FICCO PUBLIC HEALTH JOURNAL
Publisher: Ficco Scientific Corner
Website: http://journal.theficco.com/index.php/publichealth

e-ISSN: **3047-9126**
Vol. **02** | No. **01** | **April 2025**
Open Access

ORIGINAL ARTICLE

Discriminant Analysis with the Approach of Direct Method and Stepwise Method to Analyze the Factors That Influence the Occurrence of Hypertension in the Sukamara Health Center Area

Suska Evi Rahmanasari[1], Ratna Wardani[1]*, Yuly Peristiowati[1]
[1] Postgraduate Program in Public Health Sciences, STRADA University of Indonesia, Kediri; thenmustarkaan@gmail.com (SER); ratnawardani61278@gmail.com (RW); yulyperistiowati@strada.com (YP)
*** Author Correspondence;** E-mail: ratnawardani61278@gmail.com

DOI: 10.5281/zenodo.15307397	**Received:** January 30, 2025	**Accepted:** February 19, 2025	**Published:** April 30, 2025

ABSTRACT

Background: Discriminant analysis is one of the statistical techniques of multivariate analysis that can be used in analyzing dependency relationships, namely relationships between variables that can distinguish between response variables and explanatory variables or independent variables. There are several methods of approach taken so that the discriminant function is formed, including direct and gradual approach methods. This study is presented in a descriptive quantitative manner and the purpose of this study is to compare the factors that influence the occurrence of hypertension in the Sukamara Health Center area using direct and stepwise discriminant analysis. **Methods**: Data were collected using secondary data from the ASIK application in 2024 with 158 screening participants, with the response (dependent) variable being hypertension status and the explanatory (independent) variables being physical activity (X1), body mass index (X2), salt consumption (X3) and age (X4). **Results**: The results of the analysis showed that the salt consumption variable was the strongest discriminant variable because it was the variable with the largest coefficient with a canonical correlation value of (36.72% direct method, 36.12% stepwise method). This means that the salt consumption variable has the strongest separating power on the occurrence of hypertension in the Sukamara Health Center working area. **Conclusions**: In addition, based on the results of this study it is also known that the level of accuracy in predicting the incidence of hypertension, the direct approach method has a higher accuracy value (51.0%) compared to the stepwise approach method which only has an accuracy value of 48.4%, so it can be concluded that the direct approach method is the best research method in this study, and this method can also be used for research with other non-communicable disease data.

Keywords: Discriminant, Hypertension, Sukamara

INTRODUCTION

Discriminant Analysis is a statistical technique for grouping individuals into mutually independent groups based on a group of independent variables (Mattjik et al., 2004). Specifically, discriminant analysis can be used in cases where the response variable is qualitative data while the explanatory variables or independent variables are quantitative data. The purpose of discriminant analysis is to classify an individual or observation into a mutually exclusive/disjoint group or category and or exhaustive according to the number of explanatory variables or independent variables so that the separation between groups or categories can be maximized (Tri, 2012). After clustering, discriminant analysis is also useful in seeing the accuracy of the groupings formed (S. et al., 2020).

e-ISSN: **3047-9126**
Vol. **02** | No. **01** | **April 2025**

The purpose of this study is to compare the factors that influence the occurrence of hypertension in the Sukamara Health Center area using direct and stepwise discriminant analysis, by using non-communicable disease screening data from the ASIK application.

One of Indonesia's SDGs is the increasing problem of non-communicable diseases, one of which is the increasing prevalence of hypertension. High blood pressure or hypertension is one of the non-communicable diseases that contribute to high mortality and morbidity worldwide is still a public health problem today (Nurvita & Adi, 2020). As for the factors related to or that affect hypertension, the authors chose explanatory variables including the following: Physical activity (X1), Body Mass Index (X2), Salt or Sodium Consumption (X3), Age (X4) (Hidayati, 2018), and as an explanatory variable is hypertension status. The method used is descriptive analysis to determine the general description of the data, and Discriminant Analysis with a direct and gradual approach to the analysis of factors that influence the occurrence of hypertension in the Sukamara Health Center area, Central Kalimantan using secondary data obtained from the ASIK Application for Sukamara District in 2024.

