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Distribution of Household Tobacco Expenditure and Household Affordability of Tobacco Products in Malaysia

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Tobacco epidemic is a public health threat in Malaysia. In this paper, we describe the distribution of household tobacco expenditures across different living standards from 1993 to 2014 and examine household affordability of tobacco products in Malaysia. The study reveals that the proportion of households with tobacco expenditure was declining between 1993 to 2004 but resurged in 2009 for all consumption quintiles. Tobacco expenditure had increased from USD24 in 1993 to USD34 in 2014 with the richest quintile had been having the highest tobacco expenditure. This was further corroborated by the concentration indices that tobacco expenditure was more concentrated among the richest. Despite of the increasing tobacco expenditure, the household tobacco expenditure share representing household tobacco affordability had been declining. In short, the tobacco products were becoming more affordable in Malaysia although the household tobacco expenditure had increased from 1993 to 2014.

I. INTRODUCTION

Consumption of tobacco and tobacco products cause the deaths of about 7 million people annually, with approximately 6 million deaths among smokers and the remaining deaths due to second-hand tobacco exposure (WHO, 2012). There is widespread recognition of the dangers of tobacco consumption resulting in international and national tobacco control measures. These measures have led to declining smoking prevalence in Europe and the United States of America since 2015 (WHO, 2016). However, this decline has not been experienced in other parts of the world, especially in low- and middle- income countries, where high rates of tobacco consumption continue to use up scarce household resources.

Malaysia is an upper-middle income country of 32 million people which has experienced a gradual increase in tobacco consumption among the adult male population from 36.4% in 2011 to 42.4% in 2015 (NHMS, 2015; Lim *et al.*, 2013). The high burden of tobacco consumption has significant health and economic impact. Cancers of trachea, bronchus, and lung are the most common cancers among males and these cancers accounted for 24.6% of all cancer mortality among males in 2014 (Kan and Chan, 2016). Among females, lung cancer is the second most common cancer leading to death after breast cancer with age-standardised incidence at 7.6 in 2006 (Kan and Chan, 2016; Omar *et al.*, 2006). A cost of illness study estimated that the medical costs related to the treatment of lung cancer, chronic pulmonary airway disease and ischemic heart disease totalled USD 790 million in 2006, or 16.5% of the GDP of the country (Aljunid, 2006).

Over the years, Malaysia has implemented several tobacco control measures such as the banning of tobacco advertisements and sponsorship in sports, mandating the display of health warnings on cigarette packaging, banning of cigarettes sale to minors, banning of packages of cigarettes less than 12 sticks, as well as prohibition of tobacco-smoking in public areas and dining establishments (Zarihah, 2012). In addition to these, the Malaysian government gradually increased the tobacco excise taxes from MYR0.013 per stick in 1990 to MYR0.260 per stick in 2010 (Norashidah *et al.*,

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2013a). A minimum price law (MPL) for cigarettes was enacted in 2010 ensuring that the cheapest pack of 20 cigarettes was retailed at a price of USD1.49 or MYR6.40 (Food Act 1983, 2009) However, as evidenced from the increasing prevalence of tobacco consumption in Malaysia, these fiscal and non-fiscal tobacco control measures do not appear to have achieved their intended effect.

Fiscal tobacco control measures are aimed at increasing tobacco prices and thus making tobacco products less affordable, especially for poorer households. It has been estimated that the long-run and short-run elasticities of cigarettes demand were -0.38 ad -0.13 whereby a 10.0% increase in price will reduce 3.8% of cigarettes consumption (Ross and Al-Sadat, 2007). In this paper we describe the distribution of household tobacco expenditures across households of different living standards over the time period, 1993 to 2014, during which fiscal measures to increase tobacco prices in Malaysia had been intensified. We also examined household affordability of tobacco products in Malaysia to understand Malaysia's experience of increasing tobacco prevalence despite increasing prices.

