the case of men, these variables offset the positive effect of education on the likelihood of being obese and heavy drinking. These results highlight the importance of knowledge variables to reduce the prevalence of risky health behaviors. When analyzing the sample by area of residence, some differences are found in the case of obesity and unsafe sexual behavior. For instance, whereas for individuals in urban areas the number of years of schooling has a negative effect on the probability of being obese, it is not significant in rural areas. In addition, education has no effect on the probability of having unsafe sexual behavior in urban areas, while in rural areas it has a positive effect.

The effects of socio-economic and knowledge variables on each risky health behavior are also analyzed. *Logit* estimations show that being married reduces the probability of current smoking, heavy drinking and having unsafe sexual behavior due to the negative consequences that these behaviors could have on family members. In addition, being affiliated to the contributory health regime reduces the probabilities of smoking and having unsafe sexual behavior, which might be associated with more effective campaigns aimed at reducing the incidence of these behaviors. In general, the probability of engaging in these risky behaviors increases with age, up to a certain age, when it starts to decline. Knowledge variables reduce the probability of smoking, heavy drinking and being obese, indicating that campaigns and research on the negative effects of these behaviors raised awareness about how harmful they are. Also, interesting differences are observed among regions of the country and ethnic groups.

The evidence presented in this paper highlights the importance of education and knowledge about the negative effects of these risky behaviors on health. Since there are significant differences in education by area of residence, it is important for public policy to increase the years of schooling in rural areas. Regarding knowledge, in the case of smoking, campaigns have proven to be successful in reducing the incidence of this risky behavior, especially in the case of women, since campaigns on the harmful effects of smoking during pregnancy seem to have been quite effective. In the case of heavy drinking, results indicate that although its incidence could be highly linked to social and cultural factors, knowledge about its harmful effects contributes to reduce the probability of drinking heavily. Moreover, physical activity should be promoted, since it is a key determinant of weight control and helps to curb the risk of some chronic diseases. In this sense, Law 1355 of 2009 was enacted in order to adopt measures to control, prevent, and treat obesity and non-communicable chronic diseases associated with it as a public health priority. Also, although the knowledge about condoms increases the probability of having more than one sexual partner, it has a positive effect in reducing sexually transmitted diseases and unwanted pregnancies.

Finally, public policy should continue implementing policies aimed at reducing the prevalence of risky health behaviors since they are a major source of mortality and morbidity associated with chronic and sexually transmitted diseases, as well as an important source of demand for health services.

REFERENCES

- Adler, N. E., Boyce, T., Chesney, M. A., Choen, S., Folkman, S., Kahn, R. L., and Syme, S. L. (1994). Socioeconomic status and health, the challenge of the gradient. *American Psychologist*, 49(1), 15–24.
- Agüero, J. M., and Bharadwaj, P. (2013). Do the More Educated Know More About Health? Evidence from Schooling and HIV Knowledge in Zimbabwe. Working Paper, University of California at Riverside.
- Andalón, M.; Williams, J. and Grossman, M. (2014). Empowering Women: The Effect of Schooling on Young Women’s Knowledge and use of Contraception. National Bureau of Economic Research Working Paper 19961.
- Andersone, L. (2011). The Impact of Education on Health Behaviours: Smoking, Drinking and Exercise. Evidence from the UK. Erasmus University Rotterdam, Erasmus School of Economics, Master Thesis.
- Atella and Kopinska, (2014). Body Weight, Eating Patterns, and Physical Activity: The Role of Education. *Demography*, vol. 51, num. 4, pp. 1225–1249.
- Banks, J., M. Marmot, Z. Oldfield, and J. P. Smith (2006). Disease and disadvantage in the United States and in England. *Journal of the American Medical Association* 295:2037–45.
- Banks, J., M. Marmot, Z. Oldfield, and J. P. Smith (2009). The SES Health Gradient on Both Sides of the Atlantic. In David A. Wise (ed.), *Developments in the Economics of Aging*, University of Chicago Press. (Pages 359-406).
- Bratti, M. and Braga, M. (2013). The effect of schooling on health: Evidence on several health outcomes and behaviors. Health, Econometrics and Data Group (HEDG) Working Papers 13/19, HEDG, c/o Department of Economics, University of York. Available at: http://www.york.ac.uk/media/economics/documents/hedg/workingpapers/13_19.pdf (accessed January 7, 2015).

- Brook, D.W.; Brook, J.S.; Pahl, T.; and Montoya, I. (2002). The Longitudinal Relationship Between Drug Use and Risky Sexual Behaviors Among Colombian Adolescents. *Archives of Pediatrics and Adolescent Medicine*, vol. 156, num. 11, pp. 1101-1107.
- Brunello, G.; Fort, M.; Schneeweis, N. and Winter-Ebmer, R. (forthcoming). The causal effect of education on health: What is the role of health behaviors? *Health Economics*, doi: 10.1002/hec.3141.
- Buckles, K.; Hagemann, A.; Malamud, O.; Morrill, M.; and Wozniak, A. (2013). The Effect of College Education on Health. National Bureau of Economic Research Working Paper 19222.
- Campo-Arias, A.; Ceballo, G.A.; and Herazo, E. (2010). Prevalence of Pattern of Risky Behaviors for Reproductive and Sexual Health Among Middle- and High-School Students. *Revista Latino-Americana de Enfermagem (RLAE)*, vol. 18, num. 2, pp. 170-4.
- Cawley, J. and Ruhm, C. (2011). The Economics of Risky Health Behaviors. In Mark V. Pauly, Thomas G. McGuire and Pedro P. Barros (eds.). *Handbook of Health Economics, Volume 2*, pp. 95-199. Elsevier
- Case, A. and Menendez, A. (2009). Sex differences in obesity rates in poor countries: Evidence from South Africa. *Economics and Human Biology*, vol. 7, num. 3, pp. 271–282.
- Conti, G. and Hansman, C. (2013). Personality and the education–health gradient: A note on “Understanding differences in health behaviors by education.” *Journal of Health Economics*, vol. 32, num. 2, pp. 480–485.
- Conti, G.; Heckman, J. and Urzua, S. (2010). The Education-Health Gradient. *American Economic Review: Papers & Proceedings*, vol. 100, num. 2, pp. 234–238.
- Cornelius, M. and Day, N. (2000). The Effects of Tobacco Use During and After Pregnancy on Exposed Children. *Alcohol Research and Health*, vol. 24, num. 4, pp. 242-249.

