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Event History Analysis**

by

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ABSTRACT

The 2003 Young Adult Fertility and Sexuality (YAFS3) is a rich database in which risk behaviors can be analyzed in greater detail. Smoking among the youth is one of the non-sexual risk behaviors that needs to be further understood. About 46.5 % among the youth 15-24 ever smoked and half of them were currently smoking at survey date. As expected smoking among males is much higher for males than females. The paper aims to study how long it takes until an average Filipino youth enters into and exits from smoking and to estimate the effects of contact circle (parents, siblings and close friends), schooling status and employment status holding sex, age, marital status, and urban-rural residence constant. Survival models and event history modelling techniques to deal with time-varying covariates will be applied to the data to fulfill the two objectives.

Introduction

How successful we are in maintaining a healthy life style remains the debate of the day. In his lecture, Prof. Frederick F. Fenech (2004) stated that risk factors are responsible for 70 percent decline in health.² Smoking is one of these risk factors. It is an unhealthy non-sexual behavior which when an individual starts it at very young or younger ages, he or she faces gradually increasing problems as he or she undergoes the process of aging. He or she has already done harm to himself or herself causing him or her to face immediate and long-term adverse health and social consequences (Center for Disease Control, 1994; Gruber et al., 1996; World Health Organization, 1997; 1999; Peto and Lopez, 2000; Doll et al., 2004). Choe et al. (2004: 84-85) concluded that ‘... smoking continues to be a traditional health risk for some youth in developing countries and is also emerging as a new health risk for some other youth.’

Smoking among the Filipino youth is one of the non-sexual risk behaviors that still needs to be further understood to be able to update previous findings as well as to come out with more insights which could be tapped in the ongoing

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² Prof. Frederick F. Fenech, a medical doctor practicing in 50 years and currently the Director of the International Institute on Ageing, United Nations-Malta, gave a lecture on “The Impact of Current and Future Demographic/Health Trends on Care for and Well-Being of the Elderly” during the 6-17 September 2004 International Short Training Programme in Demographic Aspects of Population Ageing and its Implications for Socio-Economic Development, Policies and Plans held at the Forum Hotel, St. Andrews, Malta and the University of Malta

'healthy life' advocacy activities. Once smoking becomes a habit, it is very difficult to quit. Human beings do not give up bad habits which they like. Advertising companies all over the world have continuously been improving their cigarette advertisements to lure the youth to smoke and become addictive side by side with the public and private 'no-smoking' campaigns.

In their analysis of the second Young Adult Fertility and Sexuality Study conducted in 1994 (1994 YAFSS), Choe et al. (2004:77-83) found that: (1) while among the male adolescents aged 15-19, 48 percent ever smoked and 28 percent were currently smoking at time of survey; among their female adolescent counterparts, 12 percent ever smoked and 3 percent were currently smoking at survey date; (2) male and female Filipino youth begin smoking at later ages compared to their US teen counterparts; (3) girls but not boys in Metro Manila are more likely to smoke than girls elsewhere; (4) girls but not boys raised by both parents are less likely to smoke than those who are not raised by two parents; (5) transitions to adulthood (getting older, being out of school and having lived away from parents) increase the probability of smoking among boys but only getting older increased the probability of smoking among girls; and (6) planning to have college education reduces smoking among boys but not among girls.

The analysis of the 2003 Young Adult Fertility and Sexuality (YAFS3) by Berja and Cruz (2004) reveals that: (1) about 46.5 % among the youth 15-24 ever smoked and half of them were currently smoking at survey date; (2) the proportion of adolescent male current smokers is six times that of females; (3) the proportion ever smoked among females increased from 16.5 percent based on the 1994 YAFSS to 30.2 percent based on YAFS3; and (4) according to multinomial logit regressions, adolescents who are likely to smoke are those with smoking or separated or permissive parents and who are engaged in leisure activities.

Given the rich database of YAFS3 in which risk behaviors can be analyzed in greater detail, it would be more illuminating to expand the Choe et al. and Berja and Cruz studies to a much broader contact circle and smoking perspective.

The aim of this paper then is twofold. One is to examine in greater detail the age pattern of initiation of smoking. The other is to estimate the effects of the same factors considered and other programmatic factors within the adolescents' contact circle which have not been considered in the two studies mentioned earlier on the initiation of smoking. Findings of this study undoubtedly contribute to the identification of the factors that are likely to induce Filipino teenagers into smoking so that appropriate actions and strategies be formulated by several stakeholders working for adolescent health.

Data and Methods

The data examined in this paper are based on YAFS3. YAFS3 consists of a national probability sample of 19,728 Filipino youth (9150 males and 10,578 females) aged 15-27 years old.