II. MATERIALS AND METHOD

A. Source of Data

This is a repeated cross-sectional study. The data for this study was obtained from the 1993, 1998, 2004, 2009 and 2014 rounds of the nationally representative Household Expenditure Surveys (HES) conducted by the Department of Statistics, Malaysia once every 5 years (DOS, 2014; DOS, 2009; DOS, 2004; DOS, 1998; DOS, 1993). The surveys collected information on the level and pattern of consumption expenditure by households on a comprehensive range of goods and services including tobacco products. Table 1 provides details of the households included in the surveys. The study population of HES included private living quarters in Malaysia and excluded institutional households, namely those living in hostels, hotels, hospitals, old folk homes, military and police barracks, prisons, welfare home and other institutions. The sampling method utilised in the HES was two-stage stratified sampling design.

B. Variables

Tobacco expenditures are the household financial outlay for purchases of cigarettes, cigar, cheroots, betel leaves and hand-rolled tobacco. The HES captured such expenditures over a period of 1 month. Households with such expenditures were assumed to have at least one member who consumed tobacco products. The surveys did not capture information on the number of smokers in a tobacco consuming household. The expenditures are expressed in Malaysian Ringgit (MYR) and inflated to 2014 prices using Consumer Price Indices and converted to USD using the 2014 exchange rates (1USD = 4.294 MYR).

Household tobacco expenditure share is the proportion of tobacco expenditure over total household consumption expenditure. The household tobacco expenditure share across the surveys is used to examine household tobacco affordability. Increasing (decreasing) shares would indicate decreasing (increasing) affordability. Both the household tobacco expenditure and the household tobacco expenditure share were analysed for households with tobacco expenditure only.

To capture the socio-economic distribution of household tobacco expenditures we repeated the analysis for 5 groups of households using per adult equivalent household consumption expenditure whereby it was derived by dividing the total household consumption expenditure against the adult equivalent scale. In this respect, the total household consumption expenditure is an aggregation of expenditure on food, alcoholic and non-alcoholic beverages, tobacco product, clothing and footwear, housing, health, transport, communication, education, recreation, restaurants and lastly miscellaneous good and services in a household. Adult equivalent scale is a scale used to adjust any consumption expenditure whereby it considers of number of adults, number of children, cost of raising a child and scales of economies. As compared to per capita expenditure consumption, it does not account for different level of consumption between adults and children whereby children consume less than adult.

C. Statistical Analysis

Using the per adult equivalent household consumption expenditure, we estimated the concentration index (CI) of household tobacco expenditures to provide a summary indictor of the socio-economic distribution of household tobacco expenditures. This index is derived from the concentration curve of household tobacco expenditures which plots the cumulative percentage of household tobacco expenditures against the cumulative percentage of the households ranked by household consumption (O'Donnell *et al.*, 2008). The CI has values ranging between -1 to 1 where a negative (positive) value indicates a disproportionate distribution of expenditures favouring the poor (rich).

We conducted the analysis using STATA version 14 and all analyses were weighted to ensure estimates were representative of the population. STATA was also used to plot the concentration curve as well as to generate the concentration indices.

III. RESULT

To explore on the household affordability on tobacco products, the study begins by examining the proportion of household with tobacco expenditure, the actual quantum of household tobacco expenditure and lastly the household tobacco expenditure share. Table 2 shows the proportion of households with tobacco expenditure whereby the proportion was declining between 1993 to 2004 for all living quintiles but resurge in 2009 and 2014. By socioeconomic quintiles, the poorest quintile was the highest from 1993 to 2004, however, second and middle quintile gradually increased in households with tobacco expenditure since 2009. At the same time, the richest quintile household remained the lowest in the proportion of household with tobacco expenditure. Overall, the burden of tobacco-smoking remains high in Malaysia whereby the proportion had not seemed to be less than 35.0% with the middle-income is emerging as the dominant group at household level. By regions, the proportion had also been declining in the three regions but resurge in 2014.

