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The More Children You Have the More Likely You Are to Smoke? Evidence from Vietnam

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Abstract

There is no doubt that parental smoking can cause health problems for children. It is expected that parents who are aware of the harmful effect of second-hand smoke would decrease parental smoking when having more children. Yet, using instrumental variable regressions and data from the 2006 and 2008 Vietnam Household Living Standard Surveys, we find a very strongly positive and significant effect of the number of children on the probability of households smoking tobacco in Vietnam. Having an additional child increases the probability of households consuming tobacco by approximately 15 percent. These findings imply low awareness levels regarding the harmful effects of second-hand smoke on children's health in Vietnam and indicate the need for policy action that disseminates knowledge on the harmful effects of smoking.

Keywords: parental smoking behaviors, children, health, instrumental variable regressions

JEL Classifications: I12; I31; O1.

1. INTRODUCTION

The World Health Organization (WHO) estimates that more than 6million people lose their lives each year because of tobacco use, with tobacco use growing fastest in low- and middle-income countries owing to rapid population growth and tobacco-industry targeting (WHO2013). Further, the annual death toll owing to tobacco use could rise to more than eight million by 2030. Smoking harms not only the smoker but also people nearby who are exposed to second-hand smoke. Second-hand smoke is the cause of death for 600.000people every year (WHO 2009a). Sorahan et al. (1997) show a strong association between fathers' smoking and the risk of cancer in children.¹

Understanding factors influencing smoking behaviors are important for not only policy makers but also researchers. Factors associated with smoking can be categorized into several groups including socio-economic, demographic, biological, intrapersonal, and psychosocial factors (Brannon and Feist 1992, Tyas and Pederson 1998, van Loon et al. 2005). Many empirical studies aim to explain smoking behaviors of individuals (Chaloupka and Wechsler 1997, Smet et al. 1998, Chaloupka and Pacula 1999, Gruber and Zinman 2000, Chaloupka and Warner 2000, Tauras 2004, van Loon et al. 2005, Carpenter and Cook 2008, Block and Webb 2009, Azagba and Sharaf 2011a). A widely used control variable in these studies is family size. However, empirical results on the effect (or association) of household size on tobacco smoking are not consistent: while several studies find individuals in large families are less likely to smoke (Burchfie et al. 1989, Jarvis 1996, Cutler and Glaeser 2007, Azagba and Sharaf 2011a), there are also results that indicate the reverse (Isohanni et al. 1991, Stanton et al. 1994, Johansson et al., 2003, Block

¹Smoking can also cause harmful effects on non-health outcomes, e.g., Zhao et al. (2012) found that smoking during adolescence can reduce students' scores on mathematics tests in China.

and Webb 2009). An interesting question in this context is whether there is a causal effect of the number of children on the parental smoking. However, this question remains under-researched in empirical studies.

Economists and sociologists have long been interested in the role of children in intra-household allocation of resources. A vast amount of this empirical literature investigates trade-offs between the number of children and their own and their family's outcomes (e.g., Becker 1960, Becker and Lewis 1973, Becker and Tomes 1976, Rosenzweig and Wolpin 1980, Cáceres-Delpiano 2006, Black et al. 2005, Angrist et al. 2010). Some of the literature specifically investigates the effect of the number of children on parental employment (e.g., Blau and Robins 1988, Korenman and Neumark 1992, Browning 1992, Angrist and Evans 1998, Lundberg and Rose 2002). Yet, little is empirically known about the ultimate impact of the number of children on tobacco smoking by their parents. A related study by Johansson et al. (2003) finds that while parenthood is not associated with lower smoking levels, it is positively associated with the probability of smoking outdoors in Sweden.

This study examines whether the number of children can affect the smoking of tobacco by households in Vietnam. In our empirical investigations, tobacco refers to both homemade tobacco products that are smoked, and commercially sold cigarettes. Vietnam is an interesting case study, since it is a country with a very high smoking prevalence rate. About 48 percent of all men in Vietnam smoke as opposed to only 1.5 percent of all women who smoke in 2009 (World Bank, 2012). Vietnam is ranked 23rd among 176 countries in terms of the prevalence of male smokers (World Bank, 2012). The preva-

lence of smoking for married men with children is even higher, at 66 percent in 2006. More seriously, around 62 percent of fathers often smoke at home.²

Our study contributes to the existing literature on determinants of smoking because we treat the number of children as the main variable of interest, and not as a control variable. In addition, there are very few studies on smoking decisions of individuals in Vietnam. Laxminarayan and Deolalikar (2004) find that increasing tobacco prices reduces tobacco demand, but does not lead to smoking cessation while Guindon (2009) finds that higher tobacco prices can delay the initiation of smoking among teens and young adults. Nguyen (2012) examines demographic variables associated with male smokers in Vietnam to find that age, education, and employment are important determinant factors for the probability of men smoking. Our study is also different from existing literature on family economics since we analyze the effect of children on health behaviors instead of welfare outcomes of families. Empirical findings on the effect of the number of children on parental smoking can potentially inform policy measures and future research on tobacco consumption and control, and children's health in Vietnam.

A methodological difficulty in estimating the effect of the number of children on parental smoking behavior is the endogeneity bias inherent in such an exercise. Unobserved variables such as attitudes towards children and the health of parents can affect both tobacco smoking decisions and the number of children expected by parents. Therefore, we use instrumental variable regression to treat the endogeneity bias. The presence

² We estimate this figure from the 2006 Vietnam Household Living Standard Survey (see the second section of this paper for description of this data set).

of twins of the first-born children is the instrument, which introduces a random and exogenous variation in the number of children.

The paper is structured into six sections. Section 2 presents the theoretical framework that underlies the empirical analysis of the effect of children on tobacco consumption in families. Section 3 discusses the data sets used in this study and the statistical description of the prevalence of smoking in Vietnam. Sections 4 and 5 respectively present the estimation method and empirical results. Finally, section 6 concludes.

2. THEORETICAL FRAMEWORK

To illustrate the channels through which the number of children can affect household consumption of tobacco, we use a simple model in which a household is assumed to maximize their utility of consumption through leisure time (T_L), quality of children nQ , tobacco (S), and other commodities (C). Q is the quality of a child and n is the number of children. We assume children receive equal investment from parents and have the same quality. The number of children is assumed to be exogenously given. An exogenous shock such as having twins or a miscarriage can cause the actual number of children to differ from the desired number.

The utility function, which is increasing, concave, and twice continuously differentiable, is assumed to be written additively as follows:

$$U(T_L, nQ, S, C) = U_S(S, n) + U_Q(nQ) + U_{T,C}(T_L, C) \quad (1)$$

We assume the utility derived from tobacco consumption depends directly on the number of children, and the marginal utility of tobacco consumption rises as the number of children increases. Numerous sociological studies show that children can be a major source of stress for parents (Aneshensel 1992, Crnic and Acevedo 1995, Pelham and Lang 1999). They also find that parents of children with behavior problems, especially children with attention deficit hyperactivity disorder, suffer greater stresses related to their children (e.g., Mash and Johnston 1980, Pelham and Lang 1999). In this context, many smokers report that smoking can help relieve stress, while stress can increase the probability and intensity of smoking (Kenneth et al. 1992, Parrott 1999, Aronson et al. 2008). This would indicate that stress could increase the marginal utility of smoking. A large number of studies find a positive association between stressful experiences and smoking (e.g., Colby et al. 1994, Tyas and Pederson 1998, Scal et al. 2003, Vitoria et al. 2006, Khwaja et al. 2006, Ayyagari and Sindelar 2009, Azagba and Sharaf 2011b). Given these sociological studies, we assume that $\partial U_s(S, n) / \partial n > 0$.

