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# Identification of Environmental Factors Influencing the Quality of Housing Environment

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## ABSTRACT

*The uncontrolled growth of population has influenced some pressure to space and environment. As an effect, we must making serious efforts of the housing demand and its facilities. Meanwhile, good quality of the healthy housing is everyone's need. The land limitedness sometimes brings some quite bad impacts to the quality of the environment itself and eventually will cause the decrease of the quality of environmental housing and people's living quality.*

*This research is aimed to analyze some factors which influence the quality of housing environment. This research is implemented in a local/self-supporting and formal housing in district of North and South Cikarang. We obtain data from the survey result and questionnaires addressed to some samples of people around the location. We use descriptive and discriminated analysis to find out the significant factors of the housing quality and get discriminated equation to estimate the quality of the housing environment. The result of the research states that the quality of air/noise, reforestation/greening, road width, transportation and numbers of places worship are the main factors which determine the quality of the healthy housing whether it is good or not. Also we get the discriminated equation as follow:*

$$Y = 0,601X1 + 0,165X2 + 0,1615X3 + 0,590X4 + 0,471X5 - 0,662X6 - 4,835$$

*Cutoff point of group of housing environment health is - 0.6. This means that the environment can be included in good health of environment if  $Y > 0.6$ . Classification accuracy is 67.8%.*

## Keywords

*Housing, health of environment, diskriminan, cutoff point*

## 1.INTRODUCTION

Housing area have been increasing about 50% during ten years ago, and most of them as formal housing at urban

area. An Uncontrolled of housing growth cause the decreasing of environmental quality of residential

The growth of residential are not followed the development of infrastructure which to serve the residential for basic needs such as water, to maintain environmental sustainability and support the flow of goods and people between internal and external regions in the city can cause of degradation for quality environment of residential.

This research carried out at Cikarang District of North and South. The reason for choosing the location is as these districts are located in Bekasi Regency, which borders directly with Jakarta, so Bekasi obtain additional population of DKI Jakarta

The research focused on studying the factors influencing the quality of housing environment. The objectives of the research were: (1) to evaluated the residential quality based on standard guidelines by Department of Health (2) to identify the factor assosiated to quality of housing environment, (3) to make the descriminan formulation of housing environmental quality

## 1.1.Housing and Residential

Housing according to Decree of The Minister for Public Health of RI Number 829/MENKES/SK/VII/1999 is functioning house group as residence environment or dwelling provided with environmental facilities and basic facilities.

Residential according to Minister for Public Health of RI number 288/MENKES/SK/III/2003 is housing, hostel, dormitories, kondomonium / apartment, mansions and of a kind him.

According to SNI concerning Procedures Planning of residential defined that housing environment is a group of houses with environmental facility. Environmental facilities are road/street, drinking water channel, drainage,



solid waste disposal, electrics network. And the infrastructure at residential consists of educational facilities, healthy facilities, commercial, governance, public service, recreation, and culture.

## 1.2. Environmental Quality of Housing

Environmental Quality of Housing consists of physical and non physical component (social of economics). Direktorat Cipta Karya (1979) specified level of quality of housing environment use parameter such as . (1) vulnerability of location against natural disasters; (2) quality of fresh water resource; (3) quality of air and noise pollution; (4) greening/penghijauan; and (6) facilities and infrastructure consisting of sanitation, waste management, drainage/sewerage system, condition of roads, transportation, education and worshipping facilities.

Identification of Housing Environmental Health Quality level of each type of residential areas was evaluated based on basic standard of Minister of Health Republic of Indonesia no:829/Menkes/VII/1999 regarding criteria of Housing Environmental Health Quality covering six aspects: critical areas, quality of air and noise pollution, reforestation/greening, disease vectors, and environmental facilities, and infrastructure such as transportation facility, school, worship facilities and vector of disease

## 2. METHODOLOGY

### 2.1. Stage sampling

Type of the research used is analytic descriptive research. Amount of Sample is taken pursuant to formula of Slovin, 1994 as follows:

$$n = \frac{N}{1 + N e^2}$$

in this case:

n = amount of sample every types housing

N = amount of populations every housing type in one segment

e = diffuseness of carelessness because of mistake of intake of sample which can be tolerated. To the amount of populations 500-2500, assess e gyrate 2 - 10%.