Table 2 also shows the proportion by urban-rural stratum where the rural stratum had persistently been having higher proportion than their urban counterpart. At the same period, both strata experienced declining trend in proportion between 1993 to 2004 and a rebound in 2014. By ethnicity, the proportion had been declining between 1993 to 2009 but rebound in 2014 irrespective of the ethnicity.

From Figure 1, the monthly household tobacco expenditure for tobacco-smoking households had increased from USD 24 in 1993 to USD34 in 2014. By consumption quintiles, the richest quintile had the highest tobacco expenditure from 1993 to 2014; yet, the lowest in proportion of households with tobacco expenditure and the lowest in household tobacco expenditure share. On top of that, there is a persistent upward gradient in tobacco expenditure from the poorest to the richest at five points of time.

Although the actual quantum of tobacco expenditure had been increasing from 1993 to 2014, the household tobacco expenditure share reduces from 7.03 in 1993 to 4.61 in 2014. Not only that, similar declining trends were observed in all socioeconomic quintiles which indicates that lesser money had been required or allocated for tobacco products from 1993 to 2014 in Malaysia.

Regarding the distribution of tobacco expenditure, the concentration indices show that tobacco expenditure was more concentrated among the richest as the concentration indices were positive. By urban-rural stratum, the concentration indices for both strata were similarly at positive side, however, the indices were slightly higher for rural stratum. By region, the concentration indices in Sabah and Sarawak were approximating zero compared to Peninsular Malaysia. In a nutshell, the tobacco expenditure was essentially more concentrated in the richer quintile by actual quantum irrespective of regions and urban-rural stratum.