Household income is from exogenous income Y and time spent working T_w with the hourly return w . We assume that households have to spend their limited total time T for leisure, working, and care of children. We denote the average time spent on care for each child by the parameter t_c . The time spent working is expressed as:

$$T_w = T - T_L - nt_c. \quad (2)$$

The household maximizes their utility subject to the budget constraint:

$$p_S S + p_Q n Q + p_C C = Y + w(T - T_L - nt_c). \quad (3)$$

p denotes the price of corresponding items. We assume that the cost of child quality can depend on the consumption of tobacco directly if parents are aware of the harmful effects of second-hand smoke on their children's health. There are numerous studies documenting adverse effects of parental smoking on children's health in both developed and developing countries (e.g., Pattenden et al. 2006, Charlton 1984, Cook and Strachan 1997, 1999). Thus, if there is parental smoking, there can be additional costs to keep the quality of children the same as in the absence of parental smoking. As a result, p_Q can be increasing in S , that is, $dp_Q/dS > 0$.

Maximizing the Lagrangian expression, and solving the first-order conditions, we obtain the demand for tobacco, quality of children, leisure time, and consumption of other commodities as a function of the number of children and other parameters. The demand for tobacco consumption is expressed as $S = S(p_S, p_Q, p_C, w, t_c, n)$.³ The effect of children on tobacco consumption is not unambiguous. Through the tobacco utility function, $U_S(S, n)$, children can increase their parent's tobacco consumption if they cause parental stress that mitigates through smoking. However, the number of children also increases the cost of providing for children's quality. Since child quality and tobacco are neither substitute goods nor complementary goods, the substitution effect of child quality cost on tobacco is expected to be negligible. As a result, an increase in the cost of children's quality can decrease tobacco consumption through the income effect: parents have

³Using comparative-static analysis, we can compute $\frac{\partial S}{\partial n} = \frac{|J_S|}{|J|}$, whether $|J|$ is the Jacobian determinant of the partial derivatives of the implicit functions of S , Q , C and T_L with respect to these variables (denoted by F), and $|J_S|$ is the determinant of the Jacobian matrix but the column vector of $\frac{\partial F}{\partial S}$ replaced by $\frac{\partial F}{\partial n}$.

to spend on children, and having more children or spending more on the quality of their life can limit the household budget for several consumption items including tobacco.

In addition, children can also affect household budget through the labor supply of parents. Motherhood and childcare require substantial time and effort that is customarily mostly expended by women, thereby reducing the labor supply of women (Becker 1965, 1985). A large number of studies find a negative relation between labor supply of women and the number of their children (e.g., Blau and Robins 1988, Browning 1992, Angrist and Evans 1998, Connelly and Kimmel 2003). However, families can also decrease their leisure time to keep their working time unchanged. Several studies show that men spend more time and effort in the labor market when they have children (Lundberg and Rose 2002). Empirical studies also find that married men have a higher presence in the labor supply and earn more wages than single men (e.g., Korenman and Neumark 1991, Lundberg and Rose 2002). Therefore, irrespective of the number of children in a household or expenditure on their quality, its consumption of tobacco through the household income channel is not known *a priori*.

3. DATA SOURCE AND STATISTICAL DESCRIPTION OF SMOKING PREVALENCE IN VIETNAM

3.1. Data description

This study uses data from the 2006 and 2008 Vietnam Household Living Standard Surveys (VHLSS). The General Statistics Office of Vietnam (GSO) conducts these surveys every two years since 2002 with technical support from The World Bank. However, only

the 2006 VHLSS contains basic information on the smoking behavior of individuals aged 10 and above, including whether they are current smokers or have quit smoking. Therefore, we use the 2006 VHLSS to examine the prevalence of smoking among individuals and the demographic characteristics of smokers.

The 2006 VHLSS covered 9,189 households and 39,071 individuals. The sample is representative at the national, urban/rural, and regional levels. It contains very detailed information on households with respect to basic demography, employment and labor force participation, education, health, income, expenditure, housing, fixed assets and durable goods, participation of households in poverty alleviation programs, etc. For our study, we restrict our sample to fathers who have at least one child. The number of observations in our sample is 4,971.

As mentioned above, we use the presence of first-born twins as the instrument for the number of children. However, this greatly impacts the sample size since the 2006 VHLSS contains only a few observations of twin children. Thus, we use data from the much larger 2008 VHLSS to examine the effect of the number of children on households' tobacco consumption. Although the 2008 VHLSS does not have individual-level data on tobacco consumption, it contains household-level data on the habit. The 2008 VHLSS is a special survey that collected consumption data for a much larger number of households with the aim of constructing price indexes for provinces in Vietnam. With data pertaining to 69,435 households, the larger sample size of this survey provides us with statistically significant number of observations on households with twin children.

Among the 2008 VHLSS surveyed households, 56,718 households have at least one child. Further, we have identified 304 households with first-born twins (0.54 per-

cent), that is, children born to the household in the same month and year. We drop households without children from our sample for the household level analysis. Therefore, we use the 2006 VHLSS data to examine the prevalence of individual smoking and demographic characteristics of smokers, while we use the 2008 VHLSS data to empirically analyze the effect of the number of children on the probability of tobacco consumption in a household. As we will show in the next section, the empirical analysis of individual-level data on smokers in the 2006 VHLSS and household-level smoking data in the 2008 VHLSS produce very similar results on the prevalence of smoking in different household groups.

3.2. Descriptive statistics on smoking prevalence in Vietnam

About 48 percent of all men in Vietnam smoke as opposed to only 1.5 percent of all women who smoke (World Bank, 2012). This is a very high prevalence of male smokers, as a percentage of total male population, in the world (World Bank, 2012). In 2000, Vietnam, a developing country, established a very ambitious policy objective that aimed to reduce the prevalence of male smoking rate to 20 percent of the total male population by 2010 (Government of Vietnam 2000). However, the objective was not achieved, and nearly half of all men currently smoke. According to our estimates from the 2006 VHLSS, prevalence of smoking for married men with children, at 66 percent, is higher than for single men, 25 percent of whom smoke. More seriously, around 62 percent of fathers often smoke at home. A possible reason for the failure in reducing smoking in Vietnam is a weak legal framework related to smoking restrictions. Smoking is

allowed in public areas. In addition, because of low taxation on tobacco, Vietnam is amongst countries with the lowest price of tobacco (Nguyen, 2010).

Unlike developed countries, tobacco is mainly consumed by men in Vietnam. Table 1 presents the smoking rate of fathers by urban/rural and other individual characteristics. Although the point estimate of tobacco smoking in rural areas is higher than that in urban areas, the difference in smoking rates between urban and rural areas is not statistically significant. Ethnic minorities who are the poorest and live mainly in mountainous and highland areas have a higher rate of smokers than the Kinh people. The percentage of smoking was highest amongst those aged between 36 and 45 years, at 68 percent. The table also shows that fathers of high expenditure quintiles are less likely to smoke than those of low expenditure and low education quintiles.

[Table 1 HERE]

With regard to the main objective of this study to examine the relationship between household smoking and children, Table 2 shows a clear association between the prevalence of smoking by fathers and the number of children, in both urban and rural areas: 63.6 percent of fathers with one child smoke, while 73.5 percent of fathers with at least four children smoke.