### 2.2 Phase of Identification and Classification of Health of Environment Housing

Factor Physical and non physical at indicator mount the quality of health of housing environment is given by score 1 to 5 at propagated questionnaire to resident in region of North and South Cikarang.

Classification analysis result of calculation of health of housing environment is based on the amount of variable scores health of housing environment and factor of scale is later; then calculated by highest and the lowest score.

According To Direktorat Cipta Karya(1979), classes amount made by classification 4 class health of environment that is:

- class 1 : very good,
- class 2 : good,
- class 3 : rather good,
- class 4 : unfavorable.

Formula used in class interval is:

$$\text{class interval} = \frac{\text{The highest score} - \text{The lowest score}}{\text{The amount of class}}$$

- Class 1 : very good (75 – 60)
- Class 2 : good (59 – 44)
- Class 3 : rather good (43 – 28)
- Class 4 : unfavorable. (27 – 15)

Hereinafter to discriminan, analysis to know variable having an effect on (variable of predictor) at forming of health of environment housing of dab obtained also equation of model of its discriminan.

Through analytical method will be identified and tested by variable data in each housing environment:

1. Variable which is enough significant statistically as predictor variable (with f value < 0.05) so automatically process of analysis will be discontinued
2. Model of Discriminan used is  
 $Y = C + B_1X_1 + B_2X_2 + B_3X_3 + B_nX_n$

Where:

- Y is the level of quality of health of housing environment at selected housing
  - C is number of Constanta of equation of discriminan
  - B1, B2, B3 and of Bn is the level of function value from each predictor variable X1, X2, X3, and Xn
3. Critical point is boundary value determining what is type health of housing environment including very good classification, good, rather good, unfavorable, according to Santosa and Tjiptono (2004), and determined based on the calculation formula:

$$Z_{cu} = (Nb.Za + Na.Zb) / (Na + Nb)$$

## 3. DATA ANALISYS

The health of environment housing data obtained from propagated questionnaire to 182 houses in district of North and south Cikarang.

### 3.1. Health of Environment Housing

Measurement of health of housing environment is meant to know how condition of quality of environment which is in



district of North and South Cikarang. Measurement of health of housing environment is based on some physical variables and non-physical. Pursuant to field survey obtained data that without differentiating self-supporting housing and foral housing explained that counted 22 boxes of sample which in district of North South Cikarang and enter in criterion health of good housing environment (Class of II) and 2 boxes of sample enter in criterion health of rather good housing environment (class of III).

Meanwhile for the district of North Cikarang that counted 20 boxes of sample, existing enters in criterion health of good environment (class 2) and 5 boxes of sample enter in criterion health of rather good housing environment (class 3).

### 3.2. Analysis of Discriminan

Analysis of discriminan is aimed to know some phenomenon that is how relation of level the quality of health of housing environment with characteristic variable at housing area. What kind of variable of having an effect on or becoming variable of predictor at level of quality of health of housing environment.

Analysis Discriminan of Health of Environment Housing Health of housing environment in North and South Cikarang reside in two conditions that is health of good housing environment ( class 2) with score value range between 46 - 59 and health of rather good environment ( class 3) with value 30 - 45.

Pursuant to analysis of discriminan for the health of housing environment, obtained data that from 13 variable found on health of housing environment, there are 6 most differentiating variables to class health of good housing environment ( class 2) with class health of rather good housing ( class 3). This matter can be seen at table 1.