Life table analysis. In examining the age pattern of initiation of smoking, the life table method is used. This method is one of the common methods applied with event-oriented data which offer a complete event history of an individual over some observed time span yielding information about the exact duration until events and their sequence occur. It is one of the event history analysis methods that measure the entrance into some initial state, event or episode until attainment of some final or terminating state. For example in mortality analysis, the life table method takes birth as the starting event and death as the terminating event.

There are five concepts to be defined here in relation to the life table method in this paper. First is *cohort* which relates to a group of individuals, defined by some set of characteristics like sex who have experienced the *starting event*, which is the second concept such as birth in a specified time period (e.g. those male adolescents born from 1984-1988 or the 15-19 years old interviewed in YAFS3). This male 1984-1988 birth cohort would then experience several events as they have grown and will grow older. One event is the initiation of smoking which in event history or life table analysis is the *terminating event*, or generically called *failure*, the third concept. There are among this male 1984-1988 cohort who have not started smoking till the survey and these male adolescents are *censored*, the fourth concept which means "lost to observation," due to reaching interview before the end of the interval and before starting smoking. In event history or life table analysis, those who have not yet started smoking, are survivors or generically called *successes*, the fifth concept.

We then have the following definitions:

- t = time since the birth of each male in the 1984-1988 cohort
- N_0 = total number of those belonging to this male 1984-1988 cohort
- N_t = number of survivors at time t (those who have not yet started smoking from this cohort)
- D_t = number of failures during the interval t to $t+1$ (those who have started smoking during the interval t to $t+1$ from this cohort)
- ct = number of males from this cohort who were censored during the interval t to $t+1$.

The cumulative survival function (S_t) or the estimated life table probability of not yet having initiated smoking or its reciprocal F_t ($1-S_t$), the cumulative death function or the estimated life table probability of having initiated smoking could either be analyzed to discern the age pattern of initiation of smoking. S_t expresses the probability that an adolescent remains in the state ('survives') until time t , that is, that smoking has not yet occurred and the episode is still continuing. Conversely, F_t expresses the probability that an adolescent

experiences the transition to the terminal state, before or at time t , that is, that smoking has occurred.

The life table method is a technique for studying smoking initiation as the single episode without explicit consideration of covariates. One can calculate the life table for females and compare the resulting cumulative survival or death function at selected ages.

In this paper, several life tables are constructed and they are as follows: (1) male and female life tables taking the 15-27 years old as one cohort; (2) male and female life tables taking the 15-24 years old as one cohort; (3) male and female life tables taking the 15-19 years old as one cohort; (4) male and female life tables taking the 20-24 years old as one cohort; and (5) male and female life tables taking the 25-27 years old as one cohort. In the succeeding sections, adolescents refer to those aged 15-19 covered in YAFS3.

Factors influencing the initiation of smoking. To ascertain the quantitative influence of hypothesized variables on the hazard or transition from birth to smoking for the first time, the Cox hazard model with time dependence is used. This model may be viewed as a multivariate life table model as time constant and time varying covariates are simultaneously considered.

In this case, although smoking initiation still remains the main interest or the dependent variable, the measure is no longer S_t or F_t but the hazard function which according to Blossfeld et al., (1989:31) "... may be interpreted as the instantaneous probability that episodes in the interval $(t, t + \Delta t)$ are terminating provided that the event has not occurred before the beginning of this interval." This hazard function is more commonly expressed as hazard rate, transition rate or mortality rate.

This paper considers just only one time dependent covariate which is age or getting older. The time constant covariates examined refer to those that imply contacts of the adolescents with their environment which may have attracted them to start smoking or which may have prevented them from smoking at young age. I term such contacts as the adolescents' *contact circle*. Operationally, I grouped these covariates into three types and measured each covariate as follows:

1. Structural/environmental/media contact
 - a. Place of birth (1=urban, 0=rural)
 - b. Urban residence before age 15 (1=yes, 0=no)
 - c. Share bed with others (1=yes, 0=no)
 - d. Use of discos in the community often or sometimes (1=yes, 0=never)
 - e. Use of discos, beta, billiard or internet in the community often or sometimes (0=never, 1=only one of these facilities, 2=at least 2 of these facilities)
 - f. Frequency of watching movies and MTV (0=never, 1=everyday/at least once a week, 2= at least once a month)