[Table 2 HERE]

Table 3 presents the percentage of households with tobacco-related expenditures, classified according to the number of children. The percentage of households that spend on smoking is 64.1 percent, which is very similar to the percentage of fathers that smoke (in Table 2). Rural households are also more likely to spend on smoking than urban households. Table 3 also clearly indicates a positive association between the number of children and the percentage of households that smoke: 57.7 percent of households with only one child consume tobacco, while 78.3 percent of households with more than four children spend on tobacco consumption. This association is also very similar to the association between fathers who smoke and the number of children they have, presented in Table 2. Since smokers are mainly men in Vietnam, tobacco consumption in families is strongly correlated with the probability of smoking by fathers.

[Table 3 HERE]

4. ESTIMATION METHOD

To examine the effect of the number of children on the tobacco consumption by fathers, we estimate a simple model using individual-level data from the 2006 VHLSS as follows:

$$Y_i = \alpha + X_i\delta + C_i\gamma + \varepsilon_i, \quad (4)$$

where Y_i refers to the tobacco smoking status of father i , which equals 1 for smokers and 0 for non-smokers; X_i is a vector of control variables applicable to the father i ; and, C_i is

the number of children that the father has. The number of children ranges from 1 to 8 in our 2006 VHLSS sample.

A challenge in estimating the effect of the number of children on household smoking is its inherent endogeneity. Households with a small number of children might have unobserved characteristics in the “smoking” equation that are different from households with a large number of children. For example, parents who pay more attention to ‘quality’ of children tend to have a small number of children (Becker and Lewis, 1973) and not to smoke at the same time. As mentioned above, we will use the presence of twins as an instrument for the number of children to deal with endogeneity. Thus, the second model uses household-level data from the 2008 VHLSS that contains a statistically significant number of observations on twins to measure the effect of the number of children on the probability of households spending on tobacco. The model is given by:

$$S_j = \alpha + X_j\beta + C_j\gamma + u_j, \quad (5)$$

where, S_j is the tobacco spending status of households j , which equals 1 for households with smoking-related expenditures and 0 for households without smoking expenditures; X_j is a vector of control variables for household i ; C_j is the number of children in the household. In the 2008 VHLSS sample, the number of children ranges from 1 to 9. The X variables include age, ethnicity, education, urban, and regional variables. The summary statistics of the explanatory variables are presented in Tables A.1 and A.2 in the Appendix.

Our parameter of interest is γ , which measures the effect of the number of children on the probability of parental smoking in the household. In the literature of quantity-

quality of children, the presence of twins is often used as an instrument for the number of children (Rosenzweig and Wolpin 1980, Cáceres-Delpiano 2006, Black et al. 2005, Angrist et al. 2010). The presence of twins can be considered as a random event that causes the expected number of children in a family to increase and does not affect the smoking of parents directly. Twins can be regarded as an exogenous source affecting the number of children. Therefore, we use the presence of first-born twins as the instrument. Twins born after the first child are not considered for the empirical analysis in order to avoid reverse causality, since having more children can increase the probability of having twins. A new concern about using twins as an instrument variable refers to the increasing randomness of twins being born owing to parents undergoing fertility treatments. However, this concern does not apply to the general population in Vietnam since fertility techniques have been introduced only recently and are very expensive for average Vietnamese families. We expect that only a very small proportion of higher-income families in Vietnam have twins through fertility techniques.

In Table A.3 in Appendix, we run regressions of the first-born twin presence on different observed variables including age and education of parents, ethnicity and regional dummies. In three model specifications, almost all explanatory variables are not significant. Only the age of father is statistically significant at the 10% level. The R-squared is very small. Thus, we expect that the presence of first-born twins is random for the case of Vietnam.

A potential problem in using twins as instruments is that twins can have an effect on not only the number of children but also the birth space between children. Having twins is might be more stressful than having two babies between several years. To test

whether the twins can significantly affect smoking through other channels in addition to the number of children, we can compare the tobacco consumption between families with twins and families with two non-twin children. In Table A.4 in Appendix, we run regressions of tobacco consumption on the twin presences using the sample of households with just two children and the sample of households with just three children. The twin presence is not significant in all three models using the two samples. Thus we expect that the direct effect of having twins on household smoking would be small.

Although the “smoking” variable S is a binary, we estimate equation (1) by applying the two-stage least squares (2SLS) regression for the linear probability model. This is because when there are no available estimators for a binary model with endogenous count variables, 2SLS estimators are consistent and can be applied for the binary model with count endogenous variables (e.g., Angrist 2001, Cáceres-Delpiano 2006, Angrist et al. 2010). The first-stage regression of the number of children is presented in Table A.4 in Appendix. The instrument has its expected sign and a strongly significant effect on the number of children. The weak instrument tests strongly reject the hypothesis on the weakness of the instrument.

5. EMPIRICAL RESULTS

Tables 4 and 5 present results on the effect of the number of children on smoking by fathers. We estimate three models with different sets of control variables. Model 1 does not include any control variable. Model 2 includes exogenous control variables. Although previous studies suggest that variables that are also likely to be affected by the number of

children should not be controlled (Heckman et al. 1999, Angrist and Pischke 2009), we add several demographic variables of parents as controls in Model 3 to examine whether the omission of these variables can influence the estimated effects of children on household smoking. The regression results from the different models consistently show a positive association of the number of children with the prevalence of smoking among father. Having more children is positively correlated with the probability of fathers smoking in general and at home.

[Table 4 HERE]

Table 5 reports the effect of having a child on smoking by married men. The sample used for this analysis includes married men who do not have any child and those who have only one child. This analysis shows a large difference in the smoking rate between the two groups of married men after the observed characteristics are controlled. The smoking rate among married men with a child is 11 percentage points higher than the smoking rate among married men without any child.

[Table 5 HERE]

It is possible that OLS estimators in Tables 4 and 5 are biased due to endogeneity of the number of children. Thus, the estimates from these tables should be interpreted solely as indications with regard to the association between the number of children and smoking by fathers.

In Table 6, we use 2SLS with first-born twins as the instrument for the number of children to estimate the causal effect of the number of children on the probability of households consuming tobacco. The three models with different sets of control variables

give very similar estimates. According to Model 3 2SLS estimates, an additional child leads to an increase of 0.16 in the probability of households spending on tobaccosmoking. The point estimates from the 2SLS regressions are higher than those from the OLS regressions, and the endogeneity test provides evidence against the exogeneity of the number of children.⁴

We also run reduced-form OLS regressions of to estimate the probability of tobacco consumption in the presence of first-born twins (Table A.5 in Appendix). The three models once again produce similar estimates, and, according to Model 3 for example, having first-born twins increases the probability of households using tobacco by 0.08.

[Table 6 HERE]

Table 6 reveals some interesting findings on the association between tobacco consumption and other household demographic variables. Specifically, families with fathers present are more likely to consume tobacco. In addition, men with higher education, as well as older men, are more likely to smoke. Interestingly, the presence of mothers in households reduces tobacco consumption in families significantly. It implies that a man's decision on smoking might also depend on his wife's decision. However, the education level of the wife does not affect the smoking decision of husband.

Another important question is whether there is a heterogeneous effect of the number of children on households' tobacco consumption. We examine this question by including interactions between numbers of children with other demographic variables of

⁴ We use the command "ivreg2" in Stata to estimate the 2SLS models. The P-value of endogeneity test in Model 3 is 0.02, and the null hypothesis on the exogeneity of the number of children is rejected.

families. The instruments for these interactions are the interactions between the presence of twins and demographic variables in families. For example, we examine whether the effect of children on household tobacco consumption varies across families with different education levels of fathers by including the interaction between the education level of the father and the number of children in the 2SLS regression (Table A.6 in the Appendix). The instrument for this interaction is the interaction between the father's education level and the presence of first-born twins. Demographic variables interacting with the number of children are urbanity, ethnicity, education of mother, and age and education of fathers. The estimation results show that not all the interactions are statistically significant.

