Statistical Modelling for Dropped Out School Children (DOSC) in East Nusa Tenggara Province Indonesia

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Abstract. A research has been carried out to investigate the characteristics of reasons for DOSC and to determine the statistical model explaining factors which influence on the DOSC in the age group 7 – 18 years in East Nusa Tenggara (ENT) Province. Primary data of out of school children had been collected throughout interviews using prepared questionnaires in three selected districts. Data was then analysed using descriptive and logistic regression method. The analysis shows that from the 341 samples, there were 194DOSC. The majority of them were males, lived in the countryside, had farmer parents, had family size of 5, and had mothers with only primary education level. The main reasons of children to drop out from the primary and junior education levels were the inabilities of paying the school fees and the willingness to work in the farms to help their parents. For senior education level, it was because of the unaffordable school tuitions and no desire of children in having good education. Both partial and simultaneous parameter tests in the logistic regression model show that children who lived in countryside, from poor families, males were the three factors that significantly affected the number of DOSC in the group age with odds ratio values 2.48; 2.37; 1.97 respectively.

1. Introduction

The issue of dropped out school children (DOSC) has been a public concern recently. Many studies have been conducted to investigate the complexity of the DOSC problem both in national and international level. Data shows that many children have no access to education. Globally, there were 61 million children in the primary education age group did not go to school in 2010 [1]. As a developing country Indonesia also faces similar problem. Around two and a half million children in the age group 7 -15 years were out of school [2].

East Nusa Tenggara Province (ENT) is one among the seven provinces in the eastern part of Indonesia that contribute to the large number of the out of school children in Indonesia. Most of out of school children in the area are males and live in the country side. A study conducted previously [3] shows that there were 795 out of school children in 10350 children in the junior high school age group in ENT.

A great number of investigations on DOSC have been conducted in many countries to explain factors contributing to dropping out of school. Rose [4] found that factors such as financial issues, teenage pregnancy, and family issues may have contributed to the number of students left school before graduation. Meanwhile Arun [5] indicated that physical disorders were the main reason for children in Kerala India for dropping out of school. Poverty has resulted in children have to work to help their families, as a result children might left school. Research conducted in The Philippines byRickey [6]found that children particularly those who lived in rural areas and who worked either part
or full time have bad impacts on their schooling status. They were more likely to drop out of school.
Then another research showed that gender issue is one of the crucial problems in basic education for
developing countries. The attendance rate between male and female might be significantly different.
The number of females who are out of school in urban and rural areas was two times higher than that
of males [7]

Logistic regression is employed to describe the relationship between binary dependent variable and
independent variables. It assumed that dependent variable has a binomial distribution [8]. In this case
the dependent variable is the state of the children’s drop out with category ‘yes’ and ‘no’. The current
study is to examine the characteristic of DOSC and to find a statistical model that explains factors that
contribute to the high number of DOSC in the age group 7 -18 years old in the province of East Nusa
Tenggara.

2. Experimental Method
This research employed primary data which had been collected throughout interviews using prepared
questionnaires in three selected districts; East Sumba, Sikka, and Kupang City during 6 months from
March to August 2016. The participants of the study were children who were out of schools and it was
selected using purposive sampling.

The dependent variable of the study was the state of the children’s drop out with category ‘yes’ and
‘no’. The independent variables are individual characteristics as gender (male and female), and
household characteristics as location of household (urban and rural), number of family members,
education level of mother (no education, primary school, package A, junior secondary school, package
B, senior secondary school, package C, academy, university), the occupation of household head (Civil
Servant, Private employee, Labour, Farmer (Owner), Businessman/Entrepreneur, Army/Police,
Pensioner, Fisherman, Craftsman, Driver, Motorcycle driver, and others), Income (the first category,
the second category, the third category, the fourth category), and the reasons for drop out of school.

Initially, descriptive analysis was undertaken to observe the characteristics of DOSC based on
individuals’ and households’ characteristics. A binary logistic regression model is then constructed by
employing a stepwise method. To evaluate predictors in the regression model, parameter estimation
significant test and model suitability test are carried out [8][9]. As the final step, model interpretation
considering the scales of independent variables is conducted.

3. Result and Discussion

3.1 Characteristics of DOSC in East Nusa Tenggara Province.
Figure 1 shows the distribution of DOSC based on gender and location of household. From 341
research samples, 194 children were found to be dropped out of school. The number was dominated
by male students (59%) whereas their counterpart female children were about 41%. With reference to
location of households, the majority of children who were dropped out from school living at rural area
at 65 %, whilst there were about 35% of them living in urban region.

![Figure 1. The Proportion of dropped out School Children Based on Gender and Location of Households](image)
This result is in line with a study conducted by Parikh A and Sadoulet E [14] using data survey in Brazil with 28,819 children involvement shows that children who live in rural areas spent most of their time to help their farmer parents. These children were at risk of being drop out of school.

