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## **The Impact of Human Development on Cigarettes Consumption in Malaysia**

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### **ABSTRACT**

This paper estimates the impact of human development indicators on cigarette consumption in Malaysia from 1980 to 2012. To determine the long run relationship among the variables, ARDL bound testing approach is applied since the tested variables are a mixed of I(0) and I(1). Results show that life expectancy, -16.3828 is negatively related and highly significant in determining the cigarette consumption in Malaysia. Even though the other human development indicators are insignificant in this study, an increase in the level of life expectancy is indirectly due to better living standard and improved education. This study has an interesting implication for Malaysia's policy in controlling cigarettes consumption. Higher taxation on cigarettes may not the only effective policy, but greater emphasis on factors that lead to improvement in life expectancy will likely reduce cigarette consumption in Malaysia.

**JEL Classification:** I15, I18

**Keywords:** Cigarettes Consumption, Human Development, Life Expectancy

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## INTRODUCTION

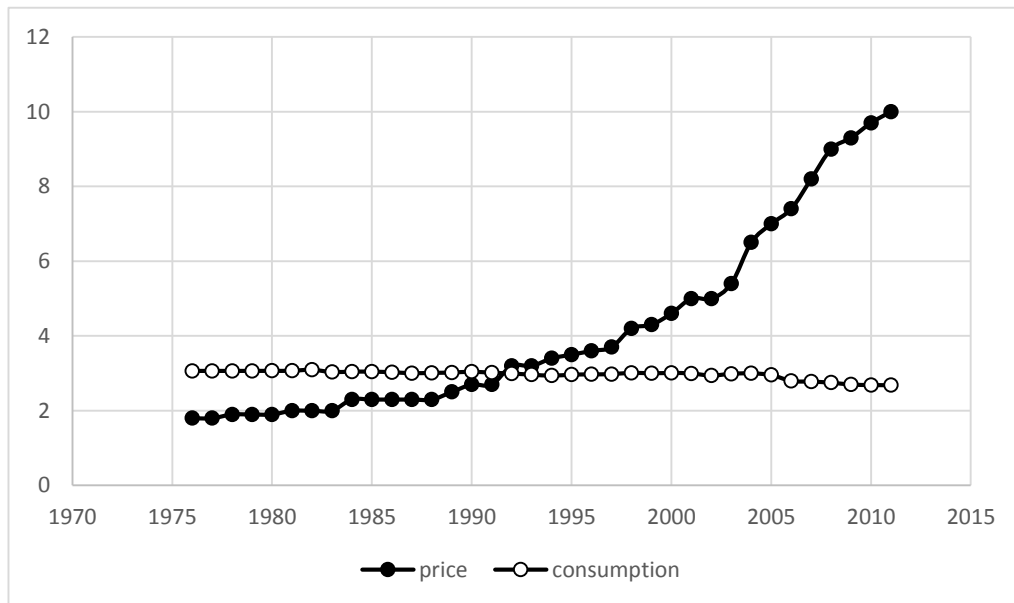
The undesired effect of tobacco consumption is a global concern and it is a common problem in both developed and developing countries. Annually, tobacco usage precipitates more than five million deaths worldwide and this is expected to increase to more than eight million deaths every year by 2030. The current trend suggests that a significant number of casualties are likely to be in developing countries. Based on a World Health Organization report (WHO, 2013), smoking prevalence in developed countries has displayed an overall declining trend for decades. For instance, the percentage of male smokers in developed countries such as New Zealand (19.4%), Australia (19.9%), Canada (19.7%), Japan (20%), the United Kingdom (21%), the United States (21.6%), and Sweden (23%) has dropped significantly. However, the number of male smokers in developing countries such as Indonesia (67%), Russia (60.2%), Armenia (55.7%), Belarus (51.1%), Bulgaria (50%), the Philippines (47.6%), and Malaysia (43.9%) shows an increasing trend (WHO, 2013).