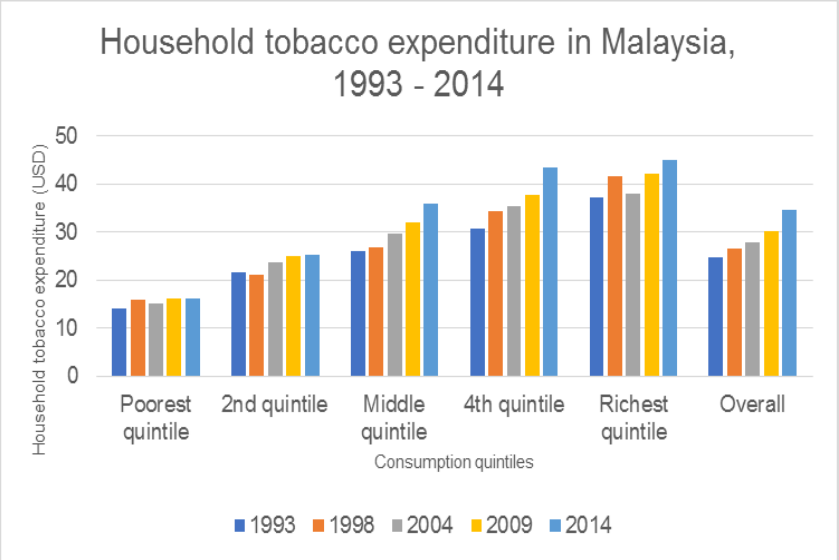

Figure 1. Household tobacco expenditure (in USD), 1993 to 2014

Table 1. Baseline of households surveyed in HES 1993, 1998, 2004, 2009 and 2014

Baseline of household	HES 1993	HES 1998	HES 2004	HES 2009	HES 2014
Total numbers of households	14631	9198	14084	21641	14838
Response rate (%)	89.5	85.3	77.3	87.4	99.4
Household distribution					
By region					
Peninsular Malaysia	10955 (74.88)	7442 (80.91)	10800 (76.68)	16295 (75.30)	10665 (71.88)
Sabah and Labuan	1787 (12.21)	859 (9.34)	1574 (11.18)	2923 (13.51)	1992 (13.42)
Sarawak	1889 (12.91)	897 (9.75)	1710 (12.14)	2423 (11.20)	2181 (14.70)
By locality					
Urban	8227 (56.23)	5232(56.88)	9467 (67.22)	14989 (69.26)	10246 (69.05)
Rural	6404 (43.77)	3966(43.12)	4617 (32.78)	6652 (30.74)	4592 (30.95)
By ethnicity of household head					
Bumiputera	8156 (56.86)	5059 (56.95)	9025 (65.87)	13941 (64.41)	10116 (68.18)
Malays	6888(48.02)	2443(27.51)	7966(58.14)	-	-
Non-Malays *Bumiputera*	1268(8.84)	2616(29.45)	1059(7.73)	-	-
Non Bumiputera	6187 (43.14)	3823 (43.05)	4677 (34.13)	7700 (35.59)	4722 (31.82)
Chinese	4201(29.29)	2636(29.68)	3200(23.35)	5126 (23.69)	-
Indians	1011(7.05)	650(7.32)	810(5.91)	1309 (6.05)	-
Others	975(6.80)	537(6.05)	667(4.87)	1265 (5.85)	-

*( ) the figure in the interval is percentage

Table 2. Proportion of household with tobacco expenditure in Malaysia, 1993 to 2014

Household Consumption Quintiles	Percentage population with reported tobacco expenditure				
	1993	1998	2004	2009	2014
Overall	47.64(0.41)	42.50(0.52)	38.41 (0.60)	40.05 (0.53)	47.02 (0.54)
By household consumption quintiles					
Poorest quintile	57.23 (0.94)	52.32(1.22)	42.43 (1.22)	39.25 (0.97)	47.75 (1.49)
2nd quintile	51.74(0.95)	47.15(1.21)	38.73 (1.25)	42.19 (1.16)	51.47 (1.57)
Middle quintile	46.76(0.94)	39.33(1.18)	40.28 (1.40)	42.52 (1.24)	48.82 (1.57)
3rd quintile	44.95(0.94)	39.10(1.19)	38.98 (1.42)	36.79 (1.25)	48.44 (1.51)
Richest quintile	36.04(0.90)	34.59(1.16)	31.63 (1.44)	34.63 (1.28)	41.75 (1.59)
By regions in Malaysia					
Peninsular Malaysia	46.13 (0.47)	42.00 (0.59)	38.34 (0.70)	38.30 (0.55)	44.19 (0.55)
Sabah and Labuan	53.83 (1.24)	47.32 (1.76)	40.65 (1.58)	36.77 (1.15)	49.48 (1.50)
Sarawak	53.72 (1.14)	42.94 (1.71)	36.40 (1.57)	36.93 (1.30)	45.22 (1.11)
By urban-rural strata					
Urban	39.23 (0.55)	36.42 (0.70)	35.35 (0.80)	36.42 (0.62)	43.40 (0.58)
Rural	57.47 (0.62)	49.52 (0.81)	44.43 (0.84)	41.51 (0.69)	49.33 (0.84)
By ethinicity					
Bumiputera[1]				39.05 (0.59)	46.58 (0.54)
Malays	53.95 (0.60)	46.22 (0.76)	40.55 (0.82)		
Non-Malays	59.41 (1.28)	49.93 (1.85)	42.04 (1.72)		
Non *Bumiputera*					41.84 (0.92)
Chinese	30.78 (0.73)	30.45 (0.93)	28.36 (1.23)	30.88 (0.97)	
Indians	46.68 (1.56)	38.03(1.97)	34.91 (2.43)	39.12 (1.95)	
Others	57.20 (1.68)	64.39 (2.14)	60.09 (2.56)	53.72 (1.86)	

Notes: The figures in the interval are the standard error for the proportion of households with reported tobacco expenditure.