- Cutler, D. M.; Glaeser, E.L. and Shapiro, J.M. (2003). Why Have Americans Become More Obese?. *Journal of Economic Perspectives*, vol. 17, num. 3, pp. 93-118.
- Cutler, D. M. and Lleras-Muney, A. (2006). Education and health: evaluating theories and Evidence. *National Bureau of Economic Research*, Working Paper 12352.
- Cutler, D. M. and Lleras-Muney, A. (2010). Understanding Differences in Health Behavior by Education. *Journal of Health Economics*, vol. 29, num. 1, pp. 1-28.
- Cutler, D. M. and Lleras-Muney, A. (2012). Education and health: insights from international comparisons. *National Bureau of Economic Research*, Working Paper 17738.
- de Walque, D. (2006). Who Gets AIDS and How? The determinants of HIV infection and sexual behaviors in Burkina Faso, Cameroon, Ghana, Kenya and Tanzania. *World Bank Policy Research*, Working Paper 3844, February.
- Dinçer, M. A.; Kaushal, N., and Grossman, M. (2014). Women's Education: Harbinger of Another Spring? Results from a Natural Experiment in Turkey. *World Development*, vol. 64, pp. 243-258.
- Fuchs, V. (1980). Time Preference and Health: An Exploratory Study. NBER Working Paper Series, Working Paper No. 539, August.
- Grossman, M. (1972). On the Concept of Health Capital and the Demand for Health. *Journal of Political Economy*, vol. 80, num. 2, pp. 223-255.
- Jones, A. M. and Etilé, F. (2011). Schooling and smoking among the baby boomers: An evaluation of the impact of educational expansion in France. *Journal of Health Economics*, vol. 30, num. 4, pp. 811-831.
- Jürges, H.; Reinhold, S. and Salm, M. (2011). Does Schooling Affect Health Behavior? Evidence from the Educational Expansion in Western Germany. *Economics of Education Review*, vol. 30, num. 5, pp. 862-872.

- Kimbro, R.T.; Bzostek, S.; Goldman, N. and Rodríguez, G. (2008). Race, Ethnicity, and the Education Gradient in Health. *Health Affairs*, vol. 27, num. 2, p. 361-372.
- Lakdawalla, D. and Phillipson, T. (2009). The growth of obesity and technological change. *Economics and Human Biology*, vol 7, num. 3, pp. 283–293.
- Li, J. and Powdthavee, N. (2014). Does Increasing Schooling Improve Later Health Habits? Evidence from the School Reforms in Australia. Melbourne Institute Working Paper Series Working Paper No. 1/14.
- Ministerio de Salud (undated). Situación de las infecciones de transmisión sexual diferentes al VIH: Colombia 2009 – 2011. Observatorio VIH. Available at: http://www.minsalud.gov.co/salud/Documents/observatorio_vih/documentos/monitoreo_evaluacion/1_vigilancia_salud_publica/a_situacion_epidemiologica/SITUACION%20DE%20LAS%20INFECCIONES%20DE%20TRANSMISION1.pdf (Accessed on 25 March 2015).
- Mocan, N. H., and Cannonier, C. (2012). Empowering Women Through Education: Evidence from Sierra Leone. National Bureau of Economic Research Working Paper 18016.
- Pan American Health Organization (2012). Health in the Americas, 2012 Edition: Available at: http://www.paho.org/saludenlasamericas/index.php?option=com_content&view=article&id=30&Itemid=30&lang=es (Accessed on 11 March 2015).
- Renner, A.T. (2011). Socioeconomic Status and Risky Health Behaviours Explaining the Health Gradient. Master Thesis for Health Economics, Policy and Law, Erasmus University Rotterdam Institute of Health Policy and Management, Rotterdam.
- Ross, C. E. and Wu, C-L. (1995). The Links Between Education and Health. *American Sociological Review*, vol. 60, num. 5, pp. 719-745.
- The Social Issues Research Centre (1998). Social and Cultural Aspects of Drinking A report to the European Commission, March. Available at: http://www.sirc.org/publik/social_drinking.pdf (Accessed on 6 April 2015).

UNAIDS (2014). HIV and AIDS estimates. Available at <http://www.unaids.org/en/regionscountries/countries/colombia/> (Accessed on 25 March 2015).

United States Department of Health and Human Services. (2006). *The Health Consequences of Involuntary Exposure to Tobacco Smoke: A Report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, Coordinating Center for Health Promotion, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Varela, M.T.; Correa, D.; Arrivillaga, M.; Zapata, H.; Hoyos, P.A; and Tovar, L. M. (2011). Prevalencia de prácticas sexuales de riesgo en población adulta de Colombia. *Revista Cubana de Salud Pública*, vol. 37, num. 4, pp. 472-481.

Webbink, D.; Martin, N. G. and Visscher, P.M. (2010). Does education reduce the probability of being overweight? *Journal of Health Economics*, vol. 29, num. 1, pp. 29-38.

World Health Organization (2010). *Global Recommendations on Physical Activity for Health*, Geneva, Switzerland. Available at: http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/ (Accessed on 25 March 2015)

World Health Organization (2012). *Global incidence and prevalence of selected curable sexually transmitted infections – 2008*, Geneva, Switzerland. Available at: <http://www.who.int/reproductivehealth/publications/rtis/stisestimates/en/> (Accessed on 11 March 2015)

World Health Organization (2013). *WHO report on the global tobacco epidemic, 2013: Enforcing bans on tobacco advertising, promotion and sponsorship*, Geneva, Switzerland. Available at: http://www.who.int/tobacco/global_report/2013/en/ (Accessed on 25 March 2015).

World Health Organization (2014a). *Global Status Report on non-communicable diseases 2014*. Switzerland, Geneva, Switzerland. Available at: <http://www.who.int/global-coordination->

[mechanism/publications/global-status-report-ncds-2014-eng.pdf](#) (Accessed on 11 March 2015).

World Health Organization (2014b). Global status report on alcohol and health 2014, Geneva, Switzerland. Available at: http://apps.who.int/iris/bitstream/10665/112736/1/9789240692763_eng.pdf?ua=1 (Accessed on 11 March 2015).