Many studies have analysed the determinants of cigarette consumption in Malaysia (Lim *et al.*, 2009; Kin & Lian, 2008; Khor, Foong, & Farizah, 2005). However, unfortunately, these researchers have not looked at the role of human development in much detail. Hence, this study examines the role of human development in influencing cigarette consumption in Malaysia by using time series data analysis during the years of 1976 to 2011. This study is an important endeavour to provide further empirical evidence and promote the significance of the relationship between human development indicators and cigarette consumption in Malaysia. It may offer worthwhile information to policymakers in formulating public health policy related to cigarettes by providing compelling empirical proof on the impact of better education, life expectancy, and higher standards of living, which are among the indicators of human development on smoking. This paper makes three contributions. First, it is the first systematic study to analyse the role of human development indicators on cigarette consumption in Malaysia. Second, the ARDL bounds test is used to verify the relationship between cigarette consumption as a dependent variable and human development factors. Finally, this study confirms an inverse relationship between human development indicators and cigarette consumption in Malaysia.

## BACKGROUND

Generally, smoking is defined as the inhalation of smoke of burning tobacco enclosed in cigarette, cigars, and pipes. A person who smokes regularly or occasionally is a smoker. Definitions of smokers vary from one country to another. In the case of Malaysia, the definition of a smoker is based on the second National Health and Morbidity Survey (NHMS) in 1996, where a person who has smoked at least once in his/her lifetime is considered to be a smoker. Hence, the operational definition of always and current smokers in this study follows the definition of NHMS 2.

Cigarette consumption in Malaysia has fluctuated to some extent in the past 30 years, showing a slight downward trend. Figure 1 below illustrates the trend of cigarette prices and consumption in Malaysia from 1976 to 2011.



**Figure 1** Trend of prices and consumption of cigarette in Malaysia (1976-2011)

Although the comparison of the NHMS in 1996 and that in 2006 shows an overall decreasing trend in the prevalence of smoking with 24.8% and 21%, respectively, the Ministry of Health Malaysia (2011) announced that tobacco consumption remains the main public health issue in Malaysia. Approximately 24% of Malaysian adults, which includes 43.9% men and 1.0% women aged 15, are current smokers of tobacco. The report by the Global Adult Tobacco Survey (MOH, 2011) shows that current smokers normally spend RM 178.8 monthly on cigarettes; meanwhile, it is estimated 7% of Malaysian current smokers' expenditure on cigarettes leads to shortage of money for food.

On the other hand, the presence of a potential group of smokers will exacerbate the status quo of smoking prevalence in Malaysia. According to Erickson, Mackay, and Ross (2012), Malaysia is among the countries with the highest rate of smoking youths in the age range between 13 and 15 (36.6%) and in turn, this group are likely to be potential future consumers of cigarettes. Moreover, according to statistics from the Ministry of Health Malaysia (2006), smoking-related diseases remain the most significant causes of death in Malaysian hospitals, comprising 35% of in-hospital deaths and 15% of hospitalisations. Treating smoking-related illnesses not only causes spending valuable resources but also leads to opportunity costs. In the case of Malaysia, the direct cost of smoking was 922 million USD in 2007, large enough to fund the Malaysian Rural Development Programme.

According to the report of the South East Asia Tobacco Control Alliance (2007), approximately 33% of reductions in life expectancy and 20% of disability-adjusted life years (DALYs) are caused by smoking-related diseases. Cardiovascular diseases are recognised as the main causes of reduction in life

expectancy and DALYs in Malaysia. Hence, tobacco consumption in Malaysia has led to three dominant smoking-related diseases (chronic obstructive pulmonary disease, ischemic heart disease, and lung cancer), amounting to a total cost of RM 2.92 billion, which was equal to 26.1% of the Ministry of Health's budget and 0.7% of Malaysia's GDP in 2006 (SEATCA, 2007).

A study on Malaysian smokers concluded that cigarette demand is inelastic: a 25% increase in cigarette tax raises the price of cigarettes by 5.9% and reduces consumption by 3.4% (Ross & Al-Sadat, 2007). Another study on demand for cigarettes in Malaysia by Norashidah, Raja Abdullah, and Yahya (2013) estimated the price elasticity of demand for cigarettes in the long run and short run at -0.49 and -0.28, respectively. On the other hand, international research suggests that if cigarette prices rise by 10%, this could bring about a 4–8% reduction in cigarette consumption (Gallus, 2006; Huang, Yang, & Hwang, 2004). The inelasticity of demand for cigarettes in Malaysia may be attributed to the effect of addiction, low level of health literacy that leads to unawareness of the impact of tobacco on human health, and the availability of illegal tobacco as a substitute for domestic and imported cigarettes.