We further run 2SLS regressions to examine the effect of children on household tobacco consumption for different sub-samples that differentiate between urban and rural households, education levels of mothers, education levels of fathers, and different age groups of fathers (Table A.7 in the Appendix). Figure 1 summarizes the point estimates of the effect of children on household tobacco consumption and the corresponding 90 percent confidence intervals. It shows that the effect of children on household tobacco consumption is approximately similar across different household groups. In addition, the effect of children on household tobacco consumption is statistically significant for families in which fathers or mothers have lower education levels (the number of completed grades less than 8). It is possible that families with lower education levels are less aware of the harmful effect of second-hand smoking on children. The effect of children on tobacco consumption is higher for families with fathers who are middle aged (age from 40 to 49).

6. CONCLUSIONS

This study examined the effect of the number of children on fathers' smoking using instrumental-variable regression and data from the 2006 and 2008 VHLSS. We show that the number of children increases the probability of households consuming tobacco. Having an additional child increases the probability of household spending on smoking by 15 percent. Possibly, having more children might cause more stress for parents, which in turn can increase their probability of smoking.

This finding implies that parents, especially fathers since smoking is predominantly a male activity in Vietnam, are possibly unaware of the health impacts of second-hand smoking on their children. This brings to the fore an important policy learning: knowledge and information on the harmful effects of second-hand smoke should be widely disseminated in Vietnam. In addition, given the weak regulatory environment related to tobacco consumption in Vietnam, legislative action that induces a healthier, smoke-free lifestyle may be appropriate. This would also apply to other developing countries, especially ASEAN countries such as Thailand, Philippines, Indonesia, Lao, and Cambodia, which have similar smoking prevalence patterns and economic structures as Vietnam.

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Tables and Figures

Table 1: The smoking rate of fathers by several characteristics (in percent)

Groups	Percentage of smoking			Percentage of smoking inside house		
	Rural	Urban	All	Rural	Urban	All
<i>Ethnicity</i>						
Vietnamese (Kinh)	65.31 (0.92)	63.37 (1.69)	64.85 (0.81)	62.39 (0.94)	57.07 (1.81)	61.12 (0.84)
Ethnic minorities	70.94 (1.77)	51.89 (7.10)	69.94 (1.72)	69.01 (1.83)	51.89 (7.10)	68.11 (1.78)
<i>Age</i>						
16-35	63.81 (1.64)	66.25 (4.08)	64.14 (1.52)	60.02 (1.68)	57.11 (4.33)	59.62 (1.57)
36-45	68.90 (1.20)	64.78 (2.53)	68.04 (1.09)	65.90 (1.22)	59.99 (2.63)	64.66 (1.11)
46-55	66.27 (1.55)	61.87 (2.95)	65.09 (1.38)	64.42 (1.57)	55.18 (3.02)	61.94 (1.41)
Above 55	59.41 (2.90)	52.43 (6.07)	57.90 (2.62)	58.22 (2.91)	47.39 (6.06)	55.88 (2.64)
<i>Expenditure quintiles</i>						
Poorest	68.98 (1.61)	69.90 (6.56)	69.03 (1.56)	66.76 (1.65)	69.90 (6.56)	66.92 (1.60)
Near poorest	68.71 (1.54)	81.86 (4.30)	69.56 (1.47)	66.86 (1.57)	81.86 (4.30)	67.84 (1.50)
Middle	64.21 (1.70)	71.76 (3.99)	65.15 (1.57)	60.99 (1.73)	69.05 (4.10)	62.00 (1.60)
Near richest	63.90 (1.88)	65.48 (3.26)	64.29 (1.63)	60.82 (1.90)	59.38 (3.48)	60.47 (1.66)
Richest	61.75 (2.94)	56.71 (2.55)	58.45 (1.95)	56.44 (3.05)	48.53 (2.65)	51.25 (2.03)
Total	66.31 (0.83)	62.95 (1.67)	65.60 (0.74)	63.56 (0.85)	56.88 (1.78)	62.15 (0.77)
Standard errors in parentheses. The standard errors are corrected for sampling weights and cluster correlation. Source: Estimation from the 2006 VHLSS.						

Table 2: The smoking rate of fathers by the number of children (in percent)

The number of children	Percentage of smoking			Percentage of smoking inside house		
	Rural	Urban	All	Rural	Urban	All
1	64.12 (1.78)	61.89 (3.55)	63.57 (1.60)	60.56 (1.83)	56.63 (3.64)	59.59 (1.65)
2	64.54 (1.23)	60.78 (2.35)	63.62 (1.09)	61.68 (1.25)	52.92 (2.50)	59.53 (1.13)
3	68.30 (1.64)	68.27 (3.96)	68.29 (1.51)	66.07 (1.66)	65.43 (4.03)	65.97 (1.53)
4	71.29 (2.51)	69.44 (7.35)	71.10 (2.38)	68.84 (2.58)	67.16 (7.46)	68.67 (2.44)
Above 4	73.23 (3.53)	75.63 (8.84)	73.52 (3.29)	71.96 (3.55)	72.53 (9.17)	72.03 (3.32)
Total	66.31 (0.83)	62.95 (1.67)	65.60 (0.74)	63.56 (0.85)	56.88 (1.78)	62.15 (0.77)

Standard errors in parentheses. The standard errors are corrected for sampling weights and cluster correlation.
Source: Estimation from the 2006 VHLSS.

Table 3: Percentage of households having smoking spending by the number of children

The number of children	Rural	Urban	All
1	59.18 (0.85)	54.30 (1.40)	57.68 (0.73)
2	66.37 (0.61)	61.15 (1.23)	65.01 (0.55)
3	68.95 (0.91)	65.53 (2.43)	68.44 (0.85)
4	72.98 (1.71)	72.27 (5.55)	72.91 (1.63)
Above 4	77.69 (2.78)	85.73 (6.58)	78.26 (2.63)
Total	65.55 (0.50)	59.55 (0.93)	64.07 (0.44)

Standard errors in parentheses. The standard errors are corrected for sampling weights and cluster correlation.
Source: Estimation from the 2008 VHLSS.