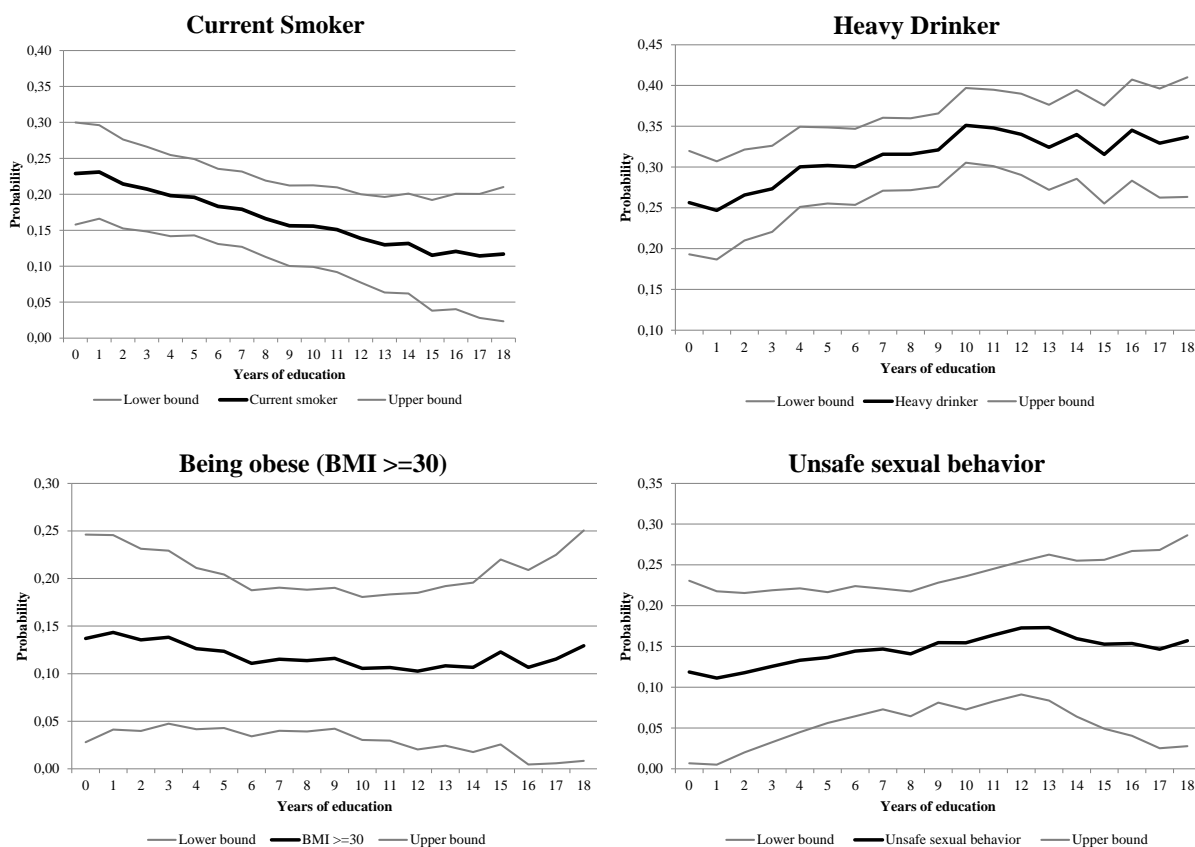
World Health Organization (2015). Obesity and overweight, Fact sheet No. 311, updated January 2015. Available at: <http://www.who.int/mediacentre/factsheets/fs311/en/> (Accessed on 6 April 2015).

Table 1
Risky health behaviors prevalence rates
(Percentage of valid answers)

	All observations	Females	Males
Current smoker	13.8%	8.1%	21.1%
Heavy drinking	23.5%	13.6%	36.3%
Being obese	10.4%	11.1%	9.5%
Unsafe sexual behavior	7.6%	1.7%	15.5%

Source: Authors' calculations based on NHS (2007).

Figure 1
Effect of education on risky health behaviors
(Predicted probabilities)



Note: Predicted probability from *Logit* regressions on education, controlling for age and gender.
 95% confidence intervals for each coefficient.

Source: Authors' calculations.

Table 2
Effect of socio-economic and knowledge variables on education gradients
Total sample

	# of obs.	Demographic controls (age, gender, ethnic group)		Adding income and other economic controls ^{1/}		Reduction in education coefficient	Adding knowledge variables ^{2/}		Reduction in education coefficient
		Years of education (β)	Standard error	Years of education (β)	Standard error		Years of education (β)	Standard error	
<i>Smoking</i>									
Current smoker	22,163	-0.0448***	0.0042	-0.0324***	0.0050	27.6%	-0.0413***	0.0043	7.8%
<i>Alcohol</i>									
Heavy drinker	14,666	0.0230***	0.0042	0.0095*	0.0050	58.5%	0.0251***	0.0042	-9.2%
<i>Diet/exercise</i>									
Being obese	14,909	-0.0013	0.0059	-0.0228***	0.0069		0.0014	0.0059	
<i>Unsafe sexual behavior</i>									
	16,441	0.0160**	0.0063	0.0051	0.0073	68.1%	0.0100	0.0063	37.4%

^{1/} The variables included are: income, marital status, contributory health regime, the region where the individual lives (Bogotá, Andean region, Pacific region, Caribbean region), labor force participation, and overcrowding. See Appendix A for a description of the variables.

^{2/} Dummy variables were included to account for the knowledge of individuals about health risks.

^{3/} Percentage change in the education coefficient of the basic regression.

^{4/} The reduction in the education coefficient is not calculated when this coefficient is not statistically significant in the basic equation.

Source: Authors' calculations.

Table 3
Effect of socio-economic and knowledge variables on education gradients by gender

	# of obs.	Demographic controls (age, gender, ethnic group)		Adding income and other economic controls ^{1/}		Reduction in education coefficient ^{3,4/}	Adding knowledge variables ^{2/}		Reduction in education coefficient ^{3,4/}
		Years of education (β)	Standard error	Years of education (β)	Standard error		Years of education (β)	Standard error	
Females									
<i>Smoking</i>									
Current smoker	9,972	-0.0257***	0.0075	-0.0172*	0.0092	33.2%	-0.0201***	0.0076	21.9%
<i>Alcohol</i>									
Heavy drinker	6,162	0.0232***	0.0077	0.0016	0.0095	93.0%	0.0234***	0.0060	-0.8%
<i>Diet/exercise</i>									
Being obese	6,434	-0.0411***	0.0087	-0.0463***	0.0104	-12.7%	-0.0386***	0.0088	6.2%
<i>Unsafe sexual behavior</i>	7,374	-0.0486**	0.0203	-0.0831***	0.0241	-71.1%	-0.0511**	0.0205	-5.2%
Males									
<i>Smoking</i>									
Current smoker	12,191	-0.0527***	12.191	-0.0392***	0.0059	25.6%	-0.0499***	0.0052	5.2%
<i>Alcohol</i>									
Heavy drinker	8,504	0.0225***	8.504	0.0120**	0.0059	46.6%	0.0259***	0.0051	-15.1%
<i>Diet/exercise</i>									
Being obese	8,475	0.0328***	8.475	-0.0025	0.0094	107.7%	0.0365***	0.0080	-11.4%
<i>Unsafe sexual behavior</i>	9,067	0.0222***	9.067	0.0129*	0.0077	41.7%	0.0161**	0.0067	27.3%