With regard to the occupation of household head, it can be clearly seen in Table 1 that the majority of DOSC is from farmer family, which is 46.9%. Then, it is followed by laborer family and businessman family with 14.9% and 9.8% respectively. Meanwhile the proportion of DOSC from fisherman and craftsman is the same at 5.2%. In general, most of DOSC in East Sumba and Sikka District is from farmer family at 19.1% and 23.2% consecutively. However, in Kupang City district, the highest percentage of DOSC is from businessman family at 5.7%, and the proportion of DOSC from farmer and labor families in the region is the same at 4.6%.

Looking at the table into more detail, it is evident that the majority of DOSC is from family which has income in category two at 37.90% followed by family in the third category at 28.5%. Meanwhile, the proportion of DOSC who has family in the first and fourth category is 14.70% and 19.10% respectively.

| Table 1. The Percentage of DOSC based on Occupation of Parents, Income of Household, and Districts. |
|--------------------------------------------------|----------------|----------------|----------------|----------------|
| Districts                                        | Total          | East Sumba     | Sikka          | Kupang City    |
| Occupation of Parents                           |               |                |                |                |
| Farmer                                          | 19.1          | 23.2           | 4.6            | 46.9           |
| Laborer                                         | 4.6           | 5.7            | 4.6            | 14.9           |
| Businessman                                     | 2.6           | 1.5            | 5.7            | 9.8            |
| Fisherman                                       | 2.1           | 2.1            | 1              | 5.2            |
| Craftsman                                       | 2.1           | 2.1            | 1              | 5.2            |
| Civil Servant                                   | 3.1           | 0.5            | 0.5            | 4.1            |
| Driver                                          | 1             | 0.5            | 1.5            | 3              |
| Motorcycle Driver                               | 0             | 2.1            | 0.5            | 2.6            |
| Household wife                                  | 1             | 0              | 1              | 2              |
| Pensioner                                       | 1             | 0              | 1              | 2              |
| Others                                          | 1.5           | 1.3            | 1.5            | 4.3            |
| Total                                           | 38.1          | 39             | 22.9           | 100           |
| Income                                          |               |                |                |                |
| The First Category                              | 10.00         | 1.20           | 3.50           | 14.70          |
| The Second Category                             | 14.10         | 13.20          | 10.60          | 37.90          |
| The Third Category                              | 8.20          | 10.90          | 9.40           | 28.50          |
| The Fourth Category                             | 6.50          | 6.70           | 5.90           | 19.10          |
| Total                                           | 38.70         | 32.00          | 29.30          | 100.00         |

With reference to the highest level of education obtained by mothers as shown in Table 2 most of DOSC (39.2%) have mothers with primary education level followed by mothers with no education in 37.6% and mothers with junior high school education level in 10.8%. DOSC with mothers who have senior high school education was about 7.7%. It is interesting to note that with refer to districts the majority of DOSC in East Sumba and Kupang districts has mothers who mostly graduated from elementary school level at 13.9% and 12.4% respectively, in Sikka district is from family with mothers who has no diploma at 19.6%.

The result also shows that DOSC were mostly from families with 5 members with the percentage of 23.20%. This particularly happened in Sikka district with the proportion of 10.38%. However, the situation is quite different in other districts. In East Sumba district for example, the DOSC was mostly from families with 7 members at about 9.76% and City of Kupang was families with 6 members at 6.70%.

The level of education of mothers plays an important role in supporting children education. The result of descriptive method of the research indicates that most of drop out children in ENT are from family with mothers who just finish elementary education level. This is in line with what stated by
Mike [13] that education level of parents is highly important in reducing the number of out of school children.

Table 2. The Percentage of DOSC based on the highest Level of Mother’s Education, Family Size, and Districts

| The Highest Diploma of Mother | Districts | Total |
|------------------------------|----------|-------|
| No Diploma                   | East Sumba | Sikka | Kupang City | Total |
| Elementary School            | 13.4     | 19.6  | 4.6        | 37.6 |
| Package A                    | 0        | 0.5   | 0          | 0.5  |
| Junior High School           | 4.6      | 3.1   | 3.1        | 10.8 |
| Package B                    | 0        | 0     | 0.5        | 0.5  |
| Senior High School           | 3.6      | 1.5   | 2.6        | 7.7  |
| Package C                    | 0.5      | 0     | 0.5        | 1.5  |
| Diploma                      | 2.1      | 0     | 0          | 2.1  |

| Family Size | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 14 |
|-------------|---|---|---|---|---|---|---|---|----|----|----|----|
| Total       | 5.15|7.73|9.28|23.20|15.98|23.20|7.73|15.98|15.98|10.31|9.28|5.15|

3.2 Reasons for dropped out from schools

Data in Table 3 shows that the main reason for dropping out from schools is quite different amongst three categories of students and between genders. It is clearly seen that in senior high school group there were 2 reasons that caused children to be dropped out of schools; can’t afford to pay school fees and unwillingness to go to school which is recorded at 38.90% and 20.60% respectively. The reason to help parents in farm was also found as a significant factor that caused DOSC with percentage 19%.

At this level, the surroundings in children’s residences and getting married were the reasons that contributed significantly to the number of DOSC at about 7%. The economy factor was the main reason for both male and female children to be dropped out from school with the proportion of 21.4% and 17.50% respectively. The reason for work to help the economy of the families for male children was about one and a half higher than that of their counterparts’ female children with the proportion of 11.9% and 7.10% respectively.

In Junior High School group, the proportion of DOSC because of the inability to afford school fees was the highest at level of 28.3% followed by the reason to work for supporting families finance at 24.50%. In this group, the main reason for male children to be dropped out was school fees at 26.40% whereas the reason for female children was working for helping the families’ economy. The health reason contributed to the number of DOSC for both male and female children at 3.8%. The same proportion was contributed by the number of female DOSC because of having families.

In primary education group, economic factor that led to the inability in paying school fees was the main reason contributed to the number of DOSC with the percentage 46.70%. Working to help families contributed about 26.70% to the number of DOSC. Surprisingly, the percentage for reasons
for DOSC due to health issues and location of school which is far away from house is the same which is 6.70%.

**Table 3. Proportion of reasons for dropped out school children based on the age group of the children**

| Reasons                          | Senior High School group | Junior High School group | Primary School group |
|----------------------------------|--------------------------|--------------------------|----------------------|
|                                  | Males | Females | Total | Males | Females | Total | Males | Females | Total |
| Can’t afford school fees         | 21.40 | 17.50   | 38.90 | 26.40 | 1.90    | 28.30 | 20.00 | 26.70   | 46.70 |
| Work to help families            | 11.90 | 7.10    | 19.00 | 15.10 | 9.40    | 24.50 | 26.70 | 0.00    | 26.70 |
| School far from residence        | 0.80  | 0.00    | 0.80  | 0.00  | 7.50    | 7.50  | 6.70  | 6.70    | 13.30 |
| Incapable to learn in school     | 0.80  | 0.00    | 0.80  | 1.90  | 0.00    | 1.90  | 6.70  | 6.70    | 13.30 |
| The effect of surroundings in residence | 3.20 | 4.00    | 7.10  | 3.80  | 0.00    | 3.80  | 6.70  | 6.70    | 13.30 |
| Parents’ health                  |       |         |       |       |         |       |       |         |       |
| Experience health issues         | 2.40  | 2.40    | 4.80  | 3.80  | 3.80    | 7.50  | 6.70  | 6.70    | 13.30 |
| Unwilling to go to school        | 14.30 | 6.30    | 20.60 | 18.90 | 1.90    | 20.80 |       |         |       |
| Married                          | 0.00  | 7.90    | 7.90  | 0.00  | 3.80    | 3.80  |       |         |       |
| Total                            | 54.8  | 45.2    | 100.0 | 69.8  | 30.2    | 100.0 | 60    | 40      | 100   |

(69) (57) (126) (37) (16) (53) (9) (6) (15)

3.3 Statistical Inference

The research was aiming at analyzing factors that related to DOSC based upon individual and household characteristics in age group 7-18 years. A logistic regression method is employed to estimate the probability of a child being drop out of school by controlling some particular variables. The application of stepwise method has been carried out to determine variables that can be input into each model to produce the best binary logistic regression model under criteria in Peng, et al [10]. The results of the suitable model for the data are displayed in Table 4.

**Table 4. Best selected model for DOSC**

| Variables          | β   | Odds Ratio | Sig  |
|--------------------|-----|------------|------|
| Gender_Male        | 0.68| 1.974      | 0.003|
| Location_Rural     | 0.908| 2.479      | 0    |
| Income             |     |            |      |
| The First Category | 0.055| 1.057      | 0.889|
| The Second Category| 0.863| 2.369      | 0.008|
| The Third Category | 0.438| 1.549      | 0.19 |
| Constant           | -1.01| 0.364      | 0.001|

Table 4 shows that variables that affect the DOSC in ENT are gender, location of households, and the income level of parents with alpha 1%. It is clear from the table that Variable income is the most significant factor affecting the DOSC occurrence in ENT. Results show that its odds ratio is 2.37 which imply that if we compare children from family which has income level on the fourth level, children who are from the second category level are 2.37 times higher to be drop out of school. This is understandable since children in this group have financial issue which in turn will hinder the children in school. As a consequence, children might drop out from school.

The result of the research is in agreement with a study conducted by Sabates, R., et all [11] using multivariate logistic method towards 9047 children age 6 – 15 years in six districts of Bangladesh. The
results show that children who were out of school and who have never been at school were from low income and low education level families. Moore, et all. [12] in his study also found that the welfare level of families was related very closely to children schooling status. Furthermore, his census in 2007 in United States showed that children from very low level income tended to be dropped out from school, had no academic achievement and had health, mental behavior problems. Moreover, Arun, et all [5] found that financial problems has become the biggest issue in most cases of drop out children.

4. Conclusion
The results of the research show that the characteristics of drop out school children in ENT are males, lived in the country side, had farmer parents, had family size of 5, and had mothers with only primary education level male children. The main reason for children to drop out in all education levels is inabilities of paying the school fees. Factors such as location of households, income of family, and gender might have contributed to the number of drop out school children in East Nusa Tenggara Province Indonesia.

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