METHODS

1. Discriminant analysis

Discriminant analysis is part of a multivariate analysis technique that has the aim of classifying, separating and allocating research objects or observations into groups or categories so that each object can be part or included in a particular group or category and no object is included in two or more groups or categories (Afifi, 1996). In the discriminant analysis technique procedure can be done by creating groups or categories that have a discriminant function based on dependent or independent variables (Sharma, 1996).

The discriminant analysis function can be used for categorizing or grouping new objects that have no known group members (Johnson & Wichern, 2007). Grouping in discriminant analysis is a priori which means that a researcher where the researcher already knows in advance which objects or individuals fall into certain groups or categories (Wardani, 2023). Usually the response variable can be divided into two classifications, but there are some response variables that have more than two classifications. If there are only two classifications, it can be called two-group discriminant analysis, but if there are more than two, it is called multiple discriminant analysis (MDA) (J.F Jr. et al., 2010).

According to Dian Norras (2013) the discriminant analysis method will give good results if the variables contained in each group are normally distributed and the covariance variants in each group are homogeneous. To get the desired data, it is necessary to test the assumptions before discriminant analysis is carried out, from the results of testing the assumptions, if the assumption test is not met it will provide less accuracy.

The objectives of discriminant analysis include:

a. Determine whether there is a real difference between some of the characteristics studied in distinguishing two or more groups.
b. Determine the independent variables that can make an important or meaningful contribution in distinguishing the average value of the Discriminant from two or more groups or categories.
c. Classify data into two or more groups based on the characteristics of the data under study.

The Discriminant Analysis model related to linear combinations is as follows:

$$Y = b_0 + b_1 X_1 + b_2 X_2 + ... + b_k X_k$$

Y = Discriminant value or score and is the dependent variable

Xk = kth variable and is an independent variable

bk = Discrimination coefficient of the kth variable

Published Online, Page. 1-10
e-ISSN: **3047-9126**
Vol. **02** | No. **01** | **April 2025**

In a population consisting of two groups and a certain number of observations in each i-th group, a linear combination of the independent variables separating the two groups is determined. The linear combination that can be formed from these two groups is:

$$Y_{1i} = a'X_{1i} = a_1X_{1i1} + a_2X_{1i2} + \cdots + a_pX_{1ip} \quad i = 1,2,\ldots,n_1,$$

$$Y_{2i} = a'X_{2i} = a_1X_{2i1} + a_2X_{2i2} + \cdots + a_pX_{2ip} \quad i = 1,2,\ldots,n_2,$$

using equation $\lambda = \frac{a'Ha}{a'Ea}$

where is $H = \sum_{i=1}^{2} n_i (\bar{x}_i - \bar{x})(\bar{x}_i - \bar{x})'$

$$E = \sum_{i=1}^{2}\sum_{j-i}^{n} (x_{ij} - \bar{x}_i)(x_{ij} - \bar{x}_i)'$$

and a is the coefficient vector xi is the i-th group mean vector, and x is the overall mean vector and n1, n2 are the sample sizes of groups 1 and 2.

From the above equation, it can be made as follows:

a`Ha = Ja' Ea

a`(Ha – JEa) = 0

a cannot be zero, because (2.3) will be of the form 11 = 0/0 so the solution is obtained from (Ha - JEa) = 0, this form can be expressed as

$(E-^{1}h - JV) = 0$

2. Discriminant analysis assumptions

There are assumptions in discriminant analysis that must be met, these assumptions are:

a. <u>Data is multivariate normally distributed</u>

According to Sharma (1996) if there is data that does not meet the multivariate normal assumption, it will affect the classification/grouping results where the grouping error will cause the estimated value to be greater than the parameter (overestimate) or smaller than the parameter (underestimate). Random variables (X1, X2, ,Xp) are multivariate normally distributed with parameters μ and Σ if they have a probability density function:

If (X1,X2,........,Xp) is multivariate normally distributed then (x -) Σ-1 (-) is distributed $\chi^2_{p.\alpha}$ where p is the number of predictor variables. To observe that the predictor variables are normally distributed, a graphical test is performed. Chi-Square QQ plot where the gerfik formed a linear line

$$X = \quad f(x) = \frac{1}{\left(\sqrt{2\pi}\right)^p |\Sigma|^{\frac{1}{2}}} exp\left[-\frac{1}{2}(x - \quad)' \Sigma^{-1}(\quad - \quad)'\right]$$

b. <u>Homogeneity of covariance matrix</u>

In addition to normal distribution, Discriminant Analysis must also fulfill the assumption of homogeneity of the covariance variance matrix. To test homogeneity according to Dian Norras (2014) using Box's M test. With the hypothesis in testing the covariance variance matrix is as follows: H0 = Σ1 = Σ2 = = Σk = Σ, H1 = there is at least one different covariance variance matrix

c. <u>No Multicollinearity between independent variables</u>

It is said that there is no multicollinearity if there is no correlation between independent variables. But if the two independent variables have a strong correlation, it is said that multicollinearity occurs, the decision-making criteria related to the multicollinearity test are as follows: (Ghozali, 2016)

1) If the VIF value < 10 or the tolerance value > 0.01, it is stated that there is no multicollinearity.
2) If the VIF value> 10 or tolerance value <0.01, it is stated that multiconierity occurs.
3) If the correlation coefficient of each independent variable> 0.8, multicollinearity occurs. But if the correlation coefficient of each independent variable <0.8 then there is no multicollinearity

3. Discriminant Analysis procedure

a. Multivariate Normal Test

Multivariate normal testing is done by finding the squared distance value for each observation, namely: $d_j^2 = (X_j - \bar{X})' S^{-1} (X_j - \bar{X})$ where X_j is the j observation and S^{-1} is the goodness of variance-covariance matrix S. Then d_j^2 are sorted from the smallest to the largest, selanjutnya dibuat plot d_j^2 with the Chi-Squared value $\chi_p^2\left(\frac{j - 1/2}{n}\right)$ where j = order 1,2,3..; n and p = many variables. If the plot results can

e-ISSN: 3047-9126
Vol. 02 | No. 01 | April 2025

approached by a straight line, it can be concluded that the multiple variables spread normally. To do the normality test can also be done with the help of using the SPSS program with the formulation of the hypothesis as follows:

H_0: the statements under study are normally distributed
H_1: the statements under study are not normally distributed normal
Test criteria: H_0 is rejected if the sig value <0.05 or vice versa.

b. Covariance Matrix Similarity Test

In addition to fulfilling the assumption that the data must be normally distributed in Discriminant Analysis, the data must also fulfill the assumption of homogeneity of the covariance variance matrix. According to Morisson (1990) to test the homogeneity of the covariance variance matrix between groups, Box's M test statistics are used. The hypothesis in testing the covariance variance matrix is as follows:
$H_0 : \Sigma 1 = \Sigma 2 = = \Sigma k = \Sigma$
H_1: there is at least one Σk that is not equal, where K = 1,2,.

Let Sk be the unbiased estimator of Σk which is the covariance matrix for the Kth group with (nk - 1) degrees of freedom. Sk is obtained from the following function:

$$S_k = \frac{1}{n_k - 1} \sum_{k=1}^{g} (x_k - \bar{x})(x_k - \bar{x})'$$

Then the equation for the covariance matrix is obtained as follows:

$$S = \frac{1}{\sum_{k=1}^{g} n_k - 1} \sum_{k=1}^{g} (n_k - 1) S_k$$

So that the homogeneity of the covariance matrix can be tested using Box's M test statistics as follows:
Box' M = MC -1
The values of M and C -1 are obtained from the following equation:

$$M = \sum_{k=1}^{g} (n_k - 1) ln|S| - \sum_{k=1}^{g} (n_k - 1) ln|S_k|$$

$$C^{-1} = 1 - \frac{2p^2 + 3p - 1}{6(p+1)(g-1)} \left[\sum_{k=1}^{g} \frac{1}{(n_k - 1)} - \frac{1}{\sum_{k=1}^{g} (n_k - 1)} \right]$$

Where:
p = number of independent variables
g = number of groups
nk = number of observations of the kth group
decision to reject H_0 if Box's M test $> \chi^2_{\alpha,v}$
where or if the significance value
$v = \frac{1}{2}(g-1)p(p-1)$ > 0,05.