^{1/} The variables included are: income, marital status, contributory health regime, the region where the individual lives (Bogotá, Andean region, Pacific region, Caribbean region), labor force participation, and overcrowding. See Appendix A for a description of the variables.

^{2/} Dummy variables were included to account for the knowledge of individuals about health risks.

^{3/} Percentage change in the education coefficient of the basic regression.

^{4/} The reduction in the education coefficient is not calculated when this coefficient is not statistically significant in the basic equation.

Source: Authors' calculations.

Table 4
Effect of socio-economic and knowledge variables on education gradients by area of residence

	# of obs.	Demographic controls (age, gender, ethnic group)		Adding income and other economic controls ^{1/}		Reduction in education coefficient ^{3,4/}	Adding knowledge variables ^{2/}		Reduction in education coefficient ^{3,4/}
		Years of education (β)	Standard error	Years of education (β)	Standard error		Years of education (β)	Standard error	
Urban area									
<i>Smoking</i>									
Current smoker	17,375	-0.0464***	0.0049	-0.0318***	0.0056	31.6%	-0.0432***	0.0049	6.8%
<i>Alcohol</i>									
Heavy drinker	11,250	0.0165***	0.0049	0.0079	0.0057	52.2%	0.0182***	0.0049	-10.2%
<i>Diet/exercise</i>									
Being obese	12,185	-0.0140**	0.0064	-0.0297***	0.0074	-111.8%	-0.0104	0.0065	26.1%
<i>Unsafe sexual behavior</i>	12,621	0.0061	0.0073	-0.0030	0.0084		0.0022	0.0074	
Rural area									
<i>Smoking</i>									
Current smoker	4,788	-0.0412***	0.0109	-0.0383***	0.0118	7.0%	-0.0378***	0.0109	8.3%
<i>Alcohol</i>									
Heavy drinker	3,416	0.0227**	0.0106	0.0107	0.0114	53.0%	0.0263**	0.0108	-15.9%
<i>Diet/exercise</i>									
Being obese	2,724	0.0227	0.0181	-0.0060	0.0204		0.0207	0.0183	
<i>Unsafe sexual behavior</i>	3,820	0.0332**	0.0152	0.0242	0.0162	27.0%	0.0234	0.0155	29.4%

^{1/} The variables included are: income, marital status, contributory health regime, the region where the individual lives (Bogotá, Andean region, Pacific region, Caribbean region), labor force participation, and overcrowding. See Appendix A for a description of the variables.

^{2/} Dummy variables were included to account for the knowledge of individuals about health risks.

^{3/} Percentage change in the education coefficient of the basic regression.

^{4/} The reduction in the education coefficient is not calculated when this coefficient is not statistically significant in the basic equation.

Source: Authors' calculations.

Table 5
The impact of education and other covariates on the probability of current smoking: Logit estimation

Variables	Total sample		Urban area		Rural area		Females		Males	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	-0.0299***	0.0050	-0.0292***	0.0057	-0.0357***	0.0118	-0.0125	0.0092	-0.0373***	0.0060
Gender	1.0437***	0.0463	1.0660***	0.0515	1.0841***	0.1117				
Age	0.0557***	0.0096	0.0494***	0.0112	0.0810***	0.0195	0.1164***	0.0194	0.0381***	0.0113
Age squared	-0.0005***	0.0001	-0.0005***	0.0001	-0.0007***	0.0002	-0.0011***	0.0002	-0.0004***	0.0001
Ethnic group	-0.0889*	0.0481	-0.0951*	0.0578	-0.0505	0.0892	-0.1765*	0.0919	-0.0576	0.0567
Income	-0.0209	0.0247	-0.0374	0.0300	-0.0085	0.0463	0.0032	0.0438	-0.0359	0.0304
Married	-0.3503***	0.0416	-0.3836***	0.0478	-0.2616***	0.0859	-0.3179***	0.0733	-0.3498***	0.0516
Contributory regime	-0.2127***	0.0469	-0.2374***	0.0509	-0.0252	0.1263	-0.2143***	0.0826	-0.2119***	0.0570
Bogotá	0.5146***	0.0763	0.5148***	0.0777			0.7315***	0.1325	0.4164***	0.0939
Andean region	0.1651***	0.0560	0.2620***	0.0619	0.1415	0.1816	0.3750***	0.1053	0.0635	0.0666
Pacific region	0.2083***	0.0641	0.1630**	0.0748	0.5125***	0.1899	0.1567	0.1232	0.2132***	0.0759
Caribbean region	-0.1341**	0.0607	-0.1657**	0.0667	0.1446	0.1903	0.0721	0.1143	-0.2369***	0.0720
Participation	0.0584	0.0564	0.0101	0.0649	0.1041	0.1209	0.0104	0.0804	0.0905	0.0834
Overcrowding	0.0623***	0.0194	0.0734***	0.0231	0.0456	0.0363	0.0381	0.0371	0.0739**	0.0232
Smoking_cancer	-0.2273**	0.0909	-0.2537**	0.1059	-0.2453	0.1773	-0.0731	0.1597	-0.3056***	0.1116
Smoking_cough	-0.4889***	0.0734	-0.5762***	0.0838	-0.2294	0.1527	-0.5714***	0.1266	-0.4469***	0.0902
Effect_babies	-0.1224	0.0947	-0.1924*	0.1120	0.0200	0.1777	-0.4904***	0.1626	0.0528	0.1156
Smoking_publicity	-0.0860**	0.0385	-0.1004**	0.0442	-0.0761	0.0792	-0.0801	0.0710	-0.0848*	0.0458
Constant	-2.2553***	0.3558	-1.6101***	0.4259	-3.8516***	0.7028	-3.8311***	0.6749	-0.7107	0.4358
Number of obs.	22,163		17,375		4,788		9,972		12,191	

Source: Authors' calculations.