Differences in socioeconomic status may also influence the responsiveness of demand for cigarettes. Individuals' socioeconomic status can be measured through basic factors such as educational status, marital standards, a country's economic condition, and citizens' social well-being in a nation (Adams *et al.*, 2013). In this regard, the United Nations Development Program (UNDP) provides an indicator known as the Human Development Index (HDI), which focuses on a different aspect of human development. The HDI consists of proxies that measure educational attainment, well-being (standards of living), and length of life. It thus provides a robust understanding about human development (Malik, 2013). According to the UNDP report in 2013, the HDI value in Malaysia increased from 0.563 to 0.769 between 1980 and 2012. Malaysia's HDI value holds a significant position among high human development countries (64<sup>th</sup> place out of 187 countries).

## LITERATURE REVIEW

Many discussions have attempted to develop a functional form of cigarette consumption within multivariate analysis (Ferrucci *et al.*, 1999; Weir & Dunn, 1970). As a general overview, cigarette consumption is considerably lower among individuals who belong to a higher occupational class, live in better housing, own cars, have jobs, and live in better environments (Jarvis & Wardle, 2005). Although the composition of indices such as education, mean years of schooling, life expectancy at birth, income, and occupation have often been used to measure socioeconomic status, it is highly common to study each component separately because each variable describes a different socioeconomic feature (Zhu, Giovino, Mowery, & Eriksen, 1996).

A considerable number of studies (e.g. Pednekar, Hebert, & Gupta. 2009; Skatun, 2010) have discussed that life expectancy is negatively affected by smoking; the impact of smoking-related diseases results in deaths, which lowers the overall level of life expectancy. Individuals who have never smoked have

higher life expectancies than both former and current smokers. Rogers and Powell-Griner (1991) discussed the relationship between life expectancy and cigarette consumption, claiming that the life expectancies of current and former smokers are lower than those who have never smoked. In fact, individuals with high dependency on cigarettes at age 25 should expect at least a 25% shorter life than non-smokers. Several surveys in the scientific community have been conducted to explain the effect of cigarette consumption on life expectancy, stillbirths, and morbidity.

Another HDI variable associated with the prevalence of smoking is the smoker's level of education. However, the association between education and smoking does not follow a certain pattern. In this regard, Grossman (2006) discussed the influence of education on health and claimed that the relationship between health and education is positive and statistically significant. Nevertheless, some researchers do not maintain the existence of a linkage between health status and educational attainment. For example, McCrary and Royer (2006) found a statistically insignificant impact of education on health. In other words, the prevalence of smoking is sometimes higher among smokers with a higher level of education and even lower among those with lower education. This finding seems to be counterintuitive to studies that claim the existence of an inverse relationship between education and smoking (Tenn, Herman, & Wendling, 2010). However, based on data from National Health Interview Survey (NHIS), USA between 1983 and 1991, Zhu *et al.* (1996) found that people with 0 to 8 years of schooling have less desire to smoke and even if they do smoke, they are more likely to stop smoking than people with 9 to 11 years of education. According to Zhu *et al.* (1996), education is the best socio demographic characteristic for predicting the pattern of smoking. In some studies where a negative relationship between education and cigarette consumption has been found, the education variables are categorised based on years of schooling.

For instance, individuals with fewer than 12 years of education are categorised as less than high school graduates, while a high school graduate is someone with 12 years of education, and a college graduate is a person with 16 years of schooling (Caldwell, 1979; Escobedo, Anda, Smith, Remington, & Mast, 1990). In 1996, the Ministry of Health in Malaysia published a report which stated that the majority of heavy smokers began smoking at an early age, thus increasing their chances of contracting diseases caused by tobacco. Khairani, Norazua, and Zaiton (2007) showed that 21% of boys in Malaysia started consuming cigarettes at an age of 12 years or younger. The results of their study indicated that education has a positive relationship with smoking and emphasised the need to reform the educational system to warn primary school pupils about the dangers of smoking. This is an important initiative to deter smoking among children and adolescents. Accordingly, students should learn how to say "NO" assertively and be influential among their peers to discourage smoking. Above all, they should be edified that smoking is not a way to reduce stress and depression (Khairani, Norazua, & Zaiton 2007). Other studies have shown that the presence of a tobacco environment whether in school, home, family, or society has considerable effects on the initial year of smoking among schoolboys. Malaysian case studies have claimed that television, movies, and other electronic media influence children to smoke and this situation demands