The decision means that the covariance matrix between groups is different.

c. Test of Equality of Mean Vectors

Discriminant functions are basically used to explain differences between populations, so discriminant functions can be built if the average values of the populations are different. If the mean vectors between groups obtained are the same, then as a result the discriminant function obtained is not significant. The hypothesis for testing the difference in mean vectors between groups is as follows:
$H_0 : \mu_1 = \mu_2 = \mu_k = \mu$
H_1: there is at least one different μk, where k = 1,2,3,. G
The test statistic used is the V-Bartlett statistic, which follows the Chi-Square distribution with p (k-1) degrees of freedom, if H_0 is accepted. The V-Bartlett statistic is as follows:

$$V = -\left(n - 1 - \frac{(p+g)}{2} \right) ln \Lambda^*$$

Where:
n = number of observations
p = number of predictor variables
g = number of groups
Λ^*= Wilk's lamda

e-ISSN: 3047-9126
Vol. 02 | No. 01 | April 2025

$$\Lambda^* = \frac{|W|}{|J|} = \frac{|W|}{|B+W|}$$

Where

$$W = \sum_{i=1}^{n_j} \sum_{k=1}^{g} (x_{ik} - \bar{x}_k)(x_{ik} - \bar{x}_k)'$$

$$B = \sum_{k=1}^{j} (\bar{x}_k - \bar{x})(\bar{x}_k - \bar{x})'$$

$$J = \sum_{i=1}^{n_j} \sum_{k=1}^{g} (x_{ik} - \bar{x})(x_{ik} - \bar{x})'$$

Where;

nk = number of observations in the kth group
X_{ik} = i-th observation in the k^{th} group
$\bar{x}_k$ = mean vector of the k^{th} group
$\bar{x}$ = total mean vector

4. Discriminant analysis direct method

Estimation can be done after the analysis sample is obtained. There are two approaches available. First, the direct method, which is a way of estimating the discriminant function by including all predictor variables at once.

Each variable is included regardless of its discriminant power. This method is good if the predictor variables are acceptable theoretically.

5. Discriminant analysis stepwise method

In this method, predictor variables are entered in stages, depending on their ability to discriminate groups. This method is suitable if the researcher wants to select a number of predictor variables to form a discriminant function

RESULTS AND DISCUSSION

This research is presented in a descriptive quantitative manner and the purpose of this study is to compare the factors that influence the occurrence of hypertension in the Sukamara Health Center area using direct and stepwise discriminant analysis. Data were collected using secondary data from the ASIK application in 2024 with the response variable being hypertension status and the explanatory variables being physical activity (X1), body mass index (X2), salt consumption (X3) and age (X4).

Table 1. NCD's screening participant age categories

Age	Frequency
17-30	52
31-59	105
>60	1
Total	**158**

Table 2. NCD's screening participant blood pressure categories

Blood pressure	Frequency	Hypertension status
< 110mmHg	33	Hypotension
110-120 mmHg	63	Normal
121-129 mmHg	22	Prahypertension
130-139 mmHg	26	Hypertension I
>140 mmHg	13	Hypertension II
>180 mmHg	0	Crisis Hypertension
Total	**158**	

Some of the steps that make up the basic process in Discriminant Analysis include:

1. Sorting the variables into dependent and independent variables.
2. Determine the method to create the Discriminant function, namely:
   a. Simultaneous Estimation: all variables are entered together and then the Discriminant process is performed.
   b. Step-wise Estimation: variables are entered one by one into the Discriminant model.
3. Test the significance of the Discriminant function formed, using Wilk's Lambda, F test values, etc.
4. Testing the classification accuracy of the discriminant function (individually with casewise diagnostic)

e-ISSN: **3047-9126**
Vol. **02** | No. **01** | **April 2025**

5. Interpreting the Discriminant Function
6. Perform validation test of Discriminant

a. Discriminant Analysis

1. First step sorting the variable and determine method to create the Discriminant function

Table 3. Variables analyzed

Dependent	Independent
Hypertension status	Physical Activity (X1), Body Mass Index (X2), Salt Consumption (X3) Age (X4).