Table 6
The impact of education and other covariates on the probability of heavy drinking: Logit estimation

Variables	Total sample		Urban area		Rural area		Females		Males	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	0.0117**	0.0050	0.0098*	0.0057	0.0147	0.0116	0.0013	0.0095	0.0158***	0.0060
Gender	0.9574***	0.0470	0.9645***	0.0519	1.0499***	0.1192				
Age	0.0038	0.0099	-0.0015	0.0115	0.0211	0.0200	-0.0180	0.0186	0.0141	0.0119
Age squared	-0.0002**	0.0001	-0.0002	0.0001	-0.0004	0.0002	-0.0001	0.0002	-0.0003**	0.0001
Ethnic group	-0.2872***	0.0475	-0.2820***	0.0556	-0.3106***	0.0933	-0.2491***	0.0879	-0.3054***	0.0567
Income	0.1238***	0.0262	0.1192***	0.0315	0.1238**	0.0497	0.1774***	0.0472	0.1028***	0.0321
Married	-0.2558***	0.0425	-0.2581***	0.0484	-0.2506***	0.0901	-0.2649***	0.0718	-0.2562***	0.0539
Contributory regime	-0.0463	0.0467	-0.0551	0.0506	0.0075	0.1279	-0.0147	0.0810	-0.0620	0.0573
Bogotá	0.1107	0.0806	0.1182	0.0818			-0.1471	0.1394	0.2631***	0.1008
Andean region	-0.3385***	0.0575	-0.3325***	0.0650	-0.3236***	0.1641	-0.3327***	0.1028	-0.3329***	0.0694
Pacific region	-0.1942***	0.0654	-0.1841**	0.0763	-0.1613	0.1751	-0.2890**	0.1168	-0.1432*	0.0792
Caribbean region	0.1412**	0.0559	0.1770***	0.0603	0.0664	0.1713	0.0581	0.0987	0.1917***	0.0681
Participation	0.2636***	0.0606	0.2290***	0.0689	0.2984**	0.1339	0.2254***	0.0850	0.2889***	0.0907
Overcrowding	-0.0031	0.0199	0.0161	0.0234	-0.0467	0.0387	0.0278	0.0362	-0.0169	0.0241
Age starting drinking	-0.0455***	0.0050	-0.0387***	0.0057	-0.0679***	0.0110	-0.0306***	0.0074	-0.0568***	0.0069
Alcohol_harmful	-0.4253***	0.0540	-0.4075***	0.0622	-0.4665***	0.1095	-0.1890*	0.1078	-0.5065***	0.0634
Constant	-1.5109***	0.3647	-1.4131	0.4338	-1.6719***	0.7199	-1.9930***	0.6554	-0.3482	0.4504
Number of obs.	14,666		11,250		3,416		6,162		8,504	

Source: Authors' calculations.

Table 7
The impact of education and other covariates on the probability of being obese: Logit estimation

Variables	Total sample		Urban area		Rural area		Females		Males	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	-0.0203***	0.0070	-0.0264***	0.0075	-0.0083	0.0206	-0.0436***	0.0105	0.0008	0.0095
Gender	-0.2419***	0.0617	-0.1348**	0.0659	-0.8125***	0.1803				
Age	0.1515***	0.0166	0.1533***	0.0180	0.1523***	0.0442	0.1497***	0.0249	0.1379***	0.0228
Age squared	-0.0015***	0.0002	-0.0015***	0.0002	-0.0015***	0.0005	-0.0013***	0.0003	-0.0014***	0.0003
Ethnic group	-0.1065	0.0700	-0.1349*	0.0768	-0.0539	0.1749	-0.2854***	0.1036	0.0054	0.0962
Income	0.1294***	0.0368	0.0969**	0.0406	0.1909**	0.0924	0.0523	0.0513	0.2203***	0.0545
Married	0.3874***	0.0606	0.4037***	0.0653	0.3355**	0.1656	0.2493***	0.0813	0.6503***	0.0993
Contributory regime	0.0759	0.0603	0.0404	0.0640	0.1116	0.1837	-0.1763**	0.0885	0.2343***	0.0828
Bogotá	-0.7375***	0.1213	-0.7198***	0.1222			-0.6898***	0.1720	-0.8044***	0.1724
Andean region	-0.3911***	0.0749	-0.3258***	0.0806	-0.4935**	0.2518	-0.4698***	0.1129	-0.2721***	0.1018
Pacific region	-0.2636***	0.0908	-0.2004**	0.0991	-0.3966	0.2815	-0.1199	0.1286	-0.3936***	0.1311
Caribbean region	-0.1269	0.0781	-0.0662	0.0820	-0.3696	0.2791	-0.1302	0.1182	-0.0831	0.1059
Participation	-0.1380*	0.0738	-0.1261	0.0799	-0.0302	0.2034	-0.0328	0.0936	-0.0323	0.1356
Overcrowding	-0.1328***	0.0314	-0.1229***	0.0345	-0.1675**	0.0763	-0.1017**	0.0468	-0.1766***	0.0432
Vigorous exercise	-0.1854***	0.0648	-0.2393***	0.0705	0.1587	0.1683	-0.2562**	0.1116	-0.1932**	0.0811
Constant	-6.5851***	0.5637	-6.1900***	0.6193	-7.2404***	1.4373	-5.4452***	0.8252	-8.0715***	0.8134
Number of obs.	14,909		12,185		2,724		6,434		8,475	

Source: Authors' calculations.