Table 4: OLS regressions of father's smoking on the number of children

Explanatory variables	Father's smoking			Father's smoking inside house		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
The number of children	0.0266*** (0.0070)	0.0177*** (0.0060)	0.0146** (0.0056)	0.0336*** (0.0065)	0.0212*** (0.0068)	0.0155** (0.0070)
Age		-0.0013 (0.0008)	-0.0062*** (0.0017)		-0.0004 (0.0008)	-0.0054*** (0.0020)
The completed education grade		-0.0185*** (0.0029)	-0.0169*** (0.0033)		-0.0210*** (0.0025)	-0.0173*** (0.0030)
Ethnic minorities (yes=1)		0.0121 (0.0272)	0.0078 (0.0298)		0.0217 (0.0253)	0.0104 (0.0256)
Urban (urban=1, rural=0)		0.0093 (0.0222)	0.0175 (0.0222)		-0.0137 (0.0199)	0.0014 (0.0203)
Red River Delta	Reference					
North East		-0.0215 (0.0268)	-0.0236 (0.0265)		-0.0323 (0.0275)	-0.0327 (0.0275)
North West		-0.0188 (0.0371)	-0.0201 (0.0391)		-0.0203 (0.0428)	-0.0243 (0.0427)
North Central Coast		0.0018 (0.0392)	-0.0009 (0.0396)		0.0216 (0.0282)	0.0165 (0.0281)
South Central Coast		0.0669** (0.0291)	0.0654** (0.0297)		0.0504* (0.0292)	0.0469 (0.0295)
Central Highlands		-0.0143 (0.0333)	-0.0087 (0.0339)		-0.0085 (0.0331)	-0.0012 (0.0332)
South East		0.0218 (0.0310)	0.0293 (0.0326)		0.0045 (0.0297)	0.0162 (0.0306)
Mekong River Delta		0.0882*** (0.0203)	0.0889*** (0.0217)		0.0855*** (0.0239)	0.0867*** (0.0251)
Living with wife			-0.2922** (0.1104)			-0.3051*** (0.1086)
Living with wife * The completed education grade of wife			-0.0001 (0.0035)			-0.0020 (0.0031)
Living with wife * Age of wife			0.0058*** (0.0019)			0.0059*** (0.0021)
Log of per capita income			-0.0207* (0.0113)			-0.0388*** (0.0135)
Constant	0.5949*** (0.0197)	0.7895*** (0.0534)	1.2334*** (0.1280)	0.5445*** (0.0172)	0.7357*** (0.0483)	1.3500*** (0.1641)
Observations	4,971	4,971	4,971	4,971	4,971	4,971
R-squared	0.004	0.031	0.034	0.005	0.037	0.041

* significant at 10%; ** significant at 5%; *** significant at 1%

Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.

Source: Estimation from the 2006 VHLSS.

Table 5: OLS regressions of father's smoking on 'having a kid'

Explanatory variables	Father's smoking			Father's smoking inside house		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Having a kid (yes=1; no=0)	0.1751*** (0.0252)	0.1223*** (0.0300)	0.1231*** (0.0307)	0.1570*** (0.0253)	0.1097*** (0.0303)	0.1122*** (0.0309)
Age		-0.0029*** (0.0010)	-0.0043** (0.0021)		-0.0026** (0.0010)	-0.0043** (0.0021)
The completed education grade		-0.0104*** (0.0039)	-0.0089* (0.0046)		-0.0105*** (0.0040)	-0.0078* (0.0046)
Ethnic minorities (yes=1)		0.0821* (0.0427)	0.0768* (0.0432)		0.0966** (0.0446)	0.0878* (0.0450)
Urban (urban=1, rural=0)		-0.0405 (0.0328)	-0.0329 (0.0337)		-0.0376 (0.0336)	-0.0262 (0.0345)
Red River Delta	Reference					
North East		-0.0174 (0.0425)	-0.0137 (0.0426)		-0.0352 (0.0423)	-0.0304 (0.0424)
North West		0.0525 (0.0709)	0.0556 (0.0707)		0.0192 (0.0787)	0.0224 (0.0783)
North Central Coast		0.0190 (0.0459)	0.0209 (0.0460)		0.0364 (0.0457)	0.0388 (0.0459)
South Central Coast		0.1720*** (0.0497)	0.1730*** (0.0501)		0.1345*** (0.0515)	0.1342*** (0.0518)
Central Highlands		0.0091 (0.0719)	0.0141 (0.0719)		0.0319 (0.0715)	0.0378 (0.0715)
South East		0.1332*** (0.0476)	0.1422*** (0.0485)		0.1073** (0.0488)	0.1157** (0.0498)
Mekong River Delta		0.2336*** (0.0349)	0.2395*** (0.0367)		0.2265*** (0.0355)	0.2312*** (0.0372)
Living with wife			-0.0712 (0.1451)			-0.0870 (0.1450)
Living with wife * The completed education grade of wife			-0.0008 (0.0052)			-0.0025 (0.0052)
Living with wife * Age of wife			0.0015 (0.0022)			0.0018 (0.0022)
Log of per capita income			-0.0170 (0.0205)			-0.0231 (0.0209)
Constant	0.4606*** (0.0199)	0.6413*** (0.0811)	0.8497*** (0.2258)	0.4389*** (0.0196)	0.6068*** (0.0820)	0.8913*** (0.2287)
Observations	1,710	1,710	1,710	1,710	1,710	1,710
R-squared	0.030	0.095	0.096	0.024	0.083	0.084

* significant at 10%; ** significant at 5%; *** significant at 1%

Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.

Source: Estimation from the 2006 VHLSS.

Table 6: OLS and 2SLS regressions of dependent variable ‘household having tobacco consumption’

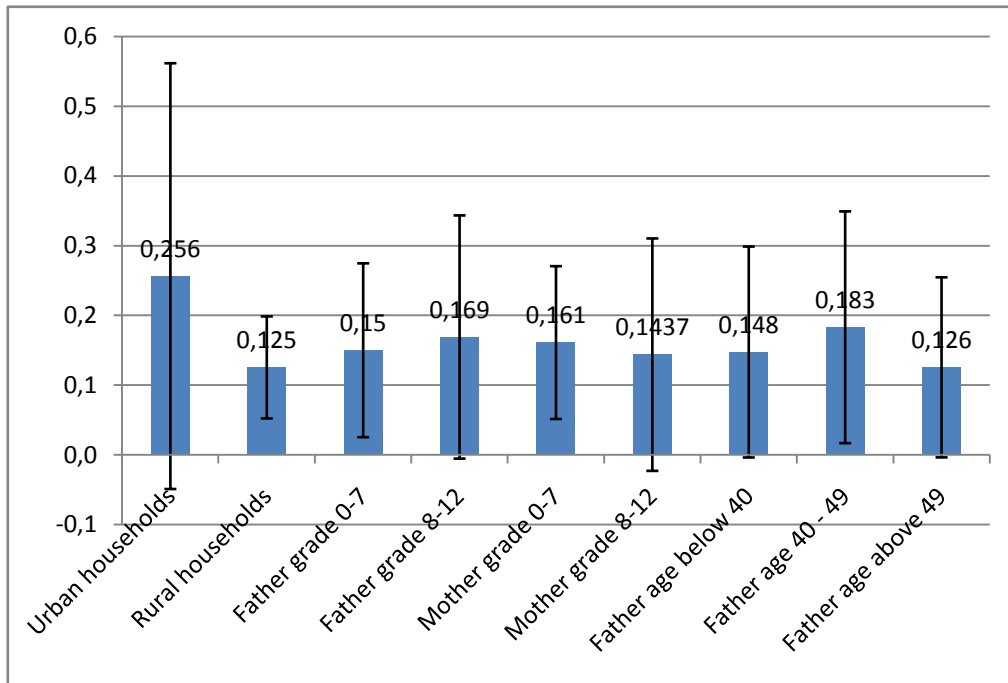
Explanatory variables	OLS regressions			IV regressions		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
The number of children	0.0473*** (0.0042)	0.0425*** (0.0039)	0.0320*** (0.0040)	0.1459** (0.0583)	0.1521** (0.0596)	0.1549*** (0.0587)
Ethnic minorities (Vietnamese = 0; ethnic minorities = 1)		0.0587*** (0.0087)	0.0446*** (0.0094)		0.0137 (0.0250)	-0.0007 (0.0226)
Living with father			0.7261*** (0.0257)			0.6879*** (0.0354)
Living with father * Age of father			-0.0072*** (0.0005)			-0.0072*** (0.0005)
Living with father * The completed education grade of father			-0.0028*** (0.0008)			-0.0029*** (0.0009)
Living with mother			-0.4368*** (0.0239)			-0.4913*** (0.0359)
Living with mother * Age of mother			0.0081*** (0.0004)			0.0084*** (0.0004)
Living with mother * The com- pleted education grade of mother			-0.0022* (0.0012)			-0.0002 (0.0016)
Urban (urban=1, rural=0)		-0.0603*** (0.0094)	-0.0505*** (0.0092)		-0.0406** (0.0172)	-0.0318** (0.0155)
Red River Delta	Reference					
North East		-0.0010 (0.0123)	-0.0041 (0.0116)		0.0021 (0.0114)	0.0011 (0.0110)
North West		-0.0189 (0.0197)	-0.0231 (0.0202)		-0.0291 (0.0230)	-0.0304 (0.0241)
North Central Coast		-0.0056 (0.0225)	0.0030 (0.0223)		-0.0307 (0.0233)	-0.0253 (0.0223)
South Central Coast		0.0671*** (0.0200)	0.0679*** (0.0198)		0.0376 (0.0242)	0.0378* (0.0219)
Central Highlands		0.0302* (0.0155)	0.0336* (0.0168)		-0.0435 (0.0443)	-0.0442 (0.0414)
South East		0.0325** (0.0123)	0.0352*** (0.0122)		0.0014 (0.0224)	0.0029 (0.0209)
Mekong River Delta		0.0892*** (0.0136)	0.0742*** (0.0144)		0.0794*** (0.0120)	0.0680*** (0.0123)
Constant	0.5487*** (0.0165)	0.5382*** (0.0126)	0.3115*** (0.0153)	0.3349*** (0.1259)	0.3179*** (0.1231)	0.1281 (0.0917)
Observations	56,718	56,718	56,718	56,718	56,718	56,718
R-squared	0.011	0.021	0.073			