parental responsibilities and adult supervision to educate their children on the undesirable habit of smoking (Hwang, Yeagley, & Petosa, 2004). Reininger *et al.* (2005) claimed that adolescents like to be more accepted by friends and peer groups, lack the ability to control their impulsive behaviours during these years, and have the tendency to try new experiences. Therefore, they are inclined to indulge in risky behaviour such as smoking. This theory explains the high level of curiosity (69%) among schoolboys in Malaysia.

Generally speaking, the existence of an inverse correlation between smoking and HDI variables has been indicated by studies in the U.S., South Korea, and many EU countries. Studies in South Korea have reported that cigarette consumption is higher among lower income groups in both men and women (Kim *et al.*, 2006). In another study, Cho, Song, Smith, and Ebrahim (2004) conducted a survey to find the effects of HDI indicators based on the distribution of monthly salary and how this influences smokers' behaviour. They found that the rate of smoking cessation decreased and the prevalence of cigarette consumption increased with lower levels of income. Thus, differences in socioeconomic status can change the amount of cigarette consumption.

## METHODOLOGY

Based on neoclassical theory of demand, the relationship between cigarette consumption (CO) and human development variables such as Gross Domestic Product per capita (GDP), which represents standards of living, Life expectancy at birth (LIFE), Educational level (EDU) at the tertiary level, and Price of Cigarettes (PR) can be presented as below:

$$CO_t = \beta_0 + \beta_1 LIFE_t + \beta_2 EDU_t + \beta_3 PR_t + \beta_4 GDP_t + u_t \quad [1]$$

To determine the relationship between cigarette consumption and these human development indicators, the ARDL bounds testing approach is applied (Pesaran, Shin, & Smith, 2001). This cointegration approach is important because it can be applied to analyse variables even when they are both I(1) and I(0). ARDL avoids the well-known conventional approach associated with variables being integrated of the same order. All the variables in this model are transformed in natural logarithm:

$$\begin{aligned} \Delta \ln CO_t = & \gamma_0 + \sum_{i=1}^p \beta_1 \Delta \ln CO_{t-i} + \sum_{i=0}^p \beta_2 \Delta \ln LIFE_{t-i} + \sum_{i=0}^p \beta_3 \\ & \Delta \ln GDP_{t-i} + \sum_{i=0}^p \beta_4 \Delta \ln EDU_{t-i} + \sum_{i=0}^p \beta_5 \Delta \ln PR_{t-i} + \alpha_1 \ln CO_{t-1} + \\ & \alpha_2 \ln LIFE_{t-1} + \alpha_3 \ln GDP_{t-1} + \alpha_4 \ln EDU_{t-1} + \alpha_5 \ln PR_{t-1} + u_t \end{aligned} \quad [2]$$

In equation 2,  $\beta_1$  to  $\beta_5$  signify the short-run parameters and  $\alpha_1$  to  $\alpha_4$  are the long-run parameters. There is no cointegration in the null hypothesis,  $H_0: \beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = 0$ ; the alternative hypothesis is that there is cointegration  $H_1: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq 0$ . The rejection of the null depends on the F-test and the critical bound tabulated value for small sample size according to Narayan (2005). Along-run relationship between the variables exists if the calculated value of the F-statistic is greater than the upper critical bound but less than the lower critical

bound. However, a long-run relationship does not exist or is inconclusive if the calculated value of the F-statistic is between these critical bounds (Hassan & Kalim, 2012).

If a long-run equilibrium relationship exists between the variables, equation [2] can be expressed as

$$\ln CO_t = \gamma_0 + \sum_{i=1}^{p+1} \beta_1 \ln CO_{t-i} + \sum_{i=1}^{p+1} \beta_2 \ln GDP_{t-i} + \sum_{i=0}^{p+1} \beta_3 \ln LIFE_{t-i} + \sum_{i=1}^{p+1} \beta_4 \ln EDU_{t-i} + \sum_{i=0}^{p+1} \beta_5 PR_{t-i} + u_t \quad [3]$$

Following Shrestha and Chowdhury (2005), the ARDL method estimates the (p+1)k number of regressions in order to obtain the optimal lags for each variable, where p is the maximum number of lags to be used and k is the number of variables in the equation. The optimal lag can be selected by using model selection criteria such as Schwartz-Bayesian Criteria. According to Narayan (2005), the maximum lags for small sample size are two.