Table 8
The impact of education and other covariates on the probability of having unsafe sexual behavior: Logit estimation

Variables	Total sample		Urban area		Rural area		Females		Males	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	0.0005	0.0074	-0.0059	0.0085	0.0145	0.0165	-0.0856***	0.0244	0.0082	0.0078
Gender	2.3928***	0.0979	2.3442***	0.1056	2.7830***	0.2696				
Age	0.0085	0.0147	-0.0070	0.0171	0.0530*	0.0299	0.0482	0.0587	0.0161	0.0155
Age squared	-0.0003	0.0002	-0.0001	0.0002	-0.0008**	0.0004	-0.0016**	0.0008	-0.0003*	0.0002
Ethnic group	-0.3294***	0.0669	-0.2874***	0.0791	-0.4355***	0.1294	0.1797	0.2488	-0.3750***	0.0701
Income	0.2187***	0.0396	0.2255***	0.0485	0.1771**	0.0719	0.2479*	0.1270	0.2245***	0.0420
Married	-0.7817***	0.0640	-0.7992***	0.0737	-0.7362***	0.1309	-0.5587***	0.1918	-0.8316***	0.0682
Contributory regime	-0.2506***	0.0717	-0.3100***	0.0779	0.0965	0.1863	-0.1110	0.2154	-0.2686***	0.0764
Bogotá	-0.1935	0.1378	-0.1988	0.1394			0.5917*	0.3233	-0.3385**	0.1525
Andean region	-0.2126**	0.0918	-0.2349**	0.1048	-0.0906	0.2608	0.1603	0.2712	-0.2420**	0.0975
Pacific region	0.2282**	0.0961	0.2144*	0.1109	0.3173	0.2693	0.3766	0.2978	0.2309**	0.1017
Caribbean region	0.3715***	0.0837	0.4434***	0.0898	0.2220	0.2639	0.1981	0.2722	0.4082***	0.0885
Participation	0.0284	0.1023	0.1083	0.1182	-0.2159	0.2117	0.3037	0.2310	-0.0709	0.1149
Overcrowding	0.0144	0.0301	0.0009	0.0357	0.0562	0.0565	-0.0766	0.0906	0.0240	0.0321
Heard of condoms	1.4966***	0.1501	1.4162***	0.1754	1.7010***	0.2915	2.2497***	0.7155	1.4389***	0.1543
Constant	-7.4640***	0.5639	-7.1374***	0.6791	-8.3427***	1.0944	-8.0859***	1.9170	-5.2493***	0.5941
Number of obs.	16,441		12,621		3,820		7,374		9,067	

Source: Authors' calculations.

Appendix A
Variables used in the model

Table A1
Description of Variables

Variables	Description
Dependent variables – Risky behavior	
<i>Current smoker</i>	1 if the individual smokes cigarettes every day or on some days 0 otherwise
<i>Heavy drinking</i>	1 for those who have drunk more than 5 glasses a day, of any alcoholic beverage, during any of the last 15 days. 0 otherwise
<i>Being obese</i>	1 if the body-mass index is greater than or equal to 30 0 otherwise
<i>Unsafe sexual behavior</i>	1 for those who have had more than one sexual partner during the last 30 days 0 otherwise
Explanatory variables	
<i>Demographic controls</i>	
Age	Individual's age in years at the time of the survey
Gender	1 Male 0 Female
Marital status	1 if married or on a common-law marriage 0 otherwise
Ethnic group	1 if the individual considers himself / herself <i>mestizo</i> 0 if the individual does consider himself / herself <i>raizal</i> from the archipelago, gypsy, indigenous, <i>palenquero</i> , black, and mulatto (Afro-descendants)
<i>Economic controls</i>	
Years of education	Number of years completed
Income	Logarithm of money received the previous month. It includes wages, gifts, pensions, contribution, and income from renting property, received from any person or institution outside the home.

Table A1 (Cont.)
Description of Variables

Variables	Description
Participation	1 if the individual participates in the labor market 0 otherwise
Contributory health regime	1 if the individual is affiliated to the contributory health social security regime 0 otherwise
Bogotá	1 if household lives in Bogotá 0 otherwise
Caribbean Region	1 if household lives in the Caribbean region 0 otherwise
Andean Region	1 if household lives in the Andean region 0 otherwise
Pacific Region	1 if household lives in the Pacific region 0 otherwise
Overcrowding	Number of people per room (excluding living room and dining room)
<i>Knowledge about risky health behaviors</i>	
Smoking increases the risk of cancer	1 if the individual considers this statement to be true 0 otherwise
Smokers become chronic coughers	1 if the individual considers this statement to be true 0 otherwise
A pregnant woman who smokes affects the baby	1 if the individual considers this statement to be true 0 otherwise
It is forbidden to broadcast cigarette advertising on television before 11 pm	1 if the individual considers this statement to be true 0 otherwise
Alcohol is harmful to health	1 if the individual considers this statement to be true 0 otherwise

Table A1 (Cont.)
Description of Variables

Variables	Description
Age started drinking	Age at which the individual took or first drank a glass of beer, <i>chicha</i> , wine or a shot of brandy, rum, <i>cola and pola</i> , <i>forcha</i> , punch or any other liquor
Vigorous exercise	1 if over the past 30 days, the individual did vigorous physical activities 0 otherwise
Have you heard of condoms?	1 if the individual considers this statement to be true 0 otherwise

Table A2
Summary of descriptive statistics explanatory variables

Variables	Total sample		Females		Males	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	41.2	17.014	41.4	17.106	40.9	16.902
Gender			53.6%		46.4%	
Marital status	56.8%		53.3%		60.7%	
Ethnic group	80.2%		81.6%		78.3%	
Years of education	7.4	4.621	7.4	4.633	7.4	4.605
Ln(income)	12.6	0.956	12.5	1.009	12.7	0.904
Labor participation	57.6%		39.1%		81.9%	
Contributory health regime	33.4		34.4%		32.3%	
<i>Region</i>						
Bogotá	8.0%		8.1%		7.9%	
Caribbean region	26.6%		26.3%		26.9%	
Andean region	32.5%		32.9%		32.1%	
Pacific region	15.6%		15.5%		15.6%	
Rest of the country	17.3%		17.2%		17.5%	
Overcrowding	2.0	1.083	1.9	1.081	2.0	1.085
Smoking increases the risk of cancer	95.5%		95.4%		95.7%	
Smokers become chronic coughers	93.0%		93.3%		92.7%	
Smoking while pregnant affect the baby	96.0%		96.3%		95.7%	
It is forbidden to broadcast cigarette advertising on television before 11 pm	47.2%		45.6%		49.4%	
Alcohol is harmful to health	87.6%		89.4%		85.3%	
Age started drinking	16.8	5.169	18.1	5.848	15.2	3.715
Vigorous exercise	25.3%		17.0%		36.1%	
Have you heard of condoms?	85.6%		84.5%		87.0%	

Source: Authors' calculations.