* significant at 10%; ** significant at 5%; *** significant at 1%

Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.

Source: Estimation from the 2008 VHLSS.

Figure 1: The effect of the number of children on household smoking consumption for different household groups



Note: The graph presents the point estimates and the 90% confidence interval of the estimates of the number of children on the 2SLS regressions of the household smoking consumption. The sample is households with all the children. The full regressions are presented in Tables A.5 in Appendix
 Source: Estimation from the 2006 VHLSS.

Appendix

Table A.1. Summary statistics of individual-level data in the 2006 VHLSS

Explanatory variables	Type	Mean	Std. Dev.	Min	Max
Age	Binary	42.80	8.80	19	79
Urban (Urban = 1; Rural = 0)	Binary	0.210	0.408	0	1
Ethnic minorities (Vietnamese = 0; ethnic minorities = 1)	Binary	0.148	0.355	0	1
The number of completed education grades of husband	Discrete	7.568	3.383	0	12
Living with wife	Binary	0.984	0.124	0	1
Age of wife	Binary	40.20	9.77	16	69
The number of completed education grades of wife	Discrete	6.798	3.591	0	12
Red River Delta	Binary	0.235	0.424	0	1
North East	Binary	0.128	0.334	0	1
North West	Binary	0.036	0.185	0	1
North Central Coast	Binary	0.146	0.353	0	1
South Central Coast	Binary	0.082	0.275	0	1
Central Highlands	Binary	0.065	0.246	0	1
South East	Binary	0.120	0.325	0	1
Mekong River Delta	Binary	0.188	0.391	0	1
Number of observations		4,971			

Source: Estimation from the 2006 VHLSS

Table A.2. Summary statistics of household-level data in the 2008 VHLSS

Explanatory variables	Type	Mean	Std. Dev.	Min	Max
Urban (Urban = 1; Rural = 0)	Binary	0.267	0.443	0	1
Ethnic minorities (Vietnamese = 0; ethnic minorities = 1)	Binary	0.135	0.342	0	1
Living with father	Binary	0.880	0.324	0	1
Age of father	Discrete	46.56	11.00	18	88
The number of completed education grades of father	Discrete	5.171	4.613	0	12
Living with mother	Binary	0.976	0.154	0	1
Age of mother	Discrete	44.66	11.04	17	77
The number of completed education grades of mother	Discrete	4.598	4.407	0	12
Red River Delta	Binary	0.214	0.410	0	1
North East	Binary	0.132	0.338	0	1
North West	Binary	0.031	0.174	0	1
North Central Coast	Binary	0.122	0.327	0	1
South Central Coast	Binary	0.086	0.281	0	1
Central Highlands	Binary	0.060	0.237	0	1
South East	Binary	0.154	0.361	0	1
Mekong River Delta	Binary	0.202	0.401	0	1
Number of observations		56,718			

Source: Estimation from the 2008 VHLSS

Table A.3: OLS regressions of the presence of first-born twins

Explanatory variables	Dependent variable is the presence of first-born twins		
	Model 1	Model 2	Model 3
Ethnic minorities (Vietnamese = 0; ethnic minorities = 1)	0.00020 (0.00104)		0.00036 (0.00105)
Urban (urban=1, rural=0)	0.00151 (0.00095)		0.00137 (0.00097)
Red River Delta	Reference		
North East	0.00160 (0.00147)		0.00154 (0.00147)
North West	-0.00047 (0.00172)		-0.00039 (0.00172)
North Central Coast	-0.00072 (0.00152)		-0.00081 (0.00151)
South Central Coast	-0.00094 (0.00136)		-0.00094 (0.00135)
Central Highlands	-0.00156 (0.00126)		-0.00153 (0.00126)
South East	-0.00058 (0.00138)		-0.00057 (0.00138)
Mekong River Delta	-0.00055 (0.00125)		-0.00051 (0.00124)
Living with father		-0.00586 (0.00374)	-0.00572 (0.00377)
Living with father * Age of father		0.00012* (0.00007)	0.00012* (0.00007)
Living with father * The completed education grade of father		-0.00006 (0.00014)	-0.00005 (0.00014)
Living with mother		0.00044 (0.00381)	0.00083 (0.00380)
Living with mother * Age of mother		-0.00006 (0.00007)	-0.00006 (0.00007)
Living with mother * The completed education grade of mother		0.00012 (0.00015)	0.00006 (0.00015)
Constant	0.00525*** (0.00111)	0.00774*** (0.00289)	0.00748** (0.00307)
Observations	56,718	56,718	56,718
R-squared	0.0002	0.0002	0.0004

* significant at 10%; ** significant at 5%; *** significant at 1%
Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.
Source: Estimation from the 2008 VHLSS.