- g. Frequency of watching TV program (1=everyday, 0=once a week or none at all)
 - h. Frequency of watching MTV (0=never, 1=everyday/at least once a week, 2= at least once a month)
2. Normative contact
- a. Participation to religious activities (1=everyday, more than once a week, once a week, 0, otherwise)
 - b. Active participation in community activities (1=yes, 0=no)
 - c. With financial support at ages 7 or 13 or 18 (1=yes, 0=no)
 - d. Really want to finish college (1=agree, 0=disagree or no response)
3. Family contact
- a. Smoking family members (0=none, 1=one member, 2=2 or more)
 - b. Visited by parents while at dorm or boarding house (1=yes, 0=no)
 - b. Raised by both parents (1=yes, 0=no)
 - c. Got along with father or mother or siblings (1=yes, 0=no).
 - d. Father's education (1=elementary, 2=high school or over, 0=none)
 - e. Mother's education (1=elementary, 2=high school or over, 0=none)

The multivariate analysis is confined to the adolescents 15-19 as they are the most vulnerable group when it comes to smoking and as will be shown later, they are the ones that reveal the highest probabilities of smoking at young age compared to the 20—24 and 25-27 cohorts.

Results

Life table analysis. Table 1 presents the percentage of youth initiating smoking at selected ages 10 to 25 for each of the considered five cohorts (15-27, 15-24, 15-19, 20-24 and 25-27). For the whole sample (cohort 15-27), the percentage of youth starting to smoke before age 15 is about 17 % for males and 5% for females. By age 15, the percentage rose to about 29 % for males but only 9% percent for females. About 75% among males and 31 % among females started smoking by age 20.

If the analysis is confined to the cohort of 15-24, there is no great difference in the percentage of youth initiating smoking, even with the cohort of 20-24 and 25-27, just displaying the corresponding values a little less than those in the whole sample. Strikingly, the youngest cohort (adolescents 15-19) show values much higher than their older counterparts at any age from 10 to 19. In short, there more smoking adolescents today than adolescents five or ten years ago.

Table 1. Percentage of Youth Initiating Smoking by Selected Ages, YAFS3

Age of start of F Smoking	Cohort/Sex									
	15-27		15-24		15-19		20-24		25-27	
	M	F	M	F	M	F	M	F	M	
10	2.6	1.1	2.7	1.2	2.7	1.3	2.6	1.0	1.9	1.0
11	3.3	1.4	3.4	1.4	3.6	1.6	3.0	1.2	2.5	1.3
12	6.4	2.1	6.5	2.2	7.1	2.6	5.5	1.5	5.6	1.5
13	10.5	3.2	10.7	3.4	12.0	4.2	8.7	2.2	8.6	2.3
14	16.6	5.1	17.0	5.5	19.3	7.1	13.2	3.0	13.8	2.9
15	28.6	9.2	29.4	10.0	39.6	13.0	22.9	5.7	22.8	5.4
16	41.2	13.5	42.5	14.8	49.4	19.7	33.1	8.7	32.1	7.1
17	51.9	17.9	53.9	19.8	62.5	27.2	43.6	12.1	39.2	9.3
18	63.8	23.0	66.0	25.7	74.3	35.4	57.2	17.2	51.0	12.0
19	67.7	26.8	72.1	30.0	82.7	43.6	64.2	21.4	56.5	14.6
20	75.3	30.6	77.6	34.5	-	-	71.6	26.4	63.1	17.2
21	78.9	33.2	81.2	37.7	-	-	76.4	30.0	67.7	18.9
22	81.3	35.4	83.8	40.8	-	-	79.9	33.6	70.3	20.4
23	82.6	37.6	84.8	44.1	-	-	81.5	37.4	72.6	22.0
24	84.1	39.5	85.9	48.2	-	-	84.1	43.0	75.1	23.6
25	85.3	41.9	86.11	51.0	-	-	-	-	77.6	26.7

Factors influencing the initiation of smoking. Table 2 shows the mean values of the variables examined in relation to discovering which variables significantly affect smoking at early age among the Filipino adolescents.

Table 2. List of variables examined as to their influence to smoking at early age and their mean values for boys and girls aged 15-19, YAFS3

Variable	Male	Female
A. Structural/environmental/media contact		
1. Place of birth as rural	.56	.55
2. Rural residence before age 15	.91	.87
3. Not sharing bed with others	.31	.33
4. Never use discos in the community	.81	.85
5. Use leisure and game activities in the community		
a. One of them	.62	.08
b. At least 2 of them	.81	.03
5. Watching movies		
a. everyday/at least once a week	.23	.05
b. at least once a month	.47	.15
6. Watching MTV		
a. everyday/at least once a week	.62	.12
b. at least once a month	.29	.10
7. Watching TV program everyday	.70	.74
B. Normative contact		
1. Never participated in religious activities	.71	.66
2. Inactive in community activities	.82	.85
3. No financial support at ages 7 or 13 or 18	.97	.97
4. Really wants to finish college	.88	.94
C. Family contact		

1.Smoking family members		
a. one member	.50	.17
b. 2 or more	.17	.06
2. Not visited by parents while at dorm or boarding house	.92	.88
3. Not raised by both parents	.14	.16
4. Did not get along with father or mother or siblings	.36	.32
5. Father's education, elementary or below	.94	.87
6. Mother's education, elementary or below	.94	.88
D. Time-dependent covariate		
1. Age	16.9	16.8

It is very clear that there are highly skewed variables which may create some problems in the estimation. These are: (1) rural residence before age 15 under the first type, (2) No financial support at ages 7 or 13 or 18 and really wants to finish college under the normative contact circle; and (3) three of the six variables under the family contact circle group (Parental visit at dorm, father's and mother's education). Nonetheless, they were all explored in the initial modeling stages of this paper.

