Analysis of Contraceptive Use Rates on Fertility Rates Using the Chaid Method (Chi-Squared Automatic Interaction Detection)

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A B S T R A C T

Fertility is the result of real reproduction (live born babies) from a woman or a group of womenor the number of children a woman will give birth during her reproductive life. Children born to a woman have 2 categories in the BKKBN, namely the number of children > 2 and the number of children 2. The fertility/birth rate according to the number of children > 2 reaches 60.9%, so it is not in accordance with the BKKBN target because the target birth rate > 30% belongs to the category tall. One of the efforts to control the fertility rate is by using contraception. Contraceptive device is a tool or method to prevent pregnancy. The existence of contraceptives but the fertility rate is still high So it is necessary to do targeting (targeting) with the CHAID (*Chi-square Automatic interaction detection*) method. This method is used for targeting and knowing which contraceptive method is the most significant, effective and with the strongest influence on fertility levels in order to launch efforts to target the BKKBN in seeking population control. The result of the largest *Chi-square* test is owned by female sterilization of 28.624. From the data, it can be concluded that the fertility rate/number of children is mostly affected by the use of female sterilization contraceptives, and female sterilization contraceptives are the most effective contraceptives. With this tool, it can help BKKBN in achieving the target. From these data, it can be concluded that the fertility rate/number of children is mostly affected by the use of female sterilized contraceptives, and female sterilized contraceptives are the most effective contraceptives. With this tool, it can help BKKBN in achieving the target. From these data, it can be concluded that the fertility rate/number of children is mostly affected by the use of female sterilized contraceptives, and female sterilized contraceptives are the most effective contraceptives. With this tool, it can help BKKBN in achieving the target. ≤ 2 atau $>$ 2.

Keywords:

Fertility, Contraception, CHAID Method

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1. INTRODUCTION

Fertility is the result of reproduction (live born babies) from a woman or a group of women [5]. In the KKBPK Program Performance and Accountability Survey (SKAP) book describes the notion of fertility (birth rate / number of children) is the number of children that will be born by a woman during her fertile period [5]. People who marry early can lead to a large number of fertility [6]. The solution to this problem is the use of contraceptives. In seeking population control, the BKKBN does not yet know which contraceptives are the most effective and have the most effect on fertility rates. Therefore, further studies are needed regarding the effectiveness of contraceptives and the results will be input to the BKKBN in their efforts to control population.

BKKBN in seeking population control must have targeting. The North Sumatra Province BKKBN did not achieve the fertility target because the total fertility rate for children with more than 2 children reached 60.9%, while the birth rate target was in the high category. Regarding this problem, Thomas Robert said that if the population is not controlled, the world will be overwhelmed by the population of the world itself $>$ 30% [7]. One of the major factors that greatly affect the fertility rate is the use of contraception.

Contraceptives are any action or device that functions to prevent pregnancy. Contraceptives have 2 methods, usually hormonal methods (pills, implants, birth control injections) and non-hormonal methods (IUDs, condoms, etc.) and other contraceptives) which can prevent sperm from reaching the cells. The use of contraceptives is one of the efforts to overcome the high fertility rate [5].

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The following is the percentage of birth rate categories for the number of children more than 2:

1. Birthrate $< 20\% =$ Low
2. Birthrate $20\% - 30\% =$ Currently
3. Birthrate $> 30\% =$ High

The data can show that fertility or birth rates for children more than 2 still have not reached the target desired by the BKKBN (National Population and Family Planning Agency) in seeking population control.

The CHAID method is an Automatic Interaction Detection (AID) method. The AID method is a technique for analyzing large data sets. This method can divide large data sets into non-overlapping sub-groups. This sub-group is intended for data with independent variables with ratios or interval ratios. This method is mainly used to trace structural connections in survey data. The CHAID method is an exploratory technique for analyzing large data sets, and its efficiency is sufficient to estimate the most important independent variable on the dependent variable [1].

The CHAID method has advantages, one of the main advantages is in exploring large amounts of data, all of which are categorical variables. By using the CHAID method, the results of the analysis will be easier to interpret and the authors will know the most significant predictor factor among other predictors. The CHAID method is one method for classifying data in a clear and structured manner [2].

2. RESEARCH METHODOLOGY

This type of research uses a quantitative correlational approach. Quantitative correlation is one type of research to determine the relationship between variables. Correlational research is conducted to determine whether or not there is a strong or weak relationship between variables on the research subject. This research uses secondary data, which is done by reviewing books related to research as a reference in completing research. This study looks for the interaction/correlation of the rate of contraceptive use on fertility levels in North Sumatra Province. The data used in this study is the 2019 SKAP data (KKBPK Program Accountability and Performance Survey) of the North Sumatra Province BKKBN with a total of 920 respondents.