Table 3. Household tobacco expenditure share among tobacco-smoking households, 1993 to 2014

Household Consumption Quintiles	Tobacco expenditure share				
	1993	1998	2004	2009	2014
Poorest quintile	6.84 (0.17)	6.37 (0.21)	6.31 (0.24)	6.00 (0.15)	5.01 (0.15)
2nd quintile	7.19 (0.18)	6.48 (0.22)	6.53 (0.26)	6.34 (0.19)	4.94 (0.14)
Middle quintile	7.22 (0.18)	6.17 (0.21)	6.68 (0.32)	6.70 (0.18)	4.93 (0.13)
4th quintile	7.51 (0.21)	7.33 (0.26)	6.63 (0.27)	6.44 (0.21)	4.60 (0.11)
Richest quintile	6.23 (0.20)	5.63 (0.20)	5.21 (0.28)	5.40 (0.19)	3.46 (0.12)
Overall	7.03 (0.08)	6.41 (0.10)	6.32 (0.12)	6.19 (0.08)	4.61 (0.06)

Table 4. Concentration indices of household tobacco expenditure, 1993 to 2014

	Concentration indices									
	1993		1998		2004		2009		2014	
Overall	0.2058	(0.1866, 0.2250)	0.2204	(0.1895, 0.2514)	0.2144	(0.1862, 0.2426)	0.2593	(0.2340, 0.2846)	0.2563	(0.2343, 0.2782)
By regions in Malaysia										
Peninsular Malaysia	0.2069	(0.1845, 0.2294)	0.2325	(0.1960, 0.2689)	0.2246	(0.1901, 0.2590)	0.2825	(0.2509, 0.3140)	0.2619	(0.2357, 0.2881)
Sabah and Labuan	0.1787	(0.1385, 0.2189)	0.0763	(0.0343, 0.1183)	0.0767	(0.0336, 0.1197)	0.0898	(0.0549, 0.1247)	0.1518	(0.1173, 0.1863)
Sarawak	0.1795	(0.1245, 0.2345)	0.1772	(0.0916, 0.2627)	0.1521	(0.0922, 0.2120)	0.101	(0.0520, 0.1500)	0.1226	(0.0942, 0.1511)
By urban-rural strata										
Urban	0.1796	(0.1536, 0.2056)	0.2511	(0.2030, 0.2993)	0.2044	(0.1678, 0.2411)	0.2718	(0.2384, 0.3051)	0.2574	(0.2312, 0.2836)
Rural	0.3524	(0.3160, 0.3887)	0.2402	(0.2001, 0.2803)	0.3273	(0.2796, 0.3751)	0.295	(0.2569, 0.3331)	0.3184	(0.2729, 0.3639)

IV. DISCUSSION

The study indicates that the burden of tobacco-smoking at household level in Malaysia is persistently high whereby the proportion of household with tobacco expenditure had never seemed to drop below 35.0% in all consumption quintiles. In this respect, there have been a declining trend in the proportion of household with tobacco expenditure from 1993 to 2009 in all consumption quintiles whereby the decline could possibly be due to effective tobacco taxes in Malaysia. In the same period, the excise tax increased approximately 1630.0% from MYR0.013 per cigarette in 1993 to MYR0.225 per cigarette in 2009 (Malaysian Government). However, the proportion resurge back in 2014 in all consumption quintiles irrespective of regions, ethnicity and urban-rural stratum. This finding could be possibly be related to tobacco policy in Malaysia where there was implementation of Minimal Price Law (MPL) in January 2010. The main aim of the MPL was to reduce cigarette affordability among the tobacco smokers. To support this postulation, a study by Liber and colleagues in Malaysia reveals that the introduction of the MPL led to increase in purchase of illicit cigarettes from 13.4% to 16.5% while the reduction of licit cigarettes purchases from 3.9% to 1.8% (Liber *et al.*, 2015). As such, the mitigation strategy by resorting to illicit cigarettes has ensured the cigarettes were affordable among the tobacco smokers.