Appendix B

Table B1
Effect of socio-economic and knowledge variables on education gradients: Females by area of residence

	# of obs.	Demographic controls (age, gender, ethnicity)		Adding income and other economic controls ^{1/}		Reduction in education coefficient ^{3,4/}	Adding knowledge variables ^{2/}		Reduction in education coefficient ^{3,4/}
		Years of education (β)	Standard error	Years of education (β)	Standard error		Years of education (β)	Standard error	
Urban area									
<i>Smoking</i>									
Current smoker	8,332	-0.0268***	0.0083	-0.0093	0.0100	65.4%	-0.0213**	0.0084	20.5%
<i>Alcohol</i>									
Heavy drinker	5,097	0.0162*	0.0085	0.0000	0.0102	100.2%	0.0163*	0.0085	-0.6%
<i>Diet/exercise</i>									
Being obese	5,602	-0.0422***	0.0094	-0.0447***	0.0111	-6.0%	-0.0388***	0.0094	8.0%
<i>Unsafe sexual behavior</i>	6,049	-0.0647***	0.0220	-0.0886***	0.0257	-36.9%	-0.0649***	0.0221	-0.3%
Rural area									
<i>Smoking</i>									
Current smoker	1,640	-0.0281	0.0213	-0.0524**	0.0246		-0.0220	0.0214	
<i>Alcohol</i>									
Heavy drinker	1,065	0.0242	0.0220	0.0054	0.0261		0.0248	0.0221	
<i>Diet/exercise</i>									
Being obese	832	-0.0433	0.0267	-0.0585*	0.0311		-0.0453*	0.0269	
<i>Unsafe sexual behavior</i>	1,325	0.0006	0.0597	-0.0418	0.0711		-0.0089	0.0609	

^{1/} The variables included are: income, marital status, contributory health regime, the region where the individual lives (Bogotá, Andean region, Pacific region, Caribbean region), labor force participation, and overcrowding. See Appendix A for a description of the variables.

^{2/} Dummy variables were included to account for the knowledge of individuals about health risks

^{3/} Percentage change in the education coefficient of the basic regression.

^{4/} The reduction in the education coefficient is not calculated when this coefficient is not statistically significant in the basic equation.

Source: Authors' calculations.

Table B.2
Effect of socio-economic and knowledge variables on education gradients: Males by area of residence

	# of obs.	Demographic controls (age, gender, ethnicity)		Adding income and other economic controls ^{1/}		Reduction in education coefficient ^{3,4/}	Adding knowledge variables ^{2/}		Reduction in education coefficient ^{3,4/}
		Years of education (β)	Standard error	Years of education (β)	Standar d error		Years of education (β)	Standard error	
Urban area									
<i>Smoking</i>									
Current smoker	9,043	-0.0556***	0.0061	-0.0425***	0.0069	23.7%	-0.0536***	0.0061	3.6%
<i>Alcohol</i>									
Heavy drinker	6,153	0.0162***	0.0060	0.0106	0.0069	34.3%	0.0191***	0.0060	-18.2%
<i>Diet/exercise</i>									
Being obese	6,583	0.0117	0.0087	-0.0139	0.0101		0.0164*	0.0089	
<i>Unsafe sexual behavior</i>	6,572	0.0139*	0.0078	0.0056	0.0089	60.0%	0.0099	0.0079	29.3%
Rural area									
<i>Smoking</i>									
Current smoker	3,148	-0.0445***	0.0126	-0.0377***	0.0136	15.4%	-0.0419***	0.0126	5.8%
<i>Alcohol</i>									
Heavy drinker	2,351	0.0223*	0.0122	0.0125	0.0129	43.9%	0.0270**	0.0124	-21.0%
<i>Diet/exercise</i>									
Being obese	1,892	0.0853***	0.0246	0.0439	0.0269	48.6%	0.0837***	0.0248	1.9%
<i>Unsafe sexual behavior</i>	2,495	0.0355**	0.0158	0.0288*	0.0167	18.8%	0.0259	0.0161	27.0%

^{1/} The variables included are: income, marital status, contributory health regime, the region where the individual lives (Bogotá, Andean region, Pacific region, Caribbean region), labor force participation, and overcrowding. See Appendix A for a description of the variables.

^{2/} Dummy variables were included to account for the knowledge of individuals about health risks.

^{3/} Percentage change in the education coefficient of the basic regression.

^{4/} The reduction in the education coefficient is not calculated when this coefficient is not statistically significant in the basic equation.

Source: Authors' calculations.

Appendix C

Table C1
Current smoker: Logit estimation by gender and area of residence

Variables	Females				Males			
	Urban area		Rural area		Urban area		Rural area	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	-0.0046	0.0101	-0.0474*	0.0247	-0.0408***	0.0069	-0.0359***	0.0136
Age	0.1160***	0.0212	0.1389***	0.0520	0.0249*	0.0135	0.0799***	0.0215
Age squared	-0.0011***	0.0002	-0.0012**	0.0006	-0.0003*	0.0002	-0.0007***	0.0002
Ethnic group	-0.0614	0.1073	-0.6104***	0.1979	-0.1159*	0.0690	0.1027	0.1014
Income	-0.0687	0.0493	0.2337**	0.1002	-0.0232	0.0384	-0.0924*	0.0529
Married	-0.3835***	0.0814	-0.0650	0.1756	-0.3640***	0.0605	-0.3159***	0.1000
Contributory regime	-0.2088**	0.0881	-0.0725	0.2492	-0.2532***	0.0624	0.0103	0.1470
Bogotá	0.7567***	0.1353			0.3968***	0.0956		
Andean region	0.4910***	0.1126	-0.3250	0.3411	0.1399*	0.0748	0.3194	0.2162
Pacific region	0.2436*	0.1366	-0.3814	0.3656	0.1258	0.0902	0.7976***	0.2254
Caribbean region	-0.0007	0.1248	0.0406	0.3528	-0.2543***	0.0795	0.1962	0.2266
Participation	-0.0025	0.0904	-0.0814	0.1870	0.0203	0.0973	0.2161	0.1711
Overcrowding	0.0741*	0.0416	-0.0661	0.0849	0.0759***	0.0283	0.0781*	0.0410
Smoking_cancer	-0.0573	0.1783	-0.1565	0.3596	-0.3804***	0.1335	-0.2573	0.2055
Smoking_cough	-0.6213***	0.1382	-0.3110	0.3189	-0.5627***	0.1056	-0.1632	0.1758
Effect_babies	-0.5250***	0.1797	-0.4256	0.3893	-0.0068	0.1423	0.1621	0.2006
Smoking_publicity	-0.1037	0.0779	-0.0155	0.1759	-0.0932*	0.0537	-0.0900	0.0891
Constant	-2.9963***	0.7482	-6.7459	1.6897	-0.0740	0.5444	-2.2596***	0.7982
Number of obs.	8,332		1,640		9,043		3,148	

Source: Authors' calculations.