An error correction model (i.e. the ARDL) is used to investigate the short-run relationship as follows:

$$\ln CO_t = \gamma_2 + \sum_{i=1}^p \beta_6 \Delta \ln CO_{t-i} + \sum_{i=0}^p \beta_7 \Delta \ln LIFE_{t-i} + \sum_{i=0}^p \beta_8 \Delta \ln GDP_{t-i} + \sum_{i=0}^p \beta_9 \Delta \ln EDU_{t-i} + \sum_{i=0}^p \beta_{10} \Delta PR_{t-i} + \varphi ECT_{t-i} + u_t \quad [4]$$

The lagged error term in equation [4] explains the disequilibrium of equation [2].

The data were obtained from various sources: the World Bank Development Indicators, Department of Statistics, Malaysia, Royal Malaysia Customs, Confederation of Malaysian Tobacco Manufacturers, and Ministry of Health, Malaysia.

### Results and Discussion

The results of the stationarity tests (ADF test and Phillips–Perron test) are shown in Table 1.

Both tests revealed that cigarette consumption (CO) is stationary in first differences, which means CO is I(1). The results demonstrate that all other variables are stationary in first differences; however, life expectancy (LIFE) is found to be significant at a level and thus it is I(0). Thus, following Narayan (2005), it is possible to apply the ARDL approach to this model because the variables are both I(0) and I(1).

**Table 1** Unit Root Test Result

Variable	ADF	PP
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Level I(0)	Intercept	Trend and Intercept	Intercept	Trend and Intercept
CO	0.72	-0.955	0.777	-1.075
GDP	-1.1248	-1.714	-1.089	-1.926
PR	1.647	-1.852	1.930	-1.779
LIFE	-5.229***	-5.487***	-6.869***	-4.233**
EDU	-1.4982	-0.8861	-1.633	-1.113
First Difference I(1)	Intercept	Trend and Intercept	Intercept	Trend and Intercept
CO	-4.971***	-5.242***	-4.975***	-5.207***
GDP	-4.83***	-4.822***	-4.838***	-4.822***
PR	-6.299***	-7.073***	-6.277***	-7.243***
LIFE	-3.140**	2.171	-2.581	1.663
EDU	-4.702***	-4.8699***	-4.618***	-4.783***

Note: \*\*\*, \*\*, and \* denote statistical significance at 1%, 5%, and 10% respectively

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The analysis proceeds by testing for long-run cointegrating relationships between the variables using the bounds testing approach proposed by Pesaran *et al.* (2001). Results in Table 2 reveal the existence of a long-run relationship for the model. They show that the computed F-statistic is 6.8682. The relevant critical bounds at the 1% level (with an unrestricted intercept and no trend) are 4.768 and 6.670 for the lower and upper bounds, respectively. Clearly, the computed F-statistic is higher than the critical value of the upper bound; hence, the null hypothesis of no long-run cointegration relationship between the variables can be rejected. Having established the presence of a long-run association between cigarette consumption and the HDI variables, the model can be used to estimate the long-run and short-run parameters.

**Table 2** ARDL Bound Test for Cointegration

F- Statistics	1%		5%		10%	
	Critical Value		Critical Value		Critical Value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6.8682***	4.768	6.670	3.354	4.774	2.752	3.994

K=4, N=34

Note: The critical value according to (Narayan, 2005) (Case III: Unrestricted intercept and on trend)

Table 3 demonstrates the selected long-run ARDL model based on Akaike's Information Criterion. The long run results show that life expectancy at birth, as one of the HDI indicators, is negatively and highly significantly related to cigarette consumption in Malaysia. Price of cigarettes is negative and is a significant determinant of demand for cigarette, and this concurs with the theory. The coefficient of price which is elasticity of demand is -0.2, meaning an



increase of 1% in cigarette price will reduce demand by 0.2% and it is inelastic. However, GDP per capita and level of education are insignificant in this model.