The variable studied in this study is the rate of use of contraceptives on the level of fertility. The dependent variable in this study is the fertility rate $0: \leq 2$ (achieved the target) and $1: > 2$ (failed the target). While the independent variable is a contraceptive which can be seen in table 1 below :

Table 3.1 Researched Variables

No	Variable	Measurement result
1	Fertility rate by number of children	$0: \leq 2$ $1: > 2$
2	Female Sterilization/Tubectomy	1: yes 2: no
3	Male Sterilization/Vasectomy	1: yes
4	KB / Implant	2: no
5	IUD/Spiral	1: yes
6	Injection	2: no
7	Pill	1: yes
8	Emergency Contraception	2: no
9	Male Condom	1: yes
10	Female Condom	2: no
11	Intravag/Diaphragm	1: yes
12	Bead Bracelet	2: no
13	Lactational Amenorrhea (MAL)	1: yes
14	Periodic Abstinence	2: no
15	Intercourse Interrupted	1: yes
16	Other Ways	2: no

a. CHAID Metode (*Chi-square Automatic interaction detection*)

The CHAID (*Chi-square Automatic interaction detection*) method is an automatic interaction detection method known as Automatic Interaction Detection (AID). The AID method is a technique for analyzing large data groups. This method can divide large data groups into non-overlapping subgroups.

This subgroup is defined for data with independent variables on a scale or interval. This method is mainly used to trace structural connections in survey data. The CHAID method is an exploratory technique for analyzing large data sets, and its efficiency is sufficient to estimate the most significant independent variable on the dependent variable [1]. The CHAID (*Chi-square Automatic interaction detection*) method is used to divide the sample into two or more different groups according to certain criteria [3].

b. Variables in CHAID analysis (*Chi-square Automatic interaction detection*)

The independent and dependent variables in the CHAID analysis are categorical variables. CHAID has categorical independent variables which are divided into three different forms, namely monotonic, independent, and floating [9]

a. Monotonic (Monotonic)

Merging categories that occur if they are close together, i.e. variables whose categories follow the original order (ordinal data or data cana). For example: age and income.

b. Free (Free)

The categories in this variable can be combined or can be combined when they are close together or not (nominal data). For example: occupation, ethnicity, and geographic area.

c. Floating (Floating)

This variable category is monotonic, but for the missing value category or missing value category (which can be combined with any category), the categories in this variable can be considered monotonic [4].

c. CHAID Algorithm

The CHAID algorithm functions to separate and combine a category into the analyzed variables. The algorithm is divided into 3 steps, namely Merging, Splitting, and Stopping [4]. The tree diagram starts from the top tree, namely the root node through these 3 stages at each node (node) that is formed and repeatedly until it is finished [8].

a. Merger stage

At this stage, each category of independent variables on the dependent variable is very important, the significance of which is checked. The merging stage aims to combine non-significant categories so that they become significant variables which will then form a tree. To make it more clear, the merging steps will be explained below as follows:

1) Make a two-way contingency table for each independent variable to the dependent.
2) Find the value and calculate the *Chi-square* statistic in each pair of categories that can be selected to be combined into 1 category in testing the degrees of freedom in the contingency $\mathbf{2 \times j}$ sub-table formed by the pair of categories with the independent variables having as many as j categories. The steps of the *Chi-square* test are as follows:

a. Hypothesis

$\mathbf{H_0}$: there is no relationship with category i on the independent variable and category j on the variable

tied up

$\mathbf{H_1}$: there is a relationship of category i to the independent variable and category j to the variable that is

bound

b. Quantity needed

Count : $\mathbf{E_{ij}}$

Test statistics

$$X^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{\left(N_{ij} - \mathrm{E_{ij}}\right)^2}{\mathbf{E_{ij}}}$$

Description:

N_{ij}: there are many analyzes that are included in the i-th category of variable 1, j-th category of the 2nd variable

2nd variable

$\mathrm{E_{ij}}$: the expected frequency of observations contained in the i-th category of variable 1 j-th category of

2nd variable

r : the number of categories of the first variable

c : the number of categories of the second variable

$$\mathrm{E_{ij}} = \frac{n_i \times n_j}{\mathbf{n}}$$

c. Test Criteria

$\mathbf{H_0}$ rejected, if $X^2 \geq X^2_{a:(b-1)(k-1)}$

d. Conclusion

Estimates of $\mathbf{H_0}$ rejected or accepted.

3) For each contiguous *Chi-square* value, find the *p-value* side by side together. Among the non-significant pairs, select several pairs to be combined into a pair of the most similar category (the pair with the lowest paired *Chi-square* value and the highest *p-value*) into a single category and then proceed to the next stage. if any is higher than the *p-value*, so the pair is combined. Assuming a pair with an insignificant category, then the pair will be combined to produce a new variable, namely $\mathbf{X_1}$ dan $\mathbf{X_2X_{1,2}}$
4) Re-check the significance of the new category after being combined with others in the independent variable. If there are pairs that are not yet significant, then repeat the previous number step, which is 3. If all are significant, continue to the next step

   If there is a new combination of variables, these variables will be combined with other variables, for example, $\mathbf{X_{1,2}X_3X_4}, \ldots \mathbf{X_a}$ then see if the pair is significant or not, if all are significant, then you can proceed to the next step, which is 5, but if there is something that is not significant then return to the next step. before is 3
5) Calculate Bonferroni's corrected *p-value* based on the combined table [8].

b. Splitting Stage (*Splitting*)

The separation stage or known as splitting is separating the independent variables that are used as the best node separator or split node. The selection is done by comparing each *p-value* (from the merging step) on each independent variable.

The selection step is used to separate which independent variables will be used for the best point division. Sorting is done by comparing the *p-value* (from the merging stage) on each independent variable. The division steps are as follows:

1. Choose the independent variable which has the smallest (very significant) *p-value*. will be used as a split node.
2. If and only if the *p-value* is less than or equal to the alpha specification level, then the split node uses an independent variable. node sorting using this independent variable. If there is no independent variable with the most significant *p-value*, then no selection is made.

c. Stopping Stage (*Stopping*)

The stopping stage is the final stage of all stages if all variables are significant. If not, then it cannot be stopped. So the termination condition must be significant for all variables. This termination stage is carried out if the tree growth process must be stopped in accordance with the termination rules. This means that you have to repeat the combination steps for the next group section, the rules for stopping are as follows:

1) The independent variable is no longer important and clear to show the difference in the dependent variable. In other words nothing is insignificant
2) If the tree has reached the maximum value of the specified tree, the growth process will stop. for example, if the tree depth limit is set to 3, then the growth of the classified tree reaches 3, then tree growth will stop.
3) The size of the node or child node is less than the specified minimum child node, or contains too little analysis, the node will not be separated. Assuming that the minimum child node size is 10, if the child node size after splitting is less than 10, the node will not be split [8].

d. Bonferroni's Correction

Bonferroni correction is a correction process that is used when several statistical tests for freedom or independence are carried out simultaneously. The Bonferroni correction can be used in multiple comparisons.

When there are as many M test comparisons that have been assumed to be independent of each other, the probability of making a type one error (rejecting the supposedly accepted hypothesis) or (in one or more of each) will be equal to 1 minus the probability of not making a type one error in the test. -the test, where the value will $\alpha > \alpha$ be pre-determined. Mathematically, it can be formulated: [3].

$$1 - (1 - \alpha)^M \geq \alpha$$

With :

$M =$ Bonferroni multiplier

α = Type error I

Assuming that the independent variable has category c, after reducing the aggregation to category r, the bonferroni multiplication operation is a number of methods for combining category c into category r. Therefore, according to the type of variable, the value of the new *Chi-square* test is multiplied by Bonferroni.

e. Tree Diagram CHAID Classification

Classification is a decision tree process that functions to find a model with a view to getting predictions or estimates of an object that is not yet known. Classification consists of 2 types of groups, namely non-parametric and parametric classifications. Parametric groups lead to regressions and discriminants that require examples. While the non-parametric group leads to CHAID, CART, Exhaustive CHAID, and others who do not use the example[3]. CHAID will produce a classification tree diagram that is formed from several segments as shown below, which can be seen in Figure 2.1 as follows:

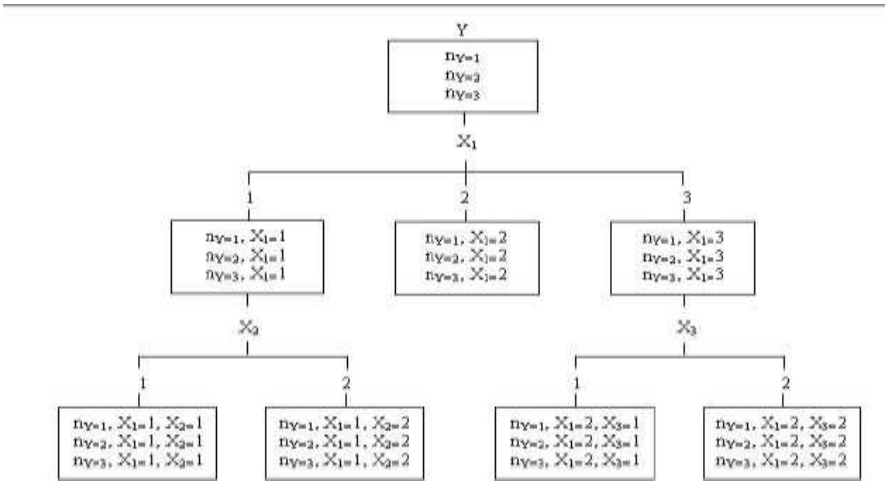

Figure 2.1 Tree Diagram CHAID (*Chi-square Automatic interaction detection*)

The CHAID (*Chi-square Automatic interaction detection*) diagram follows a "top-down" (rules that stop at the top from the bottom), where the tree diagram starts from the parent group (Root node) and continues to the group below the child group (child nodes). Continuously proceed from the distribution of the parent group in accordance with certain conditions. The node at the end of the branchless tree is called the terminal node. Each node of the tree diagram represents a subset of the studied sample group, containing all the samples and the absolute frequency of each category being compiled.

In the CHAID (*Chi-square Automatic interaction detection*) classification tree there is the term "depth" (*depth*), which means many levels from the child node to the last child node. In the first depth, based on the *Chi-square* test, the sample is divided by as $\mathbf{X_1}$ the best independent variable from the dependent variable. Each node will display information on the percentage of respondents for each category of dependent variable, and display information on the number of respondents for each node[8].

3. RESEARCH RESULT

a. Data Characteristics

This research consists of SKAP data (KKBPK Program Performance and Accountability Survey of North Sumatra Province 2019) containing 920 data on respondents in North Sumatra Province. which consists of 39.1% fertility rate/birth rate for the number of children ≤ 2 and 60.1% fertility rate/birth rate > 2 for the number of children recorded in the 2019 North Sumatra Province BKKBN data. The independent variables in this study are as follows:

1. MOW/Female Sterilization/Tubectomy
2. MOP/Vasectomy/Male Sterilization
3. Family planning implants/implants

4. IUD
5. KB injection
6. Family planning pills
7. Emergency contraception
8. Lactational Amenorrhea Method (MAL)
9. Intercourse Interrupted
10. Abstinence periodically
11. bead bracelet
12. Diaphragm/Intravag
13. Male and Female Condoms

b. CHAID analysis

The first step that must be done in the formation of a decision tree (decision tree) on CHAID (*Chi-square Automatic interaction detection*) by means of *Chi-square* testing to identify the most significant independent variable, if the most significant variable has been obtained, the splitting stage will be carried out. which will later be used as a separator or initial insulator in the formation of a decision tree. The results of the *Chi-squared* test on each independent variable can be seen in Table 3.1 as follows:

Table 3.1 First *Chi-squared* Test Results

Variable pairs	X^2 Count	X^2 Table	*P-value*	*P-value number*	Description
Female Sterilization/Tubectomy*Fertility/Number of Children	28,624	3,84146	0,000	8,79E-08	**Significant**
Male Sterilization/Vasectomy*Fertility/Number of Children	8,543	3,84146	0,003	0,003468	**Significant**
KB/Implant*Fertility/Number of Children	22,660	3,84146	0,000	1,93E-06	**Significant**
IUD/Spiral*Fertility/Number of Children	27,970	3,84146	0,000	1,23E-07	**Significant**
Injections*Fertility/Number of Children	22,169	3,84146	0,000	2,5E-06	**Significant**
Pills*Fertility/Number of Children	13,048	3,84146	0,000	0,000304	**Significant**
Emergency Contraception*Fertility/Number of Children	0,625	3,84146	0,429	0,429263	**Not significant**
Male Condom*Fertility/Number of Children	0,206	3,84146	0,650	0,650147	**Not significant**
Female Condom*Fertility/Number of Children	3,092	3,84146	0,078	0,078664	**Not significant**
Intravag/Diaphragm*Fertility/Number of Children	1,506	3,84146	0,220	0,21972	**Not significant**
Bead Bracelet*Fertility/Number of Children	0,250	3,84146	0,617	0,617325	**Not significant**
Lactational Amenorrhoea (MAL) *Fertility/Number of Children	10,935	3,84146	0,000	0,000943	**Significant**
Periodic Abstinence*Fertility/Number of Children	12,174	3,84146	0,000	0,000485	**Significant**
Intercourse Interrupted*Fertility/Number of Children	7,546	3,84146	0,006	0,006016	**Significant**
Other Methods*Fertility/Number of Children	5,862	3,84146	0,015	0,015472	**Significant**

Based on Table 3.1, it will be seen that the independent variable has a *p-value* that is less than the significance level $\alpha = 0.05$ or which has X^2 a count that exceeds the table X^2 value, in other words, the most significant independent variable will be sought on the fertility level/number of children. The *P-value* in Table 3.1 stands for

Pearson value or Pearson value. Which can be searched by statistical tests or *Chi-square* independence tests where the formula is:

$$X^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(N_{ij} - \mathrm{E_{ij}})^2}{\mathbf{E_{ij}}}$$

N_{ij} : The value in the i-th category of the first variable and the j-th category value of the second variable
$\mathrm{E_{ij}}$: Expected frequency
r : The result of the sum of the first variable
c : The result of the sum of the second variable

$$\mathrm{E_{ij}} = \frac{n_i \times n_j}{\mathbf{n}}$$

Table 3.2 Cross Tabulation (Crosstabulation)

N_{ij}	Female Sterilization/Tubectomy		Total
	Ya	Tidak	
Number_Children 2 ≤	289	71	360
Child_Number > 2	357	203	560
Total	646	274	920

In order to better understand the author will do it manually. The table above is a 2 x 2 cross tabulation of SPSS, the first step to find the *Chi-square* is to find the expected frequency value (Fh) as follows:

Expected Frequency (Fh)

$$Fh = \frac{Number\ of\ line}{The\ sum\ of\ all} \times Number\ of\ columns$$

$$\mathrm{E_{ij}} = \frac{n_i \times n_j}{\mathbf{n}}$$

$Fh =$ Number of children ≤ 2 use famale sterilization

$$\mathrm{E_{ij}} = \frac{n_i \times n_j}{\mathbf{n}} = \frac{646}{920} \times 360 = \mathbf{252,782609}$$

$Fh =$ Number of children ≤ 2 don't use famale sterilization

$$\mathrm{E_{ij}} = \frac{n_i \times n_j}{\mathbf{n}} = \frac{274}{920} \times 360 = \mathbf{107,2174}$$

$Fh =$ Number of children > 2 use famale sterilization

$$\mathrm{E_{ij}} = \frac{n_i \times n_j}{\mathbf{n}} = \frac{646}{920} \times 560 = \mathbf{393,21739}$$

$Fh =$ Number of children > 2 don't use famale sterilization

$$\mathrm{E_{ij}} = \frac{n_i \times n_j}{\mathbf{n}} = \frac{274}{920} \times 560 = \mathbf{166,7826}$$

Expected Frequency of Female Sterilization/Tubectomy

Expected Frequency	Yes	No
Number of children =<2	**252,782609**	**107,2174**
Number of children >2	**393,21739**	**166,7826**

$$X^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\frac{(N_{ij} - \mathrm{E_{ij}})^2}{\mathbf{E_{ij}}}$$

1. $Chi - square$ Number of children ≤ 2 use famale sterilization

$$X^2 = \frac{(289 - 252{,}782609)^2}{252{,}782609} = 5{,}189041444$$

2. $Chi - square$ Number of children ≤ 2 don't use famale sterilization

$$X^2 = \frac{(71 - 107{,}2174)^2}{107{,}2174} = 12{,}23402$$

3. $Chi - square$ Number of children > 2 use famale sterilization

$$X^2 = \frac{(357 - 393{,}21739)^2}{393{,}21739} = 3{,}335812357$$

4. $Chi - square$ Number of children > 2 don't use famale sterilization

$$X^2 = \frac{(203 - 166{,}7826)^2}{166{,}7826} = 7{,}864725$$

$$Chi - Square = 5{,}189041444 + 12{,}23402 + 3{,}335812357 + 7{,}864725 = \mathbf{28{,}624}$$

$X^2\ table\ 0{,}05(db) = X^2 table\ 0{,}05(k-1)(b-1)$
$= X^2 table\ 0{,}05(2-1)(2-1)$
$= X^2 table\ 0{,}05(1)(1)$
$= X^2 table\ 0{,}05(1)$
$= 3{,}8416$
Description
$k = Number\ of\ columns$
$b = Number\ of\ line$
$X^2\ count\ (\mathbf{28{,}624}) > X^2 table\ (3{,}8416)$

∴ There is a significant relationship between the use of female sterilization/tubectomy contraceptive methods and the fertility rate/number of children.

The most significant variable is determined by the smallest *p-value* or the largest X^2 calculated value. Of the 15 independent variables in table 3.1 the most significant to fertility/number of children based on the highest Count (*Chi-squared*) value X^2, which is 28.624, which is 0.000 (in SPSS) if detailed in MS Excel, the value is 8.79E-08 and the value obtained is 8.79E-08. The most significant variable is owned by the Female Sterilization/Tubectomy variable. Therefore, this variable will be used as the best splitting variable at the root node in the CHAID (*Chi-squared Automatic Interaction Detection*) decision tree.

In node 1, it can be seen the type of Female Sterilization/Tubectomy and according to the target of fertility/birth according to the number of children ≤ 2 (according to the target) as much as 25.9% and respondents who do not use contraceptives of the type of Female Sterilization/Tubectomy and do not meet the target of fertility/birth according to the number of children > 2 (not on target) as much as 74.1%, because at nodes 1 and 2 these can be separated and made another node, because there are still significant variables, node and 2 will produce a decision node that will branch again until it can no longer be separated and After that, the right conclusion is reached. Because what we are looking for is a category branch that does not use Female Sterilization/Tubectomy, the variable Female Sterilization/Tubectomy will no longer be included in the 2nd *Chi-squared* calculation.

Table 3.3 2nd *Chi-squared* Test Results

Variable pairs	X^2Count	X^2Table	*P-value*	*P-value number*	Description
Male Sterilization/Vasectomy*Fertility/Number of Children	0,000	3,84146	0,983	0,983184	**Significant**
KB/Implant*Fertility/Number of Children	2,687	3,84146	0,101	0,101179	**Significant**
IUD/Spiral*Fertility/Number of Children	4,282	3,84146	0,039	0,038518	**Significant**
Injections*Fertility/Number of Children	0,634	3,84146	0,426	0,425827	**Significant**
Pills*Fertility/Number of Children	1,871	3,84146	0,171	0,171316	**Significant**
Emergency Contraception*Fertility/Number of Children	2,564	3,84146	0,109	0,109329	**Not significant**
Male Condom*Fertility/Number of Children	0,012	3,84146	0,912	0,912331	**Not significant**

Variable pairs	X^2Count	X^2Table	*P-value*	*P-value number*	Description
Female Condom*Fertility/Number of Children	4,169	3,84146	0,041	0,041166	**Not significant**
Intravag/Diaphragm*Fertility/Number of Children	1,881	3,84146	0,170	0,170199	**Not significant**
Bead Bracelet*Fertility/Number of Children	0,075	3,84146	0,784	0,783615	**Not significant**
Lactational Amenorrhoea (MAL) *Fertility/Number of Children	0,199	3,84146	0,656	0,655817	**Significant**
Periodic Abstinence*Fertility/Number of Children	1,611	3,84146	0,204	0,204340	**Significant**
Intercourse Interrupted*Fertility/Number of Children	0,026	3,84146	0,872	0,872	**Significant**
Other Methods*Fertility/Number of Children	0,304	3,84146	0,581	0,581223	**Significant**

Based on Table 3.3, it can be seen that the IUD/Spiral variable is obtained which will become a branch of node 2 with the smallest *p-value* and $x^2$the largest count compared to other variables. Because the IUD/Spiral variable has an influence on Female Strealization and fertility/number of children, the IUD/Spiral variable will be used as a branch at node 2.

Table 3.4 3rd *Chi-squared* Test Results

Variable pairs	X^2Count	X^2Table	*P-value*	*P-value number*	Description
Male Sterilization/Vasectomy*Fertility/Number of Children	**1,074**	3,84146	0,300	0,300044	**Not significant**
KB/Implant*Fertility/Number of Children	**5,501**	3,84146	0,019	0,019006	**Significant**
Injections*Fertility/Number of Children	**13,576**	3,84146	0,000	0,000229	**Significant**
Pills*Fertility/Number of Children	**3,800**	3,84146	0,051	0,051253	**Not significant**
Emergency Contraception*Fertility/Number of Children	**0,057**	3,84146	0,811	0,811302	**Not significant**
Male Condom*Fertility/Number of Children	**7,238**	3,84146	0,007	0,007138	**Significant**
Female Condom*Fertility/Number of Children	**1,090**	3,84146	0,296	0,296471	**Not significant**
Intravag/Diaphragm*Fertility/Number of Children	**3,630**	3,84146	0,057	0,056747	**Not significant**
Bead Bracelet*Fertility/Number of Children	**0,090**	3,84146	0,764	0,764177	**Not significant**
Lactational Amenorrhoea (MAL) *Fertility/Number of Children	**12,031**	3,84146	0,001	0,000523	**Significant**
Periodic Abstinence*Fertility/Number of Children	**0,539**	3,84146	0,463	0,462847	**Not significant**
Intercourse Interrupted*Fertility/Number of Children	**0,859**	3,84146	0,354	0,354019	**Not significant**
Other Methods*Fertility/Number of Children	**0,042**	3,84146	0,838	0,837620	**Not significant**

Based on Table 3.4 Variable Lactational Amenorrhea (MAL) which will be a branch of node 3 because the *p-value* is the smallest and x^2 the count is the largest compared to other variables. Because the Lactational Amenorrhea (MAL) variable has an influence on Female Strealization and fertility/number of children, the Lactational Amenorrhea (MAL) variable will be used as a branch at node 3. There is a significant relationship between the use of contraceptives with Lactational Amenorrhoea (MAL) type on the fertility rate/ number of children.