Table C2
Heavy drinking: Logit estimation by gender and area of residence

Variables	Females				Males			
	Urban area		Rural area		Urban area		Rural area	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	0.0000	0.0102	0.0031	0.0263	0.0141**	0.0070	0.0186	0.0131
Age	-0.0182	0.0202	-0.0020	0.0485	0.0101	0.0142	0.0247	0.0220
Age squared	-0.0001	0.0002	-0.0001	0.0006	-0.0003*	0.0002	-0.0004	0.0003
Ethnic group	-0.2492***	0.0973	-0.3279	0.2144	-0.3012***	0.0681	-0.3043***	0.1044
Income	0.1577***	0.0523	0.2201*	0.1144	0.1006**	0.0402	0.1004*	0.0561
Married	-0.2534***	0.0778	-0.3041	0.1908	-0.2741***	0.0632	-0.2270*	0.1040
Contributory regime	-0.0133	0.0856	-0.1036	0.2652	-0.0747	0.0630	0.0661	0.1473
Bogotá	-0.1304	0.1411			0.2666***	0.1024		
Andean region	-0.2704**	0.1103	-0.6640*	0.3434	-0.3631***	0.0801	-0.2150	0.1860
Pacific region	-0.2154*	0.1304	-0.5536	0.3577	-0.1621*	0.0940	-0.0164	0.1997
Caribbean region	0.0892	0.1036	-0.2000	0.3551	0.2267***	0.0744	0.1948	0.1949
Participation	0.2096**	0.0944	0.1798	0.2038	0.2232**	0.1050	0.4421**	0.1884
Overcrowding	0.0193	0.0400	0.0933	0.0874	0.0146	0.0292	-0.0811*	0.0437
Age starting drinking	-0.0263***	0.0081	-0.0528***	0.0190	-0.0489***	0.0080	-0.0766***	0.0134
Alcohol_harmful	-0.1997*	0.1170	-0.1509	0.2853	-0.4894***	0.0747	-0.5391***	0.1206
Constant	-1.7148**	0.7249	-2.7195*	1.6358	-0.3001	0.5579	-0.4325	0.8184
Number of obs.	5,097		1,065		6,153		2,351	

Source: Authors' calculations.

Table C3
Being obese: Logit estimation by gender and area of residence

Variables	Females				Males			
	Urban area		Rural area		Urban area		Rural area	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	-0.0413***	0.0112	-0.0606*	0.0313	-0.0100	0.0102	0.0421	0.0272
Age	0.1591***	0.0271	0.1237*	0.0662	0.1363***	0.0247	0.1624***	0.0601
Age squared	-0.0014***	0.0003	-0.0012	0.0008	-0.0014***	0.0003	-0.0016**	0.0007
Ethnic group	-0.2925***	0.1134	-0.2837	0.2668	-0.0294	0.1055	0.1223	0.2403
Income	0.0402	0.0559	0.0777	0.1342	0.1690***	0.0607	0.3421**	0.1389
Married	0.2525***	0.0874	0.2445	0.2260	0.6864***	0.1073	0.5237**	0.2651
Contributory regime	-0.1585*	0.0940	-0.4588	0.2937	0.1634*	0.0879	0.4429*	0.2389
Bogotá	-0.6901***	0.1738			-0.7833***	0.1733		
Andean region	-0.4878***	0.1219	-0.4452	0.3653	-0.1655	0.1088	-0.4846	0.3574
Pacific region	-0.0876	0.1397	-0.3933	0.4100	-0.3326**	0.1438	-0.3873	0.4011
Caribbean region	-0.0924	0.1233	-0.5331	0.4357	-0.0397	0.1114	-0.1507	0.3805
Participation	-0.0836	0.1009	0.2754	0.2509	-0.0039	0.1462	-0.2006	0.3779
Overcrowding	-0.0797	0.0514	-0.2171*	0.1164	-0.1751***	0.0477	-0.1655	0.1035
Vigorous exercise	-0.3365***	0.1219	0.1834	0.2849	-0.2332***	0.0879	0.0936	0.2131
Constant	-5.5458***	0.9011	-4.6174**	2.1405	-7.2048***	0.8986	-1.0726***	2.0957
Number of obs.	5,602		832		6,583		1,892	

Source: Authors' calculations.

Table C4
Unsafe sexual behavior: Logit estimation by gender and area of residence

Variables	Females				Males			
	Urban area		Rural area		Urban area		Rural area	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Years of education	-0.0894***	0.0260	-0.0552	0.0730	0.0024	0.0090	0.0194	0.0171
Gender								
Age	0.0647	0.0661	-0.0031	0.1352	0.0028	0.0182	0.0561*	0.0306
Age squared	-0.0019**	0.0009	-0.0007	0.0017	-0.0001	0.0002	-0.0009**	0.0004
Ethnic group	0.1995	0.2745	-0.2103	0.5945	-0.3375***	0.0835	-0.4505***	0.1329
Income	0.1412	0.1409	0.5730*	0.3049	0.2423***	0.0522	0.1581**	0.0742
Married	-0.4744**	0.2054	-1.0079*	0.5490	-0.8741***	0.0793	-0.7298***	0.1358
Contributory regime	-0.1239	0.2265	0.2535	0.6586	-0.3311***	0.0836	0.0961	0.1945
Bogotá	0.5812*	0.3264			-0.3400**	0.1544		
Andean region	0.1079	0.2931	0.6183	1.1058	-0.2744**	0.1123	-0.1374	0.2685
Pacific region	0.5685*	0.3121	0.0443	1.1985	0.1811	0.1188	0.3377	0.2766
Caribbean region	0.2424	0.2831	0.0696	1.1696	0.4878***	0.0953	0.2373	0.2710
Participation	0.6187**	0.2790	-1.2280**	0.5727	-0.0552	0.1323	-0.0168	0.2433
Overcrowding	-0.0933	0.0985	0.0012	0.2372	0.0124	0.0386	0.0540	0.0585
Heard of condoms	2.0069***	0.7175			1.3568***	0.1819	1.6273***	0.2925
Constant	-6.9635***	2.0908	-8.7085*	4.4717	-5.1003***	0.7293	-5.5554***	1.1002
Number of obs.	6,049		1,086		6,572		2,495	

Source: Authors' calculations.



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