

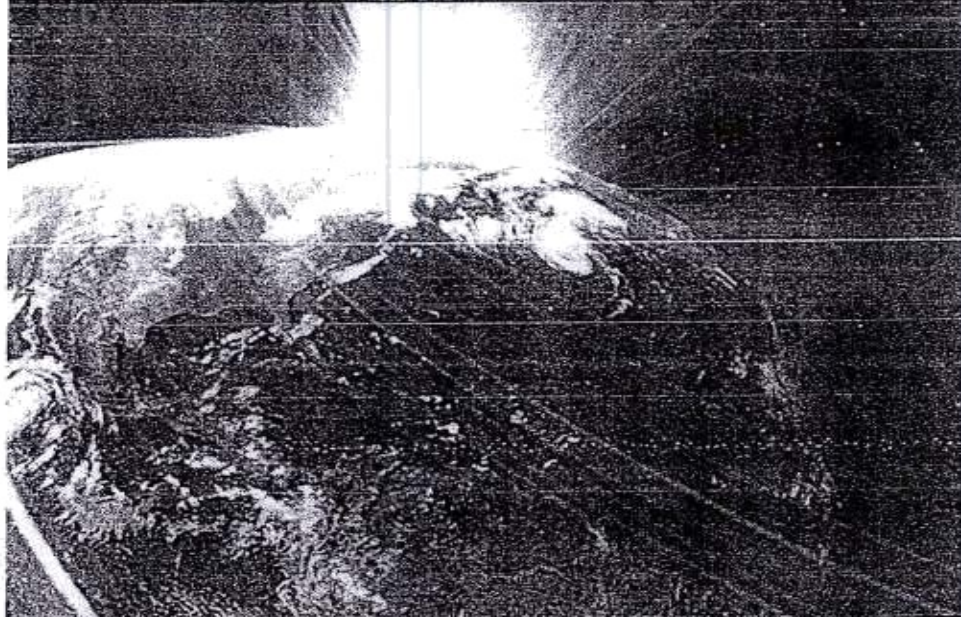
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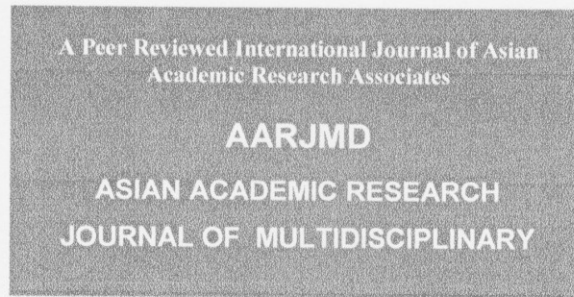
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**SPREAD CONTROL MODEL OF PULMONARY TB MULTILEVEL
MODELLING APPROACH (CASE IN DISTRICT BETUNG AND
DISTRICT MUARA TELANG BANYUASIN REGENCY)
RISMALA KESUMA*;M.T. KAMALUDDIN**;NGUDIANTORO***;
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Abstract

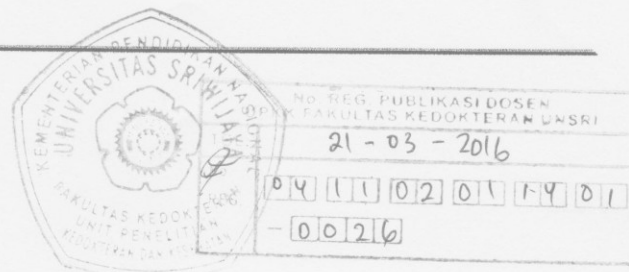
Aim :General purpose of this research is the effect of contents analyze determinants individual, household.

Methods : Troubles in the case of pulmonary tb district in which occurs Telang estuary enhancement of data d ad in health care unit in compare with data d find in field.

Results : All of factors that influence the incidence of pulmonary tuberculosis in the district Muara Telang (wetlands) and sub Betung (dry land) Banyuasinie density residential district on the individual level , the air quality at the household level as well as lighting and temperature at the level of the household environment .

Conclusion : Consider the results show that the model simultaneously acquired models is significant , meaning that these factors simultaneously have a significant effect on the incidence of pulmonary tuberculosis in the district and sub-district estuary gutter BetungBanyuasin district . The next partial test results show the air quality factor and temperature of each household have a significant effect on the incidence of pulmonary tuberculosis in the district and sub-district estuary BetungBanyuasingutter .

Keyword : pulmonary TB, Individual, Household and Environment.



INTRODUCTION

Environment have the effect of the most of public health. one form of environmental conditions affecting the place is condition of human places or settlements. institute for human settlement form takes place to stay or shelter. Increased with science, the society is now in a form can live or residential flat. (Soemirat 2002).

One of environmental health problems in Indonesia to get attention and increase in good quality health problems namely housing (Department of Health, 1993) trending health problems relating to housing problem still very outstanding especially water, garbage disposal, air quality and lighting in the house (Departement of Health, 2005)

This is an environmental integral from human life environment, physically better physical or biological, very allies in the process of health disorders may be in the form of lung disease tuberculosis (Notoatmodjo, 2003) therefore very health conditions affected by whether physical environment, and social.

Environment house is one factor that give effect to the status of health inhabitants (Notoatmodjo, 2003). Environment house is one factor d allies in the spread of germs tuberculosis. tuberculosis can germ life even for 1-2 hours until there beberpa week depending on whether ultraviolet light, yg good ventilation, and density house residents.

Pulmonary TB lead to death in the world, especially in developing countries. there yet so far the successful free from indonesia mycobacterium tuberculosis is the fifth control of 22 countries with loads of pulmonary TB, TB patients with lung total 429 730 New cases and the number of cases 183 366, case number re-treatment and as many cases 6589 (67%) is relapse cases (WHO, 2012.)

Regional water district is Banyuasin, while 25% is the advantage for land in d and rubber rice fields. This study examines the detwerminan effect of various events and see the role of pulmonary tuberculosis new level of risk factors effects of gender role of individual level, density dwelling, and health care attitudes: the role factorrisk household namely(1). consist of air quality indoor air quality covers floor area of temperature and household. (2). density dwelling house consist of densityoccurrence of tuberklosis.



Research Objectives

General purpose of this research is the effect of contents analyze determinants individual, household.

METHOD**Analysis Method****1. New Pattern Events TB Analysis.**

Event Analysis of pulmonary TB in 2 stages do:

1. Troubles in the case of pulmonary tb district in which occurs Telang estuary enhancement of data d ad in health care unit in compare with data d find in field.
2. Audit by laboratory sputum collection d called 3 times with morning when namely SPS.

Interpretation of results sputum examination is 3 times investigation:

1. 3 positive positive or 2 + 1 negatif: BTA positive
2. 1 positive + 2 positive negative a repeat 3 times smear. 1 positive 1 + 2 positive negative but if a BTA 3 negative: BTA negatif.

2. The Analysis Of Factors That Influence With TB Pulmonary Happen.

Analysis done this to see the effect of different determinants of occurrence of pulmonary tuberculosis namely the role of individual level (age, gender, knowledge). Role of risk factors of household namely:

1. Consist of air quality air quality outdoor and indoor air quality spacious floor covering.
2. Densitas consist of density dwelling house and rooms.

2.1 Form Control The Spread Of Pulmonary TB

Description of the disease risk factors of individual, household, and environment through modeling approach multilevel analysis, general model of the occurrence of individual can write:

$$\text{logit } \hat{Y} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8$$

with

\hat{Y} is a pulmonary events :

α and $\beta_1, \dots, \beta_{12}$ is parameters

Model :

X_1 is age

X_2 is a gender

X_3 is knowledge

X_4 is a behavior

X_5 is density dwelling

X_6 is indor air quality

X_7 is maid of health

X_8 is the attitude

X_9 is air quality

X_{10} is density dwelling

X_{11} is spacious floor

X_{12} is a type of floor

X_{13} is a roof :

X_{14} is ventilation

X_{15} is a roof

X_{16} is the temperature of household

Further , the general model of household can be written as follows:

$$\hat{Y} = \alpha + \beta_1 H_1 + \beta_2 H_2$$

With

\hat{Y} is the occurrence of pulmonary tb :

α and β_1, β_2 is parameters model

X_9 is outdoor air quality

X_{11} is spacious floor

X_{12} is a type of floor

X_{13} is a roof

X_{14} is ventilation

X_{15} is lighting

X_{16} is the temperature of household .

3 .Model Development Control

Model development control in field as performed by examination .

3.1 Chemical Air

Chemical examination of air in ambient air do is examination by physical and chemical test .

3.1.1 Test Physics

Test do is in physics d temperature wind speed direction and noise .

influence of humidity air pollutant concentrations. moisture associated with negative air temperature the air temperature high humidity will mak the low. moisture reaches 40-70% moisture not meet standards said if more than 70% or less than 40%. moisture is good for media d pathogenic bacteria, including new germ tb (Department of Health 1999) optimal conditions generally breeding.

3.1.2 Chemical Test

Chemical testIsconductedexamination TSP (*Total Solid Partkulat*)

SNI 19-7119.2-2005 examination method and quality standard refers limits in accordance with NO PPRI 1991 41 th of threshold values for residential areas and settlements.

3.2 Biological Environment

Biology test environment with numbers germ checking the air space, audit done to see total numbers germ diruang d where the re is room such an d the patients taking more commonly used daily activities.

THEORY

A. An understanding of the Environment

1 . The definition of Environment



Environment is everything physical, biological, social and being around humans and external influences that affect the lives and human development (Lennihan and Fletter , 1989)

2. Physical Environment

The physical environment is everything that is to be around people who are not dead , for example, water , soil , air humidity , temperature , wind , houses and other inanimate objects .

3 . Biological environment

Biological environment is everything that is life-like plants, animals , including microorganisms .

4 , Social Environment

The social environment is everything that govern the actions of human life and its efforts to sustain life , such as education for each individual , sense of responsibility , knowledge of the family , job type , number of occupants and the state of the economy .

5 . Home environment

The home environment is everything that was in the house (Walton , 1991) . Home environment consists of the physical environment that is ventilation , temperature , humidity , floors , walls and the social environment is the density of occupants . According to the WHO home environment is a physical structure in which people use for shelter . Environment of the structure as well as all the facilities and services necessary , useful equipment for physical and spiritual health and good social conditions for families and individuals .

B. The Protection from diseases' transmission

a. There must be a water source that meets the requirements , both in quality and quantity , so in addition to eating and drinking needs are met , also enough available water to maintain the cleanliness of the home , clothing and occupants .

b . There must be a place to store garbage and toilets are good and qualified , well water disposal must be channeled properly

c . Disposal of human waste and the waste must meet health requirements , yatu should be able to prevent the waste does not seep and contaminate surface water sources .

d . Place cooking and eating should be free from pollution and dust nuisance animals and insects .

e . There should be a prevention of vector-borne diseases can not live and breed in the house , so the house in its construction should be rat proof , fly to fight , fight mosquito .

f . There should be room air (air space) are quite

g . The spacious bedrooms at least 8.5 m² per person and a minimum ceiling height of 2.75 meters .

C. multilevel Models

Multilevel Data Analysis : " any set of analytical procedures that involve; Gathered Data from individuals and from social structure in the which they are embedded and are Analyzed in a manner that models the multilevel structure " (Burnstein , 1985 , dikutip dari Ariawan , 2005)

1. The important thing of analysis Multilevel

Analysis Multilevel or can be called by the other word likes random effects models , random coefficient models , hierarchical linear mixed effects models models needed for;

- a. Calculate the variability at each level (eg , variance and variance student class)
- b . Creating a model at level 1 as the effect of all levels

$$\text{Var total} = f(\text{var. Individuals} + \text{var. Groups})$$
- c . Calculate the interaction between the effects at each level
- d . Responses are not independent of subjects in one cluster have the same risk factors (Snijders , 1999) .

2.The benefit of Analysis Multilevel

The benefits that can by using multilevel analysis are :

- a. analysis of thr data longitudianal ie repeated observations on the same subject .
- b . Analysis of the data is subject groups (level 1) in the group (level 2) (Ariawan , 2005)

Multilevel statistical approach has the advantage of technical and substance (Anderson , 2004) . Substance of the approach , this analysis can solve problems related to :

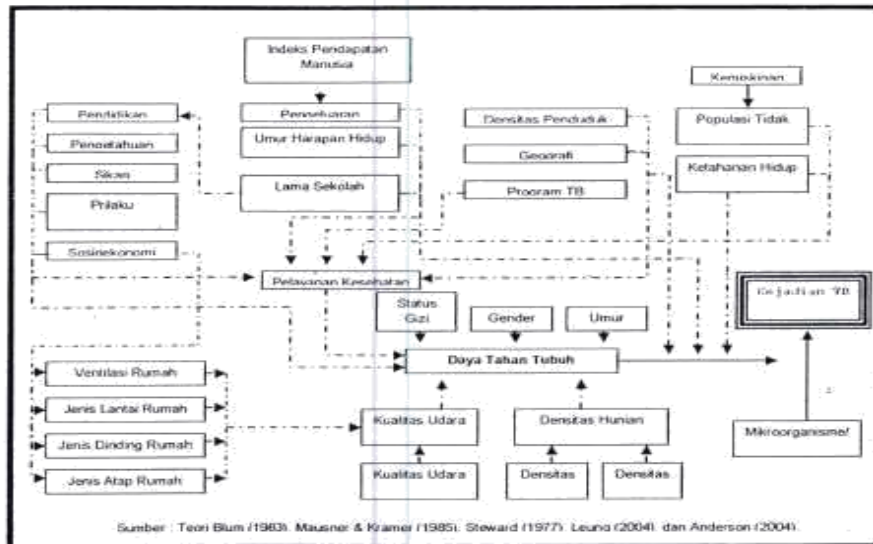
- a. Ecological Fallacy is a mistake in interpreting the results of observations on the ecological level to the individual level
- b . Individualistic fallacy that occurs due to errors in estimating the role of ecological relationships at the individual
- c . Atomistic fallacy that arises when the relationship between the individual variables used to make inferences on the relationship between the variables at the level of ecological analogue / group .

The existence of common errors fallacy is the failure to recognize the unique relationship observed in the data blocks and each level its own important things . The specific manner , have a look only at the individual relationship (example: poor people have worse health risks) : some are seen only on ecological relationships (eg , where the proportion of individuals who are many individuals who are poor usually have a rate higher poor health) and the relationship of individual contextual (eg the possibility of the existence of the greatest bad health status will be found on the individual poor in places with a high proportion of the poor) . Multilevel models are clearly the natural relationship - contingent level (Anderson , 2004) .

From presepektif in teknikal , multi-level analyst allows researchers to efficiently obtain statistical estimates of regression coefficients fixed . Specifically , the use of information clustering , multilevel models provide the correct standard errors , so that will give coonfident intervals and significance robust.Hal results like this will not come if we do not take into account the clustering information . As in the analysis of this konvensional.Dampak will certainly affect the statistical validity . Broader multi- level models also provide an appropriate and realistic specification of the variance structure of the complex on every level.Multilevel models also accurately perform weighting and capitalization of profits that may result in the collection of all aspects of the neighborhood who then made an inference into a specific neighborhood

A. The Skeleton Of The Theory

To see the impact of various determinants on the incidence of pulmonary tuberculosis as well as a look at the role of the level of effect of individual risk factors (age , education and knowledge) , which includes the contextual determinants of domestic risk factors (socio - economic , density houses , home ventilation , home floor , walls , ceiling and roof of the house) , and risk factors Banyuasin district level (population density , geography , HDI (measured by per capita expenditure variables , and old school) and HPI (measured from the population do not access health services and populations are not survive the age of 40 years) on the incidence of pulmonary tuberculosis . then can be seen from Figure.



RESULTS and DISCUSSION

Logistic regression analysis level of individual

Data analysis using logistic regression model intended to see significant factors affecting the occurrence of yg and knowing the amount of pulmonary tb chance of occurrence of such factors based pulmonary TB.

Selection of the best in this research procedures performed using BackwardStepwise. Backward Stepwise variable procedure of removing algorithm based statistical model with a view of an interest rate variable, variable then removed from the rule based model fixed. Important as defined variable variable have the effect of real model.



Table 1 Logostik Regression Analysis Results On Individual Level In District Banyuasin

District	Peubah	B	S.E.	Wald	Sig.	Exp (B)	Sig. of the Change
Betung	X2 (gender)	-40.643	2.618E4	.000	.999	.000	.000
	X4 (behavior)	40.443	2.618E4	.000	.999	3.664E17	.001
	X5 (density dwelling)	-1.885	.785	5.771	.016	.152	.020
	X6 (indor air quality)	1.999	.728	7.541	.006	7.384	.006
	X7 (maid of health)	-19.538	6.151E3	.000	.997	.000	.001
	Constant	-.731	1.045	.489	.484	.481	
Telang	X1 (age)	-3.773	1.265	8.893	.003	.023	.001
	X2 (gender)	-25.263	4.019E4	.000	.999	.000	.007
	X4 (behavior)	43.993	4.209E4	.000	.999	1.276E19	.003
	X5 (density dwelling)	-25.263	2.010E4	.000	.999	.000	.000
	X7 (maid of health)	-42.406	4.494E4	.000	.999	.000	.025
	Constant	6.246	2.367E4	.000	1.000	516.030	

Based on the table above partial test results showed all real variables (significant).

Logistic regression analysis at the household level

The following is a step that is done in selecting the best model with backward stepwise procedure of level II.

At this step in the modeling done by including all variables in the model: X_9 (air quality) and X_{10} (density residential). Parameter coefficient (B), the value of standard deviation (SE) value of Wald statistic, p-value (Sig), the odds-ratio (exp (B)), and the p-value (Sig) changes in log-likelihood values for each independent variables.

Table 2 Results of LogisticRegression Analysis at The Level of Households in The DistrictBanyuasin.

District	Peubah	B	S.E.	Wald	Sig.	Exp (B)	Sig. of the Change
Betung	X9 (outdoor air quality)	1.945	.565	11.857	.001	6.994	.000
	X10 (density dwelling)	.392	.824	.227	.634	1.480	.623
	Constant	-3.159	.820	14.834	.000	.042	
Telang	X9 (outdoor air quality)	24.758	2.321E4	.000	.999	5.654E10	.000
	X10 (density dwelling)	-4.942	1.328	13.841	.000	.007	.000
	Constant	1.386	1.118	1.537	.215	4.000	

The above table is based on the know that the test results showed partial betung in the district, which has a p-variables of change in loglikelihoodadallahvalueterbesar variable X_{10} (residential density) so that the variable is removed, while in the district telang, partial test results showed all real variables (significant) rose X_9 (kualifitas air) and X_{10} (density residential).

At this step in the input variables only variables that air quality in the districts betung X_9 , as in the following table.

Table 3 Results of LogisticRegression Analysis at The Level of Households in The DistrictBanyuasin.

District	Peubah	B	S.E.	Wald	Sig.	Exp (B)	Sig. of the Change
Betung	X9 (outdoor air quality)	1.958	.564	12.048	.001	7.083	.000
	Constant	-2.833	.420	45.487	.000	.059	



Based on the table above; partial test results showed all real variables (significant), the variable X_9 (air quality) in the district Betung.

Regresilogistik Analysis at The Level of Environmental

Following in the steps to do in choosing the best model with backward stepwise procedure at the level of the environment:

Table 4 The final-Results of LogisticRegression Analysis on The Sub-DistrictLevel in the EstuaryEnvironmentGutters BanyuasinDistrict.

District	Peubah	B	S.E.	Wald	Sig.	Exp (B)	Sig. of the Change
Telang	X15 (lighting)	22.539	4.686E3	.000	.996	.000	.000
	X16 (temperature of household)	41.485	1.573E4	.000	.998	1.039E18	.000
	Constant	1.386	1.118	1.537	.215	4.000	

In this step, all the variables, X_{15} is lighting and X_{16} (temperature households) in the district Telang partially based on test results showed all real variables (significant) until the process is complete.

Table 5 The Final Results of Logistic Regression Analysis on The Environment in The Sub-District Level Betung Banyuasin District.

District	Peