The First Time Sexual Experience of Adolescent in Indonesia: A Survival Analysis

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Abstract

Factors affecting adolescent sexual experience have been studied many researchers, but the concern on the age at the first exposure to sex experiences has not been studied. This study aims to investigate the age distribution of the first time of sexual experiences among adolescent in Indonesia as well as its determinant factors. The Indonesian Demographic and Health Survey (IDHS) 2017 data is utilized in this study. Cox regression model is utilized to model both the event and censored data. Since the model failed to satisfy the proportional hazard assumption then stratification by education and having a boyfriend/girlfriend was required. The results showed that the average age first time sexual experience among adolescent in Indonesia is 18.48 years. Consumption of cigarette, alcohol, drug, having friend who had sex before marriage, perception about sex, and the living area are significantly influencing the age first time they experienced sex. The results also showed that having a friend who had sex before marriage provides the highest hazard ratio. It also showed that the hazards in Maluku and Papua were the highest when compared to others areas.

Keywords: Sexual experience; Adolescent; Survival analysis

Introduction

The behavior of adolescent towards premarital sex has attracted more concern from the government and society for several decades. The data collected by the National Population and Family Planning Board (BKKBN) (2018) showed that there were 8 percent of young men and 2 percent of young women claimed to have premarital sexual experience [1]. Although the percentage is small but the number of cases is relatively big. This problem is very important and need special attention from the government and the society since adolescent is the future generation. The adolescent must have positive activities and great experience in their young age for their future.

Analysis of variables which are related to adolescent sexual experience has been studied by many researchers. Susanto, (2016) investigated in 120 schools in East Java and found that among young males smoking habit as well as engagement to girlfriends was the determinant variables [2]. On the other hand, among young females the significant variable was the lack of access to information. Another study conducted by Rahmah (2017) concluded that 39 percent of the adolescent in Yogyakarta got information about sex from electronic media. Berliana, (2018) studied premarital sex initiation, but the focus was on the interval time between the first sexual contact and marriage [3]. Another research located in Bali by Pradnyani, (2019) showed that senior high school students had a low level of knowledge about the sexual reproductive process and risk [4]. Wells, (2010) examined the sexual behavior of adults who used to visit night clubs and they concluded that men had an odds ratio to have sex after drinking alcohol twice than women [5].

Although the above research has investigated adolescent sexual activities, but the age at which the adolescent exposed to the first sex activity has not been studied. Since it is well known that first sexual experience of a person is related to his/her health and psychological condition then it is important

to understand which age group has the highest risk affected by sex prior to marriage. Data about the age at first sexual experience is required and a survival model is necessary to understand such problem. However, although the data is only available for those who experienced with premarital sex but this data is essentially censored by those who have never had such experience. This study aims to investigate the distribution of the age of the first time sexual experience among adolescent in Indonesia as well as its determinant factors.

Methodology

The Indonesian Demographic and Health Survey (IDHS) 2017 data is utilized in this study. The sample is never married adolescents aged 15-24 years. The event is defined to be occurred if a person claimed to have sexual experience, whereas those who never had sexual experience until at the time of the survey are considered as censored cases give the information about number of sample, event, and censored in each area (Table 1).

The dependent variable (Y) is something that happen in the past before the survey time whereas a few of independent variable (X) are something happen in the time of the survey. Due to difficulties of collecting the data, we use all of independent variable listed in with assumption the situation at the survey time is remaining same with the time they did sex for the first time (Table 2). To meet this assumption, we select cases with interval period from did sex for the first time to the time of survey is no longer than two years.

The Cox regression model is used to explore the relationship between the age at first sex and explanatory variables. This model allows us to estimate the hazard for an individual given the explanatory variables (Kleinbaum and Mitchel, 2005) [6]. The Cox regression model is as follow:

$$h(t;x) = h_0(t)e^{(\beta_1 X_1 + \beta_2 X_2 + .. + \beta_k X_k)}$$

$$\frac{h(t;x)}{h_0(t)} = e^{\beta_1 X_1 + \beta_2 X_2 + \beta.. + _k X_k}$$

With $\frac{h(t;x)}{h_0(t)}$ represent the hazard ratio. The coefficient β is estimated using maximum likelihood and interpreted in a similar manner to that of multiple logistic regression. This model requires the Proportional Hazard (PH) assumption. Proportional hazard is a condition when the hazard ratio is constant by time. To test it, we use Schoenfeld residuals (R_ji) for j–th variable and i-th observation as follow:

$$R_{ji} = \delta_i \left[x_{ji} - \frac{\sum_{l \in R(t_{(i)})} x_{ji} e^{\beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki}}}{\sum_{l \in R(t_{(i)})} e^{\beta_1 X_{1i} + \beta_2 X_{2i} + ... + \beta_k X_{ki}}} \right]$$

H_0: ρ=0 (no correlation between Schoenfeld residuals dan time, the assumption meet) against H_1: ρ≠0 (the assumption doesn't meet). The test the hypothesis, we use the test of statistics: $z = \frac{r^2(n_u - 2)}{(1 - r^2)} \sim \chi^2_{(1)}$ with r is correlation between Schoenfeld residuals and time, n_u is total number of event. If we get p-value>α, we can conclude that the assumption meet. If the hazard assumption does not meet, we stratified the model (Husain, 2018) [7]. In the stratified estimator, the hazard at time t for subject in group j is assumed to be

$$h_j(t;x) = h_{j0}(t)e^{\beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k}$$

Literature review

The distribution of ages of first time sexual experiences among adolescent in Indonesia is visualized by Figure 1. The youngest age is 14 year old but it just a small number. The event increases dramatically for age 15 year. It may be caused by the average age of adolescent entering high school is 15 year. The mode is 17 year, the final year in school. In these ages, adolescent usually get more enthusiastic about new thing. The number of case was decreased in age 18 year and continued to decline in the following years. It is well known that legal age of marriage in Indonesia is 18 year. Those who married were not

captured by the survey. Overall, the average age for first sexual experience of adolescent in Indonesia is 18.48 years with the standard deviation is 2.67.

Results

Gender, place of residence, household wealth, and internet using are not significant factors affecting the age an adolescent did sex for the first time. Although there are many improper contents of internet that are not suitable for adolescent, but certainly not all of adolescent want to watch it. They may use it for some positive thing. Education, cigarette, alcohol, drug, having a couple, having friend who did sex, the perception about sex, and area are significant factors affecting the behavior of adolescent toward premarital sex. The model coefficients and the significance level are provided in Table 3. It shows survival function of not significant variables (Figure 2).

One important thing in the statistical analysis is assumption of PH hazard. All variables except school and couple were found to satisfy this assumption. The result of the test is shown in and visualized in Figure 3 and Table 4. When the PH assumption is violated, the true hazard ratio is changing overtime implying that the parameter actually being estimated may not be a meaningful measure of the between group differences. Stratification can be used to fix the problem. Since there are two variables that seem to violate the assumption, the categories of the strata can be formed by the combination of all categories in these variables. Strata 1 is for junior high school and having a boyfriend/girlfriend, strata 2 is for junior high school and doesn't have a boyfriend/girlfriend, strata 3 is for senior high school and having a boyfriend/girlfriend, strata 4 is for senior high school and doesn't have a boyfriend/girlfriend. Parameter estimation after stratified is in Table 5.

The final model reveals result that cigarette, alcohol, drug, friend, perception, and area are significantly influencing the age first time sex experience. Moreover, it also reveals that having a friend that had sex experiences before marriage provides the highest hazard ratio. The hazard is 2.93 times higher than those who do not have such a friend. This is an alert to all parents in order to take much care about the friendship circle of their children. Another improper behavior among adolescent also need our attention. Drinking alcohol has the hazard 2.84 times than those who never drink alcohol while the hazard ratio is 2.33 for drug behavior and 1.78 for cigarette. Perception about sex i.e. whether adolescent approves on sexual before marriage for some reason or disapproves, also affect this issue. Surprisingly, the hazard of the group who said approve is smaller than those who said disapprove. Approval to free sex before marriage does not always mean that the adolescent agree to do so. In fact, there are some adolescent who did sex even they disapprove it.

Discussion

The model shows Maluku Papua get the highest hazard. It is in line with the highest percentage of the event in Maluku Papua that mentioned in Table 1. According to the data, about 99.4 percent of those who did sex are having a boyfriend or girlfriend and about 84.5 percent of them having friend that have sex before marriage.

Bali Nusa Tenggara has the biggest hazard ratio compare to Maluku Papua than others area. As we know, this area is a famous for tourist destination. A lot number of foreign tourist whose coming with their western behavior may affect the local people, especially about sexual behavior. But it needs another deep study. The smallest hazard ratio is reached by Jawa. As we know, Jawa has a strong custom and maintain a good manners which may determine the sexual behavior of the adolescence.

If we look more into area level, we find that the model in each area is different as well as the determinant factor. The model in Sumatera, Kalimantan, and Maluku Papua do not need stratification while Jawa, Bali Nusa Tenggara, and Kalimantan do. The strata are education for Jawa and perception for Bali Nusa Tenggara and Kalimantan [8]. Gender is remain not significant in all area except Maluku Papua. The type of place of residence, variable that not significant in national level, is significant in Sumatera, Kalimantan, and Maluku Papua. Beside that, cigarette is not significant in all area while drink alcohol is the opposite. It significant in all area. Having a friend who had sexexperience before marriage has the biggest hazar ratio in Sumatera, Klimantan and Sulawesi. Alcohol is the most risk factor in Jawa

but drug is dominant in Bali. Having a girl friend or boyfriend give a very high hazard ratio in Maluku Papua summarizes all model (Table 6).

Conclusion

The youngest age first time sexual experience among adolescent in Indonesia is 14 year old, the mode is 17 year, and the average 18.48 years with the standard deviation 2.67. The final model is stratified by education and having a boyfriend/girlfriend. Consumption of cigarette, alcohol, drug, having friend who had sex before marriage, perception about sex, and area they live in are significantly influencing the age first time they did sex. The study also shows that having a friend who had sex before marriage has the highest hazard ratio. Maluku Papua get the highest hazard than other areas.

References

1. Badan Kependudukan dan Keluarga Berencana Nasional (BKKBN). Badan Pusat Statistik (BPS). Kementerian Kesehatan. USAID. 2018. Survei Demografi dan Kesehatan Indonesia2017.Jakarta: Badan Kependudukan dan Keluarga Berencana National.

2. Susanto Tantut. Prevalence of Factors Related to Active Productive Health Behavior: a Cross-Sectional Study Indonesian Adolescent. Epidemiology and Health 2016; 38: 1-10.

3. Berliana S.M. Premarital Sex Initiation and the Time Interval to First Marriage among Indonesians. Bulletin of Indonesian Economic Studies 2018; 54: 215-232.

4. Pradnyani PE. Knowledge attitude and behavior about sexual and reproductive health among adolescent students in Denpasar Bali Indonesia Global Health Management Journal 2019; 3: 31-39.

5. Wells B E. Patterns of Alcohol Consumption and Sexual Behavior Among Young Adults in Nightclubs. Am J Drug Alcohol Abuse 2010; 36: 39–45

6. Kleinbaum David G. Klein Mitchel. 2005. Survival Analysis. A Self-Learning Text. New York: Springer Science Business Media. Inc.

7. Husain Hartina. The Application of Extended Cox Proportional Hazard Method for Estimating Survival Time of Breast Cancer. The 2nd International Conference on Science (ICOS) IOP Publishing IOP Conf. Series: Journal of Physics. Conf. Series 979 (2018) 012087 .

8. Alotaibi A, Gholizadeh L, Al-Ganmi A. Diabetes knowledge of nurses in different countries: An integrative review. Nurse Educ   Today.2016; 39: 32-49.

Table 1: The number of event and censored data by area.

Area	Number of sample	Event (%)	Censored (%)
Sumatera	5967	1.3	98.70
Jawa	7337	1.4	98.60
Bali nusa tenggara	1899	8.2	91.80
Kalimantan	1848	2.7	97.30
Sulawesi	3336	4.3	95.70
Maluku papua	1693	9.7	90.30

Table 2: Variables used in the analysis with reference category is the last.

Variable		Category
Y (response variable)	Age at first sexual experience	-
Censor variable	Status	1 : had sex (event), 2: no (censored)
X1	Gender	1: male, 2: female*
X2	Type of place of residence	1 : urban , 2: rural*
X3	Highest education	1: ≤ junior high school, 2: ≥ senior high school*
X4	How often use internet16931	1: almost every day
		2: at least once a week
		3: less than once a week
		4: not at all*

X5	Ever tried smoking	1: yes, 2: no*
X6	Ever drink alcohol	1: yes, 2: no*
X7	Ever tried to use drugs	1: yes, 2: no*
X8	Currently having / ever had a couple (boy/girl friend)	1: yes, 2: no*
X9	Have friends had sexual experience before marriage	1: yes, 2: no*
X10	Perception about sexual experience before marriage	1: approve, 2: disapprove*
X11	Household Wealth	1: rich, 2: not rich*
X12	Area	1: Sumatera, 2: Jawa, 3: Bali Nusa Tenggara, 4:Kalimantan, 5: Sulawesi, 6: Maluku Papua*

Table 3: Parameter estimation in survival analysis.

Variable	B	Se	Wald	Ð	Sig.	Exp(B)
Gender	0.022	0.146	0.022	1. 000	0.882	1.022
Place	-0.151	0.083	3.328	1.000	0.068	0.860
School	0.711	0.092	59.537	1.000	0.000	2.036
Internet			5.695	3.000	0.127	
Internet(1)	-0.198	0.116	2.933	1.000	0.087	0.820
Internet(2)	-0.072	0.121	0.355	1.000	0.551	0.930
Internet(3)	-0.359	0.183	3.858	1.000	0.050	0.699
Cigarette	0.42	0.144	8.467	1.000	0.004	1.522
Alcohol	0.966	0.102	90.33	1.000	0.000	2.626
Drug	0.833	0.12	48.181	1.000	0.000	2.300
Couple	2.063	0.413	24.922	1.000	0.000	7.873
Friend	1.131	0.125	81.992	1.000	0.000	3.098
Perception	-1.186	0.091	170.715	1.000	0.000	0.305
Hw	0.042	0.079	0.284	1.000	0.594	1.043
Area			352.025	5.000	0.000	
Area(1): Sumatera	-2.038	0.144	199.35	1.000	0.000	0.130
Area(2): Jawa	-2.082	0.134	241.064	1.000	0.000	0.125
Area(3): Bali nusa tenggara	-0.46	0.115	15.921	1.000	0.000	0.631
Area(4): Kalimantan	-1.424	0.168	72.105	1.000	0.000	0.241
Area(5): Sulawesi	-0.924	0.118	61.122	1.000	0.000	0.397

Table 4: Test assumption of proportional hazard.

Variables	Rho	Chi2	Df	Sig.
School	-0.079	4.360	1	0.037
Cigarette	-0.035	0.790	1	0.373
Alcohol	0.004	0.010	1	0.920
Drug	-0.015	0.160	1	0.685
Couple	0.083	4.790	1	0.029
Friend	0.032	0.730	1	0.393
Perception	-0.023	0.390	1	0.532
Area				
Area(1): Sumatera	0.045	1.40	1	0.236
Area(2): Jawa	-0.037	0.930	1	0.336
Area(3):Bali nusa tenggara	0.090	5.660	1	0.017

| Area(4): Kalimantan | -0.008 | 0.040 | 1 | 0.833 |
| Area(5): Sulawesi | 0.04 | 1.120 | 1 | 0.290 |

Table 5: Parameter estimation in survival analysis with stratification.

Variables	Haz. Ratio	Se	Z	Df	Sig.
Cigarette	1.782	0.192	5.350	1	0.000
Alcohol	2.838	0.28	10.560	1	0.000
Drug	2.325	0.278	7.060	1	0.000
Friend	2.929	0.36	8.730	1	0.000
Perception	0.287	0.026	-13.750	1	0.000
Area					
Area(1): Sumatera	0.139	0.195	-14.060	1	0.000
Area(2): Jawa	0.127	0.016	-16.250	1	0.000
Area(3): Bali nusa tenggara	0.653	0.074	-3.780	1	0.000
Area(4): Kalimantan	0.268	0.044	-8.090	1	0.000
Area(5): Sulawesi	0.418	0.048	-7.580	1	0.000

Table 6: Cox regression model in each area.

| Variable	Indonesia	Sumatera	Jawa	Bali NT	Kalimantan	Sulawesi	Maluku papua
Strata:	school-couple		school	perception		perception	
Gender							1.993
Place		0.554			2.313		0.617
School		2.013		2.110	2.571	2.678	1.554
Cigarette	1.782						
Alcohol	2.838	4.237	8.36	2.611	3.603	2.865	1.817
Drug	2.325	2.661	2.934	5.554			
Couple							23.593
Friend	2.929	9.248	2.147	2.549	6.057	6.541	1.906
Perception	0.287	0.255	0.196		0.286		0.442
Hw				1.482			
Area	0.139						
1: Sumatera							
2: Jawa	0.127						
3: Bali nusa tenggara	0.653						
4: Kalimantan	0.268						
5: Sulawesi	0.418						
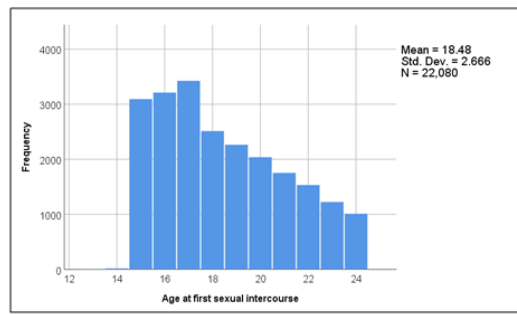
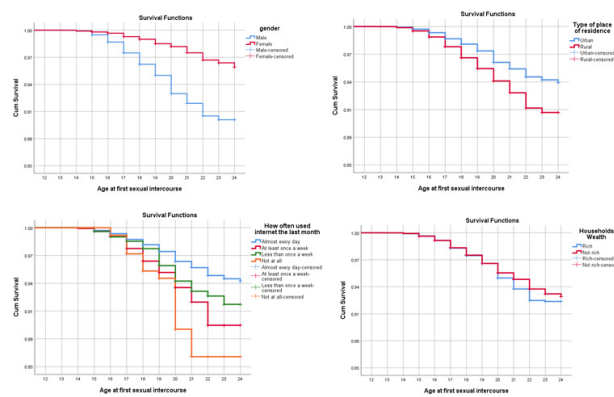**Figure 1**：Histogram of age at first sexual intercourse.

Figure 2：Survival function of gender, type of residence, internet, and household wealth.
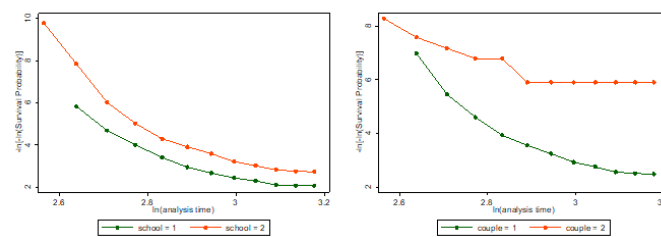

Figure 3：Graph of proportional hazard assumption in school and couple.