Variable with value of significant F 0.05 meaning there is difference between environmental class 2 with environmental class 3. Variable differentiating is the quality of air / noise, tree protector of road, green space, wide environmental road, transportation medium and Places worship. Meanwhile variable which cannot differentiate between rather good and good environmental quality is location, quality of ground water, sanitary, solid waste disposal, drainage, condition of environmental road, amount of school and vector diseases

Table 1. Significancy Score  
Health Of Environment Housing

3 Tests of equality of group means					
	Wilks' Lambda	F	df 1	df 2	Sig.
Quality air, noise	,846	10,358	1	57	,002
Tree protector of road	,911	5,591	1	57	,021
Green Space	,865	8,898	1	57	,004
Wide of road	,901	6,294	1	57	,015
Transportation facility	,922	4,830	1	57	,032
Places worship	,900	6,351	1	57	,015

Process hereinafter is to look for equation of discriminan. It is approach model of calculation of class type of health of housing environment  
table 2. Tables of discriminan function of health of housing environment.

Table 2. Canonical Discriminant Function Coefficients

	Function 1
Air quality	
Noise, Vibration	,601
Tree protector of road	,165
Green Space	,615
Wide of road	,590
Transportasi	,471
Places worship	-,662
(Constant)	-4,835

Unstandardized coefficients

Pursuant to table 2 obtained by equation of discriminan for the health of housing environment shall be as follows:

$$Y = 0,601 X_1 + 0,165 X_2 + 0,615 X_3 + 0,590 X_4 + 0,471 X_5 - 0,662 X_6 - 4,835 \quad (\text{equation 1})$$

Where:

Y = Class of health of environment that is class 2 (good) or class 3 (rather good)

X1 = Quality of air, noise

X2 = Tree Protector road

X3 = Green Space

X4 = Wide of environmental road

X5 = Medium Transportation

X6 = Places worship



Explanation of distinguishing variable between qualities of health rather good and good environmental shall be as follows:

Noise at housing with good environmental quality relative peaceful with gyration < 50 dB, and air quality tends to cleaner of cause far from motor vehicle pollution and noise. Meanwhile the noise quality at housing with rather good quality is ranging from 51-60 dB. Analogical from first equation obtained positive sign (+) at X1, this matter mean that good progressively air quality of housing hence will have good progressively also the quality of health of housing environment.

Protector tree road for good category have amount of above 50% from existing housing area, meanwhile for rather good category have 25-50% protector tree at housing area. Based on first equation obtained positive sign (+) at X2, matter this means more and more protector trees road of housing environment will compare diametrical with environmental quality of housing.

Green Space meant to improve the environmental quality, comfort, freshness and avoid environmental degradation for sustainable development. Green spaces at housing are with category health of good environment between 25 - 50% from housing area. Meanwhile Green spaces at housing with rather good environment class gyrate less than 25% from housing area. Based on first equation is obtained positive sign (+) for the X3, matter this means more and more green space at one particular housing environment hence will good progressively also the quality of health of housing environment.

Transportation medium at housing with quality health of good environment, more complete, generally they use ojek (rent motorcycle), private vehicle or made available by city transport residing in at elbow main road. Meanwhile at environmental quality of rather good housing is generally only one just city transport type to especial road/downtown. Equation 1 is obtained by positive sign (+) at X4, of matter this means complete progressively transportation medium which there is at one particular housing environment, hence will be good progressively also the quality of housing environment.

Wide for environmental road at housing with good quality tend to more wide and can passed by vehicle of wheel four and road of its environment has been concreted. Wide meanwhile environmental road at housing with environmental quality rather good 2- 4 meters and cannot passed by vehicle of wheel four. Based on first equation obtained positive sign (+) at X5, matter this means wide progressively environmental road of housing environment hence will good progressively also the quality of health of housing environment.

Places worship at housing with health of good environment has amount less than two places worship. Meanwhile the amount of places worship at housing with health of rather good environment generally has more than two places worship. Based on first equation where obtained negative sign (-) at X6 (amount of places of worship) which means the more places worship at one housing environment hence environmental quality of the housing is not yet good of course. Process hereinafter is to look for critical point (cut off Point) as constrain to determine a housing type come into environmental class 2 (good environmental class) or 3 (rather good). To calculate to search score boundary value or critical point follows formula of Santosa and of Ciptono, (2004), as follows:

$$Z_{cu} = (Nb. Z_a + Na.Z_b) / (Na + Nb)$$

Coefficient value center group (Z) obtained from value of centroid pursuant to calculation of SPSS. Assess Centroid for the health of housing environment can be seen at table 3.

