

Classification Fertility Preference among Married Woman in East Java, Indonesia Using Naive Bayes Classification

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Abstract

Fertility preference have an important role in achieving birth rates. According to the most recent Indonesian Demography and Health Survey, 2017, total fertility rate in east java has reached target of 2.1 children but the desired birth rate has increased from 2.0 to 2.1 children. This study examines classification of fertility preference in east java, Indonesia using *Naïve Bayes*. Data come from Indonesia Demography and Health Survey (IDHS) 2017, which limited on 2569 married woman in east java. The findings show married woman that have opportunity to having child again which have secondary complete education, work but have been out for less than 7 days, have middle wealth index, stay in rural, have age between 25 – 34 old, have more boys than girl and not using contraception.

Keyword: fertility preference, married woman, classification, naïve bayes

Introduction

In East Java, total fertility rate has decreased from 2.3 children in 2012 to 2.1 children in 2017. According to Indonesian Demography and Health Survey, 2017, total fertility rate in east java has reached the goal but the desired birth rate has increased from 2.0 children to 2.1 children in 2017. Fertility rate is influenced by individual fertility preference so there is a possibility that fertility rate are caused by fertility preference that are not in according with National Population and Family Planning Board program⁽¹⁾.

Fertility preference is desire of someone about family planning, family size, having more children, ideal number of children, birth planning and etc. Fertility preference is important because it can be used as a reference for estimating desired or undesired birth rates, estimating fertility and assessing unmet needs for contraception. Fertility preference has an important role in making decisions to use contraception. A study explains that fertility preference affect married women of childbearing age in terms of using contraception⁽²⁾.

Pullum theory explained that fertility preference can be influenced by social economic factors (education attainment, occupation, residence, and region), socio-cultural factors (religion and ethnicity), inter-spousal communication factor and demographic factors (age, number of living children and sex composition). A previous study about fertility preference explained that number of died children and wealth index can influence fertility preference⁽³⁾.

This study aims to classification and find factors that influence fertility preference among currently married woman in east java, Indonesia using naïve bayes classification. The existense of this research is expected to be an evaluation material for National Population and Family Planning Board in carrying out its duties so that performance achievements will be better in the future.

Method

This study was cross-sectional research and used data from Indonesian Demographic and Health Survey (IDHS) 2017. This study analysis was limited to those 2569 currently married woman aged 15-49 years and living with partner at the time of data collection.

Data were analyzed descriptively and using naïve bayes. Statistical analyses were performed using Rstudio. Dependent variable is fertility preference (1=want more child again 2=do not want child again). Independent variable are education attainment (0=no education, 1=incomplete primary, 2=complete primary, 3=incomplete secondary, 4=complete secondary and 5=higher), occupation (0=no work, 1=in the past year, 2=currently working, 3=have a job, but on leave 7 days), wealth index (1=poorest, 2=poorer, 3=middle, 4=richer, 5=richest), residence (1=urban, 2=rural), age, number of living children, number of died children, sex composition of children (1= boys=girls, 2= boys<girls, 3=boys>girls)

and contraception (0=no used, 1=traditional, 2=MKJP, 3=non MKJP).

Result

Characteristic of Respondents

Married woman in east java Indonesia that still want more child have characteristics likes complete secondary, wealth index in the middle, stay in rural, have age 25 – 35 years old, age at first cohabitation in 15 - 19 years old, have more sons than daughters and not using contraception.

Table1. Characteristics of Married Woman in East Java

Characteristics	Fertility Preference	
	Want More Child	Do not Want More Child
	n (%)	n (%)
Education attainment		
No education	33 (31.00)	73 (69.00)
Incomplete primary	90 (23.87)	287 (76.13)
Complete primary	421 (30.42)	963(64.81)
Incomplete secondary	574 (40.91)	738 (59.09)
Complete secondary	659 (47.79)	720 (52.21)
Higher	312 (54.93)	256 (45.07)
Employment status		
No work	816 (44.76)	1007(55.24)
In the past of year	146 (45.91)	172 (54.09)
Currently working	1104(37.58)	1834(52.42)
Have a job but on leave past 7 days	23 (48.94)	24 (51.06)
Wealth index		
Poorest	215 (39.67)	327 (60.03)
Poorer	426 (42.60)	574 (57.40)
Middle	510 (43.70)	657 (56.30)
Richer	457 (40.73)	665 (59.07)
Richerst	481 (37.14)	814 (62.86)
Residence		
Urban	914 (38.42)	1465(61.58)
Rural	1175(42.77)	1572(57.23)
Age		
< 24 years old	510 (89.47)	60 (10.53)
25 – 34 years old	1058 (63.66)	604 (36.34)
35 years and over	521 (18.00)	2373 (82.00)
Age at first cohabitation		
10 – 14	61 (15.21)	340(84.79)
15 – 19	828(37.88)	1358(62.12)
20 – 24	778(45.05)	949(54.95)
25 – 29	325(50.94)	313 (49.06)
30 – 34	62 (48.44)	66 (51.56)

Cont... Table1. Characteristics of Married Woman in East Java

Characteristics	Fertility Preference	
	Want More Child	Do not Want More Child
	n (%)	n (%)
35 – 39	18 (62.07)	11 (37.93)
40 – 44	15(100.00)	0
45 – 49	2(100.00)	0
Number of living children		
0	400(90.29)	14 (3.16)
1 – 2	1633(40.18)	2195(54.01)
3 – 4	54 (5.60)	758(78.63)
5+	2 (2.08)	70 (72.92)
Number of died children		
0	1960(38.35)	2756(53.93)
1 – 2	125 (28.22)	272(61.40)
3 – 4	4 (0.40)	6 (0.60)
5+	0 (0.00)	3 (100.00)
Composition of sex children		
Boys=girls	533(32.15)	1006(60.68)
Boys<girls	759(39.00)	1018(52.31)
Boys>girls	797(40.60)	1013(51.61)
Contraception		
No used	997(59.31)	573(34.09)
Traditional	100(26.74)	269(71.92)
MKJP	134(16.73)	396(49.44)
Non MKJP	858(31.65)	1799(66.36)

Classification of fertility preference using *naïve bayes*

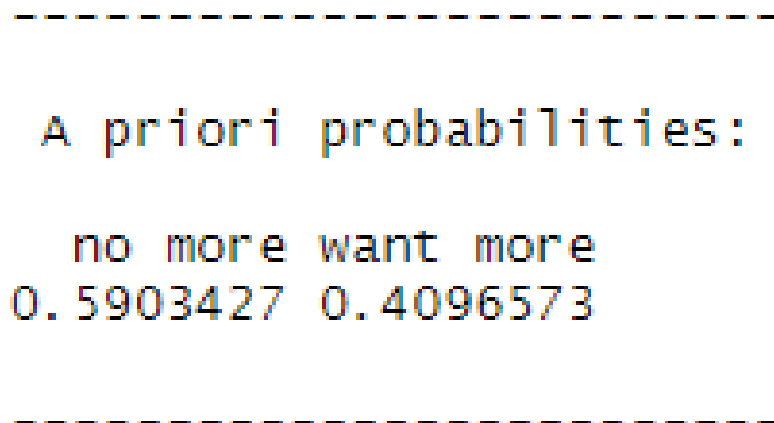


Figure 1. Prior Probability

The first step of classification using Naive Bayes, we should know about prior probabilities. Prior probabilities show us that married woman in east java still want

more child again have 0.409 or 40.96% from number of married woman in east java.

Table2. Probabilities X to Y (want more child)

Variable	Probabilities
Education attainment (complete secondary)	0.321
Employment status (have a job but leave on 7days)	0.555
Index wealth (middle)	0.241
Residence (rural)	0.537
Composition of sex child (boys>girls)	0.369
Contraception (not using)	0.453

Secondly, we need to know probabilities of variable X to Y. Table 2 show us the result of probability. Married woman that want more child have complete secondary education, have a job but leave on 7 days, middle wealth index, stay in rural, have child with boys more than girls, and not using contraception.

Table3. Accuracy of Classification Naïve Bayes Method

		Predicted	
		Want more child	No more child
Observed	Want more child	388	105
	No more child	80	651

The final step of classification using Naive Bayes, we need to know accuracy of model. Accuracy is used to show the overall classification performance, where the higher the level of accuracy, the better the classification performance. Based on table 3, the accuracy of Naive Bayes method is 84.49%. Based on the accuracy value, the accuracy is in the range of values 80 - 89 and that is good classification.

Discussion

Education level has an important role in decision making. women who have higher knowledge or education tend to have flexibility in making decisions regarding fertility preferences ⁽⁴⁾. In this study, married women who still wanted more children were those who had secondary complete. In Ethiopia, married women who have secondary complete have the decision to want more children ⁽⁵⁾.

Apart from education, employment status also influences decisions regarding fertility preferences. In this study, women who worked but quit 7 days ago tended to want to have more children. They were working but they have stopped working 7 days ago and have the decision to have another child. This can be based on the participation of women who work having their own challenges in raising children and reducing support for children ⁽⁶⁾.

The wealth index also has a role in making decisions about fertility preferences. This study show us that married women who have wealth index in medium are more likely to decide to want more children. women with higher education, good social status and good wealth index do not need to depend on children financially in the future ⁽⁷⁾. Married woman that have richeest or richeer wealth index are more likely to limit childbearing ⁽⁸⁾.

Fertility preferences in urban and rural areas tend to be different. In this study, those who live in rural areas want more children than those who live in urban areas. Study in Bangladesh also states that those living in rural areas are more likely to give birth to more children than urban areas. Mass media exposure and economic status that is responsible for it ⁽³⁾.

Composition of the number of children based on sex has an important role in making decisions on fertility preferences. In this study, married women who have more sons than daughters tend to want more children. This show us that the unbalanced gender composition of children tends to make mothers want more children ⁽⁹⁾. Other researchers also mentioned that most women want the same number of sons as daughters ⁽¹⁰⁾.

In this study also showed that married women in east java who are not currently using contraception prefer to want more children. They decide to not use any contraception while they want more child. They know if they want more child they do not use any contraception. This is in line with research in Kenya which shows that women who use contraception tend not to want more children ⁽²⁾.

Conclusion

1. Characteristics of married woman that want more child are they have education in complete secondary, have a job but leave on 7 days, wealth index in the middle, stay in rural, have more sons than daughters and not using contraception.

2. The married woman that want more child are age 25 – 34 years old, age at first cohabitation in 15-19 years old,

3. Naive Bayes classification has correctly explained the fertility preference data of 84.49%

Sugestion

It is necessary to suggest the community, especially for family planning and children's values. Family planning is intended so that the community can better determine the ideal number of families they want according to their social abilities. Family planning can also provide a picture of the community regarding the best

possible care for children, financially, psychologically and socially. Besides that, education about children's values is also important. Society needs to know that the value of children is the same regardless of boy or girl.

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