2. This research is presented in a descriptive quantitative manner with discriminant analysis direct and stepwis

Table 4. Normality test

Test of Function(s)	Wilk's Lambda	Chi-square	Approximate F
Salt consumption	,762	11,883	
Body mass index	,655	8,900	
Age	,574		7,725

In the Kolmogorov Smirnov statistical test, the sig value is> 0.05, so H0 is accepted, which means the data is normally distributed.

Table 5. Homogenity test

Variable	Wilks' Lambda
Age	,863
Body mass indeks	,834
Physical activity	,959
Salt consumption	,762

Wilk's Lambda on all predictor variables is close to 1, which means that the predictor variable data tends to be homogeneous.

Table 6. Multicollinearity test

	Tolerance	VIF
Age	,943	1,061
Body mass index	,924	1,082
Physical activity	,993	1,007
Salt consumption	,959	1,043

There is no multicollinearity, tolerance value > 0.1 and VIF value < 10. All the data used has met the required assumptions, then this research can be continued.

3. Test the significance of the Discriminant function formed

Table 7. Test the significance of the Discriminant function formed (direct methode)

Test of Function(s)	Wilk's Lambda	Chi-square
Salt consumption	,550	90,663
Body mass index	,869	21,266
Age	,946	8,356
Physical activity	,999	,200

Table 8. Test the significance of the Discriminant function formed (stepwise methode)

Characteristics	Blood pressure	Age	Body mass index
Kolmogorov-Smirnov Z	1,513	,799	,861

From the table above, the significance value is 0.000 (0.000 <0.05), so H0 is rejected, so it can be concluded that the variables studied have differences between groups.

4. Testing the classification accuracy of the Discriminant function

Table 9. Discriminant function Test (direct methode)

	Function
Age	,052
Body mass index	,124
Physical activity	-,221
Salt consumption	1,035
(Constant)	-6,446

Based on the results of the canonical discriminant function coeffcients in the table above, the following equation is obtained:

$$Y = -6{,}446 + 0.052\,X_1 + 0.124\,X_2 + (-0.221\,)X_3 + 1.035\,X_4$$

e-ISSN: 3047-9126
Vol. 02 | No. 01 | April 2025

Table 10. Discriminant function Test (stepwise methode)

Variable	Function
Age	,050
Body mass indeks	,127
Salt consumption	1,070
(Constant)	-6,930

Based on the results of the canonical discriminant function coeffcients in the table above, the following equation is obtained:

$Y = -6{,}930 + 0.050\ X_1 + 0.127\ X_2 + 1{,}070X_3$

The coefficients represent the linear combination of the independent variables that best separates the groups.

5. Interpreting the Discriminant Function

The interpretation of the discriminant function uses the eigenvalue table, in the eigenvalues table there is a canonical correlation value. The canonical correlation value is used to measure the degree of discriminant results or the amount of variability that can be explained by the independent variable on the dependent variable.

Tabel 11. Eigenvalue (direct methode)

Test of Function(s)	Eigenvalue	% of Variance	Cumulative %	Canonical corelation
Salt consumption	,581	80,0	80,0	,606
Body mass indeks	,089	12,2	92,2	,286
Physical Activity	,055	7,6	99,8	,229
Age	,001	,2	100,0	,036

It is known that the canonical correlation value for variable : (direct methode)

1. Salt consumption is obtained at 0.606 if squared becomes (0.606 x 0.606) =0.3672, which means 36.72% of the variance in salt consumption from the independent variable can be explained from the discriminant model formed.
2. Body Mass Index is obtained at 0.286 if squared becomes (0.286 x 0.286) = 0.0818, which means 8.18% of the variance in Body Mass Index from the independent variable can be explained from the discriminant model formed.
3. Physical Activity is obtained at 0.229 if squared becomes (0.229 x 0.229) = 0.0524, which means 5.24% of the variance in Physical Activity from the independent variable can be explained from the discriminant model formed.
4. Age is obtained at 0.036 if squared becomes (0.036 x 0.036) = 0.0013 which means 0.13% of the variance in Age from the independent variable can be explained from the discriminant model formed.