Tabel 3. Centroid Score of Health Environment

Functions at Group Centroids	
Class of Environment	Functions
	1
2,00	,408
3,00	-1,008

Unstandardized canonical discriminant functions evaluated at group means

As for detailed calculation to look for score boundary value or critical point shall be as follows:

$$Z_{cu} = (Nb. Z_a + Na.Z_b) / (Na + Nb)$$

Where:

Z<sub>cu</sub> = Critical point of level health of housing environment.

Na = Amount of sample which enter environmental class category 2 (good) = 42

Nb = Amount of sample which enter environmental categories 3 (rather good) = 17

Z<sub>a</sub> = Function of Centroid environmental class 2 = 0,408

Z<sub>b</sub> = Function of Centroid environmental class 3 = -1,008.

$$\begin{aligned} Z_{cu} &= (Nb. Z_a + Na.Z_b) / (Na + Nb) \\ &= (17 \cdot 0,408) + (42 \cdot -1,0081) / (17 + 42) \\ &= -0,6 \end{aligned}$$

Tabel 4. Critical Value Boundary (Cutoff Point) health of housing environment

health of housing environment	Number of group member	Core Coefisien of Group (Z)	Critical value boundary (Z <sub>cu</sub> )
Class 2 (good)	42	0,408	-0,6
Class 3 (rather good)	17	-1,008	



Pursuant to table 4, hence critical value boundary (cutoff point) of group of health of housing environment is - 0.6,. Matter this means an environmental type of housing tends to come into class category 2 (good) if value of Y is - 0.6. Meanwhile an environmental type of housing tends to come into class category 3 (rather good) if value of Y is - 0.6.

After conducted cross validated like at table 5, hence accuracy of estimation equation of discriminan of class 2 (good) and class 3 (rather good) shows number 67.8%. This matter means that function of discriminan can classify 67.8% from existing variables.

Table 5. Result of Classification Health of Environment Housing

Classification Results<sup>b,c</sup>

	Enviro nment Class	Predicted Group Membership		Total
		2.00	3.00	
Original	Cou nt	2,00	28	42
		3,00	0	17
	%	2,00	66,7	100,0
		3,00	0	100,0
Cross- validat ed <sup>a</sup>	Cou nt	2,00	28	42
		3,00	54	17
	%	2,00	66,7	100,0
		3,00	29,4,0	100,0

a. Cross validation is done only for those cases in the analysis.

In cross validation, each case is classified by the function derived from all cases other than that case.

b. 76,3 % of original grouped cases correctly classified.

c. 67,8 % of cross-validated grouped cases correctly classified

## CONCLUSION

Based on the research result in District of North and South Cikarang can be concluded that variable health of housing environment is divided into two classes, those are health of good environment (class 2) and health of rather good environment (class 3). Variable differentiating between class health of environment 2 and class 3 is the quality of air/noise, reforestation/greening,, green area, wide environmental road, transportation facility and amount of Places worships. Equation of discriminan obtained is:

$$Y = 0.601 X_1 + 0.165 X_2 + 0.615 X_3 + 0.590 X_4 + 0.471 X_5 - 0.662 X_6 - 4.835$$

Meanwhile boundary assess score (cutoff point) for the health of housing environment is - 0.6. This matter means that an environmental type of housing comes into environmental class 2 (good) if value of Y is the same or bigger than - 0.6. Meanwhile an environmental type of housing tends to come into class 3 (rather good) if value of Y is less than 0.6. Accuracy of classification for the health of housing environment is 67.8% where analysis of its discriminan can classify existing variable counted 67.8%.

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