In contrast to the high burden of tobacco-smoking, the tobacco expenditure is lower than our estimated cost. In this context, we refer to National Health Morbidity Survey (NHMS) in 2015 whereby 77.6% of tobacco smokers in Malaysia smoked more than 10 cigarettes per day which in turn at least 15 packs of cigarettes every month (NHMS, 2015). As such, the household tobacco expenditure with one smoker would cost at least USD42 monthly in 2014. However, the finding in this study shows that the household tobacco expenditure was only USD34 which is lesser than the estimated cost. Hence, there is a postulation that illicit cigarettes had been the culprit of the low tobacco expenditure. To make it worse, the poorest quintile merely spent about USD16 for their monthly tobacco expenditure which was not even half of the real estimate of tobacco expenditure cost in 2014. To support the postulation, the illicit cigarettes share was almost half of the total cigarettes market at 45.6% in 2015 according to new article as there is no published data (FMTnews, 2016).

In relation to the household tobacco expenditure share among the tobacco-smoking households, it has been reducing from 1993 to 2014 whereby it shows that lesser money was required to purchase tobacco products. This could be explained by either gradual decline in tobacco-smoking or lesser monetary amount was required to purchase of tobacco

products due to cheap tobacco products (increasing cigarettes affordability). In comparison to the increasing proportion of household with tobacco expenditure and the persistent high prevalence among adult male population in Malaysia, the latter explanation seems to be more relevant here. As such, this finding has again pointed to utilisation of cheaper illicit cigarettes among the tobacco smokers in Malaysia. In this respect, the price for a 12-packed illicit cigarette was merely USD0.99 compared to USD2.22 of licit cigarettes in 2011 (Liber *et al.*, 2015). On top of that, studies have shown that less than 5.0% of per capita gross domestic product was required to purchase 100 packs of cigarettes and the cigarettes are becoming more affordable from 1990 to 2006 in Malaysia (Blecher and Van Walbeek, 2009; Norashidah *et al.*, 2013b). One of the paradoxical questions on the increasing cigarettes affordability in Malaysia although the tobacco taxes had been raised gradually is certainly due to high availability of illicit cigarettes in the market as mentioned earlier.

From the distribution of tobacco expenditure, it was obvious that the higher income households spent higher amount of money on tobacco products although middle quintiles were the highest in consuming tobacco. This could be because the rich spend on more expensive cigarettes, in reverse, the middle-income and the poorer quintile might have opted for cheaper tobacco products such as illicit cigarettes. This finding is certainly in line with the aforementioned findings in trend of tobacco expenditure and household tobacco expenditure share across the various living standards.

Although the tobacco expenditure was low and impoverishment from direct tobacco expenditure was also low, the actual macroeconomic impacts from tobacco-smoking via increasing medical cost and loss of productivity would still be imminent as the tobacco-smoking burden is relatively high (WHO, 2004). For instance, total cost of treating three major tobacco-related illness in Malaysia was estimated to range from 790 million US$ in 2004 to 1 billion US$ in 2010 (SEATCA, 2013; Aljunid, 2006). To make it worse, Malaysia was also suffering a net loss in estimated health costs against tobacco tax revenue which amounted to approximately 231 million US$ (Aljunid, 2006). Therefore, tobacco consumption could directly affect the country via massive spending on health care and loss of productivity.

The present study provides a good insight into the trend and distribution of tobacco expenditure for a considerable long duration across ascending consumption quintiles in Malaysia. This directly informs policymaker on the impacts of tobacco taxation and tobacco control policy on tobacco expenditure in Malaysia. Another strength is the study is based on reliable and nationally representative data for a long duration in Malaysia. Nonetheless, the limitation of the study is the limited number of tobacco-smoking individual in a household to allow precise estimation of per capita tobacco expenditure.

In a nutshell, the household tobacco expenditure in Malaysia was low although the burden of tobacco-smoking has persistently been high especially among adult male population. Moreover, the household tobacco expenditure share among the tobacco-smoking households have been declining over the study period although tobacco taxation and other tobacco control policy had been implemented. This paradoxical phenomenon could possibly be explained by rampant illicit cigarettes which provide a cheaper and affordable alternative for the tobacco smokers. Consequently, tobacco control policy addressing the threat of illicit cigarettes should be formulated in order to effectively combat the tobacco epidemic in Malaysia.

V. ACKNOWLEDGEMENTS

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