Tabel 12. Eigenvalue (stepwise methode)

Test of Function(s)	Eigenvalue	% of Variance	Cumulative %	Canonical corelation
Salt consumption	,564	83,5	83,5	,601
Body mass index	,085	12,6	96,1	,280
Age	,027	3,9	100,0	,161

e-ISSN: **3047-9126**
Vol. **02** | No. **01** | **April 2025**

From the table above, 3 variables are obtained:

1. Salt Consumption, obtained a canonical correlation value of 0.601, which when squared (0.601 x 0.601) = 0.3612, which means 36.12% of the variance in Salt Consumption from the independent variables can be explained from the discriminant model formed.
2. 2. Body Mass Index, obtained a canonical correlation value of 0.086, which when squared (0.280 x 0.280) = 0.0784, which means that 7.84% of the variance in Body Mass Index from the independent variable can be explained from the discriminant model formed.
3. Age, obtained a canonical correlation value of 0.161, which when squared (0.161 x 0.161) = 0.0259, which means that 2.59% of the variance in Body Mass Index of the independent variable can be explained from the discriminant model formed.

6. Perform validation test of discriminant

Table 13. Perform validation test of discriminant (direct methode)

Classification Results[a]

		StatusHipertensi	Predicted Group Membership					Total
			Hipotensi	Normal	Prahipertensi	Hipertensi I	Hipertensi II	
Original	Count	Hipotensi	19	6	1	2	1	29
		Normal	14	30	17	6	3	70
		Prahipertensi	2	0	10	3	3	18
		Hipertensi I	2	4	7	12	2	27
		Hipertensi II	1	0	1	2	9	13
	%	Hipotensi	65,5	20,7	3,4	6,9	3,4	100,0
		Normal	20,0	42,9	24,3	8,6	4,3	100,0
		Prahipertensi	11,1	,0	55,6	16,7	16,7	100,0
		Hipertensi I	7,4	14,8	25,9	44,4	7,4	100,0
		Hipertensi II	7,7	,0	7,7	15,4	69,2	100,0

a. 51,0% of original grouped cases correctly classified.

Table 14. Perform validation test of discriminant (stepwise methode)

Classification Results[b,c]

		StatusHipertensi	Predicted Group Membership					Total
			Hipotensi	Normal	Prahipertensi	Hipertensi I	Hipertensi II	
Original	Count	Hipotensi	19	5	2	1	2	29
		Normal	14	28	15	10	3	70
		Prahipertensi	2	1	10	3	2	18
		Hipertensi I	3	2	7	11	4	27
		Hipertensi II	1	0	3	1	8	13
	%	Hipotensi	65,5	17,2	6,9	3,4	6,9	100,0
		Normal	20,0	40,0	21,4	14,3	4,3	100,0
		Prahipertensi	11,1	5,6	55,6	16,7	11,1	100,0
		Hipertensi I	11,1	7,4	25,9	40,7	14,8	100,0
		Hipertensi II	7,7	,0	23,1	7,7	61,5	100,0
Cross-validated[a]	Count	Hipotensi	16	8	2	1	2	29
		Normal	16	26	15	10	3	70
		Prahipertensi	2	1	10	3	2	18
		Hipertensi I	3	4	6	9	5	27
		Hipertensi II	1	0	3	3	6	13
	%	Hipotensi	55,2	27,6	6,9	3,4	6,9	100,0
		Normal	22,9	37,1	21,4	14,3	4,3	100,0
		Prahipertensi	11,1	5,6	55,6	16,7	11,1	100,0
		Hipertensi I	11,1	14,8	22,2	33,3	18,5	100,0
		Hipertensi II	7,7	,0	23,1	23,1	46,2	100,0

e-ISSN: 3047-9126
Vol. 02 | No. 01 | April 2025

The next test will see how much the results of the classification are correct or in other words what percentage of misclassification in the classification process, this can be seen from the discriminant result table According to Santoso, S. (Santoso, 2002) if the accuracy value is> 50% then the discriminant model above can be used to classify the case being analyzed.

CONCLUSIONS

The results of the analysis carried out in this study are comparing the approach method in discriminant analysis, namely the direct approach with a stepwise approach using several variables that show consistency in several results. The variables of salt consumption, body mass index and age show the most dominant results and have the strongest differentiating factors in both methods of discriminant analysis approach, this shows that excessive salt consumption will cause retention or increase the volume of water in the body which can result in body mass index will increase even excess, this will affect the incidence of hypertension in the Sukamara Health Center working area. Likewise, the higher the age, there will be natural changes in the body that result in the heart, blood vessels and hormones also experiencing changes in the vascular system.

On the other hand, there is a significant difference between the two model approaches in this study in predicting the accuracy of hypertension groups in the Sukamara Health Center working area. Where the direct approach method has a higher prediction of the accuracy of the hypertension group compared to the stepwise approach method, this is probably because in the stepwise approach method there are variables that are discarded because they do not have a significant effect.The results of the analysis carried out in this study are comparing the approach method in discriminant analysis, namely the direct approach with a stepwise approach using several variables that show consistency in several results. The variables of salt consumption, body mass index and age show the most dominant results and have the strongest differentiating factors in both methods of discriminant analysis approach, this shows that excessive salt consumption will cause retention or increase the volume of water in the body which can result in body mass index will increase even excess, this will affect the incidence of hypertension in the Sukamara Health Center working area. Likewise, the higher the age, there will be natural changes in the body that result in the heart, blood vessels and hormones also experiencing changes in the vascular system.

On the other hand, there is a significant difference between the two model approaches in this study in predicting the accuracy of hypertension groups in the Sukamara Health Center working area. Where the direct approach method has a higher prediction of the accuracy of the hypertension group compared to the stepwise approach method, this is probably because in the stepwise approach method there are variables that are discarded because they do not have a significant effect.

ACKNOWLEDGMENTS

For future research, it is hoped that there will be research related to the factors that influence the occurrence of hypertension in Central Kalimantan using the discriminant analysis method by comparing the direct approach method with other approaches and considering other variables that have contributed to influencing the occurrence of hypertension in Central Kalimantan.

REFERENCES

Afifi, A. A., & Clark, V. (1996). Computer-Aided Multivariate Analysis (3rd ed.). Chapman & Hall/CRC

Published Online, Page. 1-10
e-ISSN: **3047-9126**
Vol. **02** | No. **01** | **April 2025**

Ghozali, I. 2016. "Aplikasi Analisis Multivariete Dengan Program IBM SPSS 23." Edisi 8.

J.F Jr., Hair, R. E. Anderson, and R. L. Thatham W. C. Black. 2010. Multivariate Data Analysis. Seventh. New Jersey: Prentice-Hall Internasional, Inc.

Johnson, N., and D. Wichern. 2007. Applied Multivariate Statistical Analysis. 6th Edition.New. Jersey: Prentice Hall.

Mattjik, A. A., and dkk. 2004. Modul Teori Pelatihan Analisis Multivariat. Bandung: Departement Statistika. FMIPA IPB.

Nurvita, S., and M. S. Adi. 2020. "Intervensi Musik dan Relaksasi Untuk Pasien Hipertensi: A Literature Riview." Jurnal Penelitian Kesehatan" SUARA FORIKES"(Journal of Health Research" Forikes Voice" 11:1–5.

S., N. A., M. A. Tiro, and A. S. Ahmar. 2020. "Metode Analisis Diskriminan dalam Pengelompokan Kabupaten/Kota di Provinsi Sulawesi Selatan Berdasarkan Indikator Indeks Pembangunan Manusia." VARIANSI: Journal of Statistics and Its Application on Teaching and Research 2(1):40. doi: 10.35580/variansiunm14978.

Santoso, S. 2002. Buku Latihan SPSS Statistik Multivariat. PT. Elex Media Komputindo.

Sharma, S. 1996. "Applied Multivariate Technique. John Willey and Sons."

Tri, F. Maria. 2012. Analisis Diskriminan terhadap perilaku mahasiswa dalam mengkonsumsi makan cepat saji: studi kasus para mahasiswa di UPI, ITB. UNLA, dan UIN Sunan Gunung Djati, Universitas Pendidikan Indonesia.

Wardani, Ratna. 2023. Statistika Dan Analisis Data. Vol. I. DeepPublish.