Very few of the hypothesized variables emerged as significant predictors of the early initiation of smoking among the teenagers. The results of the several models run are no longer presented in this paper. Those that turned out to be significantly important either for males or females are reflected in Table 3.

It appears that the factors influencing the initiation of smoking are not exactly the same for male and female adolescents. There are only three significant predictors that are affecting the initiation to smoking by adolescents, irrespective of gender. First is the time-dependent age or getting older. In fact, getting older increases the hazard of starting to smoke by about 10 times ($e^{2.29}=9.9$) for males and 29 times ($e^{3.38}=29.3$) for females, holding constant the other variables in the model. The second common strong predictor to smoking initiation by adolescents is the lack of parental visits to adolescents staying at dormitories or boarding houses which indicates that the teenagers are more likely to start smoking at early age if they are not visited by their parents. The third common covariate of smoking initiation is the absence of financial support at ages 7 or 13 or 18.

Male teens residing in the rural areas before age 15 with no smoking two or more family members are less likely to smoke. However, male adolescents not raised by both parents are more likely to smoke at young age.

Table 3. Coefficients, standard errors, and significance of emerging important variables affecting the estimated hazard of initiating smoking at an early age, YAFS3^a

Variable	Male	Female
A. Structural/environmental/media contact		
1. Rural residence before age 15	-.23(.06)***	-.11(.08)
B. Normative contact		

2. No financial support at ages 7 or 13 or 18	.35(.09)***	.30(.14)*
C. Family contact		
3. No smoking two or more family members	-.13(.05)**	-.03(.06)
4. Not visited by parents while at dorm or boarding house	.26(.07)***	.37(.08)***
5. Not raised by both parents	.11(.06)*	.08(.07)
6. Did not get along with father or mother or siblings	-.06(.04)	-.16(.06)**
7. Mother's education, elementary or below	.08 (.08)	.20(.09)*
D. Time-dependent covariate		
8. Age	2.29(.05)***	3.38(.07)***

^a Numbers in parentheses are standard errors of coefficients.

*** significant at the 0 percent level.

**significant at the 1 percent level.

*significant at the 2 to 4 percent level.

On the other hand, female adolescents with low educated mothers are more likely to smoke. Surprisingly, female teens not getting along with father or mother or siblings are less likely to start smoking at early age. This needs to be further examined, which is on-going as the unexpected pattern may be a result of its significant interaction with another significant covariate in the model.

Discussion and Implications

There are more Filipino adolescents today who start smoking at very early age compared to those teens 5 to 10 years ago. It must be stressed here that once smoking becomes a habit, it takes time, conscious effort and practice to quit from it. Hence, there is the necessity to address two sectors simultaneously. Those who have developed the habit of smoking at young age is one sector and the advocacy campaign should include several techniques to use for developing the nonsmoking habit and holding on to it. The other sector refers to those who have not yet started smoking and prevention of early smoking should be the order of the day. They should be made aware of the places and situations that prompt the desire for a cigarette and ways to deal with the urge to smoke.

The findings of this present study are consistent with those found with the second YAFS by Choe et al. (2004) and with those found with the same 2003 YAFS by Berja and Cruz ((2004) that close relationship with parents matters. The present study demonstrates the importance of examining the factors influencing the initiation of smoking separately for males and females as there are factors that are influential to females but not for males and vice versa. Smoking environment at home especially the number of smokers, the role of both parents in raising their male children and rural residence before age 15 only influential to males but not for females. On the other hand, parental education especially the mother and getting along with the nuclear members are important for females but not for males. These imply the need to prepare

relevant advocacy materials and the need to understand further the changing norms in the society.

At the outset, the present study is the initial findings of an on-going analysis to explain the unexpected pattern of effect of the covariate not getting along with father or mother or siblings and to look at the several transition variables such as marriage, living away from home, living in a city or poblacion, living in a dorm, living away from parents, leaving school and having barkada for the first time. Taking these time-varying covariates together with the significant time-constant covariates undoubtedly provide richer insights into the phenomenon of area smoking initiation.

References

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