Table 3.5 4th *Chi-squared* Test Results

Variable pairs	X^2Count	X^2Table	*P-value*	*P-value number*	Description
Male Sterilization/Vasectomy*Fertility/Number of Children	0,040	3,84146	0,842	0,841696	**Not significant**
KB/Implant*Fertility/Number of Children	2,889	3,84146	0,089	0,089205	**Not significant**
Injections*Fertility/Number of Children	1,171	3,84146	0,279	0,279286	**Not significant**
Pills*Fertility/Number of Children	2,581	3,84146	0,108	0,108175	**Not significant**
Emergency Contraception*Fertility/Number of Children	3,328	3,84146	0,068	0,068123	**Not significant**
Male Condom*Fertility/Number of Children	0,002	3,84146	0,965	0,964667	**Not significant**
Female Condom*Fertility/Number of Children	4,057	3,84146	0,044	0,043982	**Significant**
Intravag/Diaphragm*Fertility/Number of Children	2,455	3,84146	0,117	0,117129	**Not significant**
Bead Bracelet*Fertility/Number of Children	0,107	3,84146	0,743	0,743458	**Not significant**
Periodic Abstinence*Fertility/Number of Children	0,285	3,84146	0,593	0,593369	**Not significant**
Intercourse Interrupted*Fertility/Number of Children	0,468	3,84146	0,494	0,493799	**Not significant**
Other Methods*Fertility/Number of Children	0,757	3,84146	0,384	0,384413	**Not significant**

Berdasarkan Tabel 3.5 Kondom Wanita yang akan menjadi cabang dari node 4 dikarenakan nilai *p-value* yang paling kecil dan x^2 hitung yang paling besar dibandingkan variabel lain. Terdapat hubungan yang signifikan antara alat pemakaian kontrasepsi jenis Kondom Wanita terhadap tingkat fertilitas/jumlah anak.

Table 3.6 5th *Chi-squared* Test Results

Variable pairs	X^2Count	X^2Table	*P-value*	*P-value number*	Description
Male Sterilization/Vasectomy*Fertility/Number of Children	1,989	3,84146	0,158	0,158478	**Not significant**
KB/Implant*Fertility/Number of Children	1,485	3,84146	0,223	0,222959	**Not significant**
Injections*Fertility/Number of Children	10,925	3,84146	0,001	0,000949	**Significant**
Pills*Fertility/Number of Children	2,765	3,84146	0,096	0,096371	**Not significant**
Emergency Contraception*Fertility/Number of Children	2,549	3,84146	0,110	0,110338	**Not significant**
Male Condom*Fertility/Number of Children	13,600	3,84146	0,000	0,000226	**Significant**
Female Condom*Fertility/Number of Children	0,530	3,84146	0,466	0,466474	**Not significant**
Intravag/Diaphragm*Fertility/Number of Children	1,964	3,84146	0,161	0,161061	**Not significant**
Bead Bracelet*Fertility/Number of Children	1,676	3,84146	0,195	0,195489	**Not significant**
Periodic Abstinence*Fertility/Number of Children	0,166	3,84146	0,684	0,683923	**Not significant**
Intercourse Interrupted*Fertility/Number of Children	0,734	3,84146	0,392	0,391639	**Not significant**

Other Methods*Fertility/Number of Children	1,178	3,84146	0,278	0,277666	**Not significant**

Based on Table 3.6 Male condoms will become a branch of node 7 because the *p-value* is the smallest and x^2 the count is the largest compared to other variables. There is a significant relationship between the use of male condoms on the fertility rate/number of children. And then form a tree from the results of the CHAID analysis. The image below is an image of the CHAID tree as the final result in the form of a segmented tree as follows:

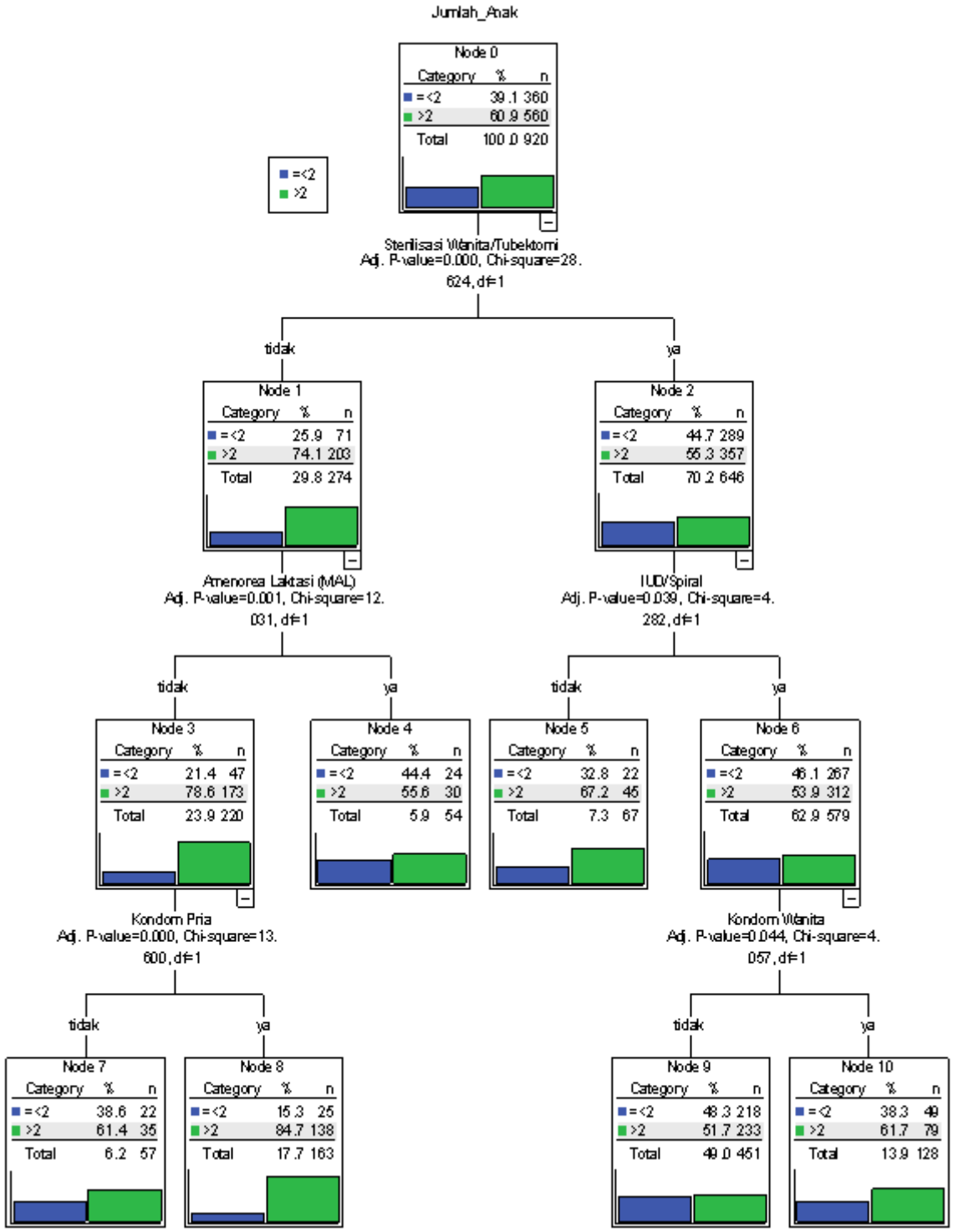

Figure 3.1 Decision Tree Using CHAID

4. CONCLUSION

Factors affecting fertility rate/number of children ≤ 2 (not at risk) or > 2 (at risk of failing the BKKBN target). Both according to the target or not according to the BKKBN target. the factors that influence it are:

1. Female Sterilization/Tubectomy
2. IUD/Spiral
3. Lactational Amenorrhea (MAL)
4. Female Condom
5. Male Condom

The types of contraceptives above are the most significant and most effective contraceptives in pursuing the BKKBN target for fertility rate/number of children ≤ 2 (according to the target) for population control.

The fertility rate/number of children ≤ 2 or > 2 is mostly affected by the use of female sterilized contraceptives, and female sterilized contraceptives are the most effective contraceptives to achieve the BKKBN target in seeking fertility/number of children ≤ 2 (not at risk). With this tool, it can help BKKBN in achieving the target and avoiding the risk of failing to target (fertility/number of children > 2), because in the *Chi-square* test results this type of contraceptive is the most significant at 28.624 in the *Chi-square* test. That's why this type of contraceptive is placed at the top as the root node and the parent node to form a child node.

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