**Table 3** Long Run Model (Dependent Variable: LCO)

Variable	Coefficient	Standard Error	T-Ratio ( <i>p-value</i> )
LIFE	-16.3828***	3.4884	-4.6964 (0.000)
EDU	0.34491	0.21698	1.5896 (0.126)
GDP	0.057092	0.20691	0.27592 (0.785)
PR	-0.20544	0.24371	-0.84296 (0.0408)
INTP	75.2338	13.9090	5.04090 (0.000)

Note: \*\*\*, \*\*, and \* denote statistical significance at 1%, 5%, and 10% respectively

Table 4 demonstrates the estimated ARDL error correction model. The results illustrate that the error correction term ( $ECM_{t-1}$ ) indicating the evidence of causality in at least one direction. The coefficient of -0.954 indicates high rate of convergence to equilibrium. Precisely, it shows the long run deviation from the consumption of cigarette is corrected by 95.4% annually. In the short run only life expectancy is a significant variable in determine demand for cigarette. Price is not a significant determinant in the short run since cigarette is an addictive substance, response to increased prices will occur more slowly since smokers need a longer time to change their addictive behaviour.

**Table 4** Short Run Model (Dependent Variable: LCO)

Variable	Coefficient	Standard Error	T-Ratio ( <i>p-value</i> )
$\Delta GDP$	0.0545	0.1924	2.5690 (0.014)
$\Delta EDU$	0.3289	0.1918	1.7151 (0.099)
$\Delta LIFE$	-922.6100***	258.9200	-3.5633 (0.002)
$\Delta LIFE1$	695.92***	221.7300	3.1385 (0.004)
$\Delta PR$	0.5883**	0.2214	2.6570 (0.014)
$\Delta PR1$	0.34249	0.2714	1.2620 (0.219)
$\Delta INTP$	71.7504***	22.6105	3.1733 (0.004)
$Ecm(-1)$	-0.95370***	0.21675	-4.4001 (0.000)

Note: \*\*\*, \*\*, and \* denote statistical significance at 1%, 5%, and 10% respectively

The model passed all the tests of autocorrelation, heteroscedasity and normality. In other words, the model has neither serial correlation nor heteroscedasticity and the error is normally distributed. Moreover, the overall goodness of fit of the model is high (R-Square equal to 0.9781). Results of the diagnostic tests are shown in Table 5.

**Table 5** Diagnostic Tests

	LM Version	F version
Serial	CHSQ (1) = 0.65033 (0.420)	F(1,21) = 0.42217 (0.523)

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correlation		
Normality	CHSQ (2) = 1.1485(0.563)	Not applicable

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## CONCLUSION

Generally, in Malaysia, when the HDI value starts to move upward, cigarette consumption begins a downward trend. This paper is among the few studies that relate cigarette consumption to several human development indicators simultaneously. It sought to highlight the importance of human development indicators in reducing cigarettes consumption and become an alternative policy of controlling smoking prevalence in Malaysia.

The HDI is a proxy of socioeconomic status, which in turn summarises the condition of citizens' health within a country. In this study, life expectancy, education level and income per capita were chosen as proxies of the HDI. A higher HDI level shows better access to knowledge, a healthier lifestyle, and an ascending trend of living standards. Nevertheless, a low HDI level increases the risk of death because of its association with malnutrition and a higher rate of infectious and non-communicable diseases. Currently, Malaysia and other developing nations are facing numerous health problems related to smoking. Higher excise tax on cigarette is one the tobacco control policies implemented to reduce demand for cigarettes. However implementation of higher taxes alone might decrease demand for legal cigarettes but there is also a potential of increase demand for illicit cigarettes. A study by Wilcox, Kim & Sen (2009) shows that for a product yielding the same benefit, consumer will typically consider a lower-priced option even though it is illegal. Illicit cigarettes are unregulated by the government or health authorities and may have higher nicotine and tar content, which in turn leads to lethal tobacco-related diseases and incur higher costs for the health sector (Cebula, 2011; Farrelly, 2001; Adams *et al.*, 2013).

This study found that an improvement in human development indicators, as shown by the highly significant level of life expectancy is another area in which governments can improve their efforts in tobacco control. Greater emphasis on healthier lifestyles and increasing awareness of tobacco's health effects among Malaysians will be highly likely to reduce cigarette consumption in Malaysia.

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