Table A.4: OLS regressions of ‘household having tobacco consumption’ on the presence of first-born twin controlled for the number of children

Explanatory variables	Sample of two children			Sample of three children		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Having the first-born twins (yes=1, no=0)	0.0351 (0.0337)	0.0461 (0.0365)	0.0397 (0.0333)	0.0231 (0.0468)	0.0203 (0.0477)	0.0388 (0.0528)
Ethnic minorities (Vietnamese = 0; ethnic minorities = 1)		0.0710*** (0.0096)	0.0535*** (0.0106)		0.0541*** (0.0130)	0.0459*** (0.0122)
Living with father			0.7162*** (0.0345)			0.6854*** (0.0587)
Living with father * Age of father			-0.0072*** (0.0007)			-0.0070*** (0.0013)
Living with father * The completed education grade of father			-0.0023 (0.0017)			-0.0022 (0.0017)
Living with mother			-0.4593*** (0.0377)			-0.5005*** (0.0651)
Living with mother * Age of mother			0.0086*** (0.0006)			0.0096*** (0.0012)
Living with mother * The completed education grade of mother			-0.0032* (0.0017)			-0.0013 (0.0021)
Urban (urban=1, rural=0)		-0.0647*** (0.0137)	-0.0555*** (0.0127)		-0.0536*** (0.0151)	-0.0456*** (0.0148)
Red River Delta	Reference					
North East		-0.0133 (0.0141)	-0.0190 (0.0136)		0.0044 (0.0259)	-0.0007 (0.0249)
North West		-0.0191 (0.0222)	-0.0231 (0.0231)		-0.0382 (0.0335)	-0.0393 (0.0337)
North Central Coast		-0.0052 (0.0252)	0.0015 (0.0253)		-0.0272 (0.0290)	-0.0203 (0.0297)
South Central Coast		0.0554** (0.0255)	0.0497** (0.0239)		0.0792*** (0.0268)	0.0732*** (0.0252)
Central Highlands		0.0412 (0.0278)	0.0396 (0.0278)		0.0263 (0.0252)	0.0326 (0.0259)
South East		0.0338* (0.0176)	0.0311* (0.0168)		0.0201 (0.0231)	0.0187 (0.0225)
Mekong River Delta		0.0743*** (0.0122)	0.0549*** (0.0135)		0.0843** (0.0313)	0.0715** (0.0294)
Constant	0.6525*** (0.0113)	0.6401*** (0.0117)	0.4073*** (0.0203)	0.6983*** (0.0072)	0.6776*** (0.0193)	0.4394*** (0.0365)
Observations	25,452	25,452	25,452	10,794	10,794	10,794
R-squared	0.000	0.010	0.055	0.000	0.011	0.051

* significant at 10%; ** significant at 5%; *** significant at 1%

Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.

Source: Estimation from the 2008 VHLSS.

Table A.5: First-stage OLS regressions of the number of children, and OLS reduced-form regressions of tobacco consumption

Explanatory variables	Dependent variable is the number of children			Dependent variable is 'household having tobacco consumption'		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Having the first-born twins (yes=1, no=0)	0.4754*** (0.0939)	0.5085*** (0.0815)	0.5122*** (0.0798)	0.0694*** (0.0229)	0.0774*** (0.0249)	0.0794*** (0.0247)
Ethnic minorities (Vietnamese = 0; ethnic minorities = 1)		0.4106*** (0.0391)	0.3686*** (0.0385)		0.0762*** (0.0083)	0.0564*** (0.0091)
Living with father			0.3135*** (0.0364)			0.7365*** (0.0259)
Age of father			0.0003 (0.0008)			-0.0072*** (0.0005)
The completed education grades of father			0.0004 (0.0027)			-0.0028*** (0.0008)
Living with mother			0.4429*** (0.0525)			-0.4226*** (0.0241)
Age of mother			-0.0027** (0.0010)			0.0080*** (0.0004)
The completed education grades of mother			-0.0162*** (0.0024)			-0.0027** (0.0012)
Urban (urban=1, rural=0)		-0.1807*** (0.0162)	-0.1524*** (0.0158)		-0.0681*** (0.0097)	-0.0554*** (0.0096)
Red River Delta	Reference					
North East		-0.0279 (0.0240)	-0.0416* (0.0243)		-0.0021 (0.0128)	-0.0053 (0.0120)
North West		0.0945 (0.0676)	0.0607 (0.0648)		-0.0148 (0.0184)	-0.0210 (0.0193)
North Central Coast		0.2304*** (0.0351)	0.2315*** (0.0325)		0.0043 (0.0221)	0.0105 (0.0220)
South Central Coast		0.2709*** (0.0273)	0.2462*** (0.0270)		0.0788*** (0.0198)	0.0760*** (0.0196)
Central Highlands		0.6741*** (0.0725)	0.6348*** (0.0708)		0.0590*** (0.0144)	0.0541*** (0.0159)
South East		0.2849*** (0.0451)	0.2639*** (0.0443)		0.0447*** (0.0122)	0.0438*** (0.0122)
Mekong River Delta		0.0900*** (0.0275)	0.0511* (0.0291)		0.0931*** (0.0141)	0.0759*** (0.0148)
Constant	2.1659*** (0.0174)	2.0056*** (0.0138)	1.4880*** (0.0315)	0.6509*** (0.0094)	0.6230*** (0.0098)	0.3586*** (0.0156)
Observations	56,718	56,718	56,718	56,718	56,718	56,718
R-squared	0.001	0.052	0.068	0.000	0.013	0.068
Cragg-Donald weak identification test	63.2	76.2	78.6			

* significant at 10%; ** significant at 5%; *** significant at 1%

Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.

Source: Estimation from the 2008 VHLSS.

Table A.6: 2SLS regressions of dependent variable 'household having smoking consumption' with interactions

Explanatory variables	Dependent variable 'household having smoking consumption' (yes=1, no=0)					
The number of children	0.1117 (0.0958)	0.1610 (0.1769)	0.1171 (0.0818)	0.1280* (0.0758)	0.1243*** (0.0431)	0.1807** (0.0717)
Age of father * The number of children	0.0011 (0.0018)					
Age of mother * The number of children		-0.0001 (0.0037)				
The completed education grades of father * The number of children			0.0089 (0.0138)			
The completed education grades of mother * The number of children				0.0061 (0.0145)		
Urban (urban=1, rural=0) * The number of children					0.1360 (0.1859)	
Ethnic minorities * The number of children						-0.2133 (0.1533)
Ethnic minorities (Vietnamese = 0; ethnic minorities = 1)	-0.0006 (0.0231)	-0.0008 (0.0229)	0.0097 (0.0285)	0.0091 (0.0288)	0.0066 (0.0194)	0.5306 (0.3656)
Living with father	0.6755*** (0.0411)	0.6867*** (0.0455)	0.6907*** (0.0361)	0.6874*** (0.0360)	0.6920*** (0.0332)	0.6863*** (0.0368)
Age of father	-0.0090*** (0.0033)	-0.0072*** (0.0008)	-0.0070*** (0.0007)	-0.0071*** (0.0006)	-0.0073*** (0.0005)	-0.0071*** (0.0005)
The completed education grade of father	-0.0027*** (0.0010)	-0.0029*** (0.0009)	-0.0222 (0.0299)	-0.0033*** (0.0011)	-0.0030*** (0.0010)	-0.0027*** (0.0009)
Living with mother	-0.4809*** (0.0384)	-0.4897*** (0.0524)	-0.4821*** (0.0427)	-0.4814*** (0.0455)	-0.4861*** (0.0319)	-0.4877*** (0.0333)
Age of mother	0.0082*** (0.0005)	0.0087 (0.0065)	0.0083*** (0.0006)	0.0083*** (0.0005)	0.0083*** (0.0004)	0.0086*** (0.0004)
The completed education grade of mother	-0.0003 (0.0017)	-0.0002 (0.0017)	0.0003 (0.0017)	-0.0126 (0.0297)	0.0001 (0.0018)	-0.0014 (0.0014)
Urban (urban=1, rural=0)	-0.0316** (0.0157)	-0.0316** (0.0156)	-0.0288* (0.0169)	-0.0301* (0.0168)	-0.3121 (0.3713)	-0.0318** (0.0158)
Red River Delta	Reference					
North East	0.0005 (0.0111)	0.0013 (0.0117)	-0.0006 (0.0113)	-0.0005 (0.0114)	0.0023 (0.0118)	-0.0154 (0.0114)
North West	-0.0317 (0.0250)	-0.0304 (0.0239)	-0.0310 (0.0231)	-0.0292 (0.0231)	-0.0244 (0.0242)	-0.0334** (0.0168)
North Central Coast	-0.0260 (0.0225)	-0.0254 (0.0221)	-0.0282 (0.0220)	-0.0268 (0.0224)	-0.0266 (0.0226)	-0.0360 (0.0247)
South Central Coast	0.0359 (0.0235)	0.0379* (0.0225)	0.0350 (0.0222)	0.0374* (0.0220)	0.0356 (0.0241)	0.0304 (0.0235)
Central Highlands	-0.0466 (0.0436)	-0.0443 (0.0415)	-0.0446 (0.0421)	-0.0411 (0.0392)	-0.0449 (0.0412)	-0.0094 (0.0286)
South East	-0.0001 (0.0213)	0.0032 (0.0219)	0.0022 (0.0220)	0.0036 (0.0200)	0.0008 (0.0213)	-0.0028 (0.0225)
Mekong River Delta	0.0664*** (0.0131)	0.0684*** (0.0146)	0.0674*** (0.0128)	0.0671*** (0.0135)	0.0638*** (0.0139)	0.0594*** (0.0111)
Constant	0.2124 (0.1786)	0.1160 (0.3495)	0.1956 (0.1330)	0.1771 (0.1296)	0.1938** (0.0765)	0.0712 (0.1236)
Observations	56,718	56,718	56,718	56,718	56,718	56,718

* significant at 10%; ** significant at 5%; *** significant at 1%

Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.

Source: Estimation from the 2008 VHLSS.

Table A.7: 2SLS regressions of ‘household having smoking consumption’ for different household groups

Explanatory variables	Dependent variable is “Household has tobacco consumption” in different samples								
	Urban households	Rural households	Father grade 0-7	Father grade 7-12	Mother grade 0-7	Mother grade 8-12	Father age below 40	Father age 40 - 49	Father age above 49
The number of children	0.2563 (0.1861)	0.1254*** (0.0446)	0.1500** (0.0760)	0.1690 (0.1063)	0.1610** (0.0668)	0.1437 (0.1016)	0.1475 (0.0922)	0.1830* (0.1013)	0.1255 (0.0787)
Living with father	0.6920*** (0.0670)	0.6953*** (0.0253)	0.7213*** (0.0251)		0.6466*** (0.0350)	0.8420*** (0.0929)	1.0886*** (0.2185)		
Age of father	-0.0082*** (0.0010)	-0.0070*** (0.0004)	-0.0080*** (0.0005)	-0.0022 (0.0018)	-0.0067*** (0.0005)	-0.0076*** (0.0012)	-0.0161** (0.0069)	-0.0035 (0.0024)	-0.0032** (0.0013)
Completed education grades of father	-0.0028 (0.0018)	-0.0027*** (0.0009)	0.0039* (0.0022)	-0.0219*** (0.0048)	-0.0047*** (0.0013)	-0.0117*** (0.0037)	-0.0013 (0.0016)	-0.0052 (0.0034)	-0.0043*** (0.0012)
Living with mother	-0.4330*** (0.0447)	-0.5018*** (0.0376)	-0.5654*** (0.0657)	-0.1326*** (0.0461)	-0.5042*** (0.0490)		-0.4176*** (0.0458)	-0.2589*** (0.0671)	-0.2702** (0.1267)
Age of mother	0.0069*** (0.0009)	0.0088*** (0.0005)	0.0095*** (0.0006)	0.0019 (0.0013)	0.0084*** (0.0006)	0.0069*** (0.0009)	0.0121*** (0.0006)	0.0028** (0.0014)	0.0040** (0.0019)
Completed education grades of mother	0.0009 (0.0033)	-0.0005 (0.0015)	-0.0018 (0.0016)	-0.0015 (0.0050)	0.0047** (0.0021)	-0.0121** (0.0050)	-0.0023* (0.0014)	0.0063 (0.0056)	-0.0005 (0.0021)
Urban (urban=1, rural=0)			-0.0343*** (0.0133)	0.0018 (0.0165)	-0.0365*** (0.0124)	0.0090 (0.0194)	0.0018 (0.0186)	-0.0257 (0.0335)	-0.0656*** (0.0153)
Red River Delta	Reference								
North East	-0.0265 (0.0197)	0.0109 (0.0133)	0.0119 (0.0113)	-0.0043 (0.0128)	0.0081 (0.0120)	-0.0041 (0.0137)	-0.0057 (0.0202)	0.0064 (0.0195)	0.0139 (0.0136)
North West	-0.0309 (0.0385)	-0.0238 (0.0258)	-0.0248 (0.0268)	-0.0267 (0.0258)	-0.0158 (0.0289)	-0.0478* (0.0259)	-0.0480* (0.0285)	0.0016 (0.0340)	-0.0343 (0.0324)
North Central Coast	-0.0738 (0.0560)	-0.0118 (0.0211)	-0.0096 (0.0278)	-0.0398 (0.0324)	-0.0142 (0.0262)	-0.0300 (0.0318)	0.0031 (0.0252)	-0.0462 (0.0380)	-0.0340 (0.0315)
South Central Coast	-0.0540 (0.0723)	0.0682*** (0.0204)	0.0655** (0.0285)	-0.0184 (0.0343)	0.0640** (0.0256)	-0.0278 (0.0355)	0.0672*** (0.0212)	-0.0202 (0.0396)	0.0546 (0.0404)
Central Highlands	-0.0938 (0.1048)	-0.0285 (0.0376)	-0.0299 (0.0598)	-0.0675 (0.0568)	-0.0450 (0.0540)	-0.0297 (0.0473)	0.0062 (0.0346)	-0.1040 (0.0781)	-0.0553 (0.0721)
South East	-0.0570 (0.0586)	0.0263 (0.0209)	0.0342 (0.0239)	-0.0531* (0.0301)	0.0241 (0.0229)	-0.0399 (0.0282)	0.0346** (0.0158)	-0.0200 (0.0309)	-0.0109 (0.0436)
Mekong River Delta	0.0227 (0.0469)	0.0764*** (0.0152)	0.0837*** (0.0114)	0.0282 (0.0224)	0.0848*** (0.0103)	0.0022 (0.0198)	0.0483** (0.0219)	0.0808*** (0.0212)	0.0832*** (0.0270)

Explanatory variables	Dependent variable is "Household has tobacco consumption" in different samples								
	Urban households	Rural households	Father grade 0-7	Father grade 7-12	Mother grade 0-7	Mother grade 8-12	Father age below 40	Father age 40 - 49	Father age above 49
Ethnic minorities (ethnic minorities = 1, Kinh = 0)	-0.0755 (0.0470)	0.0163 (0.0191)	-0.0046 (0.0348)	0.0184 (0.0174)	-0.0084 (0.0268)	0.0386* (0.0200)	0.0162 (0.0408)	-0.0499 (0.0474)	0.0153 (0.0338)
Constant	-0.0190 (0.2673)	0.1599** (0.0745)	0.1450 (0.1018)	0.6884** (0.3094)	0.1287 (0.0957)	-0.2062 (0.2122)	-0.1406 (0.1708)	0.5614** (0.2806)	0.6840*** (0.1963)
Observations	14,258	42,460	37,599	19,119	39,178	17,540	20,919	18,282	17,517

* significant at 10%; ** significant at 5%; *** significant at 1%

Robust standard errors in parentheses. The standard errors are corrected for sampling and cluster correlation.

Source: Estimation from the 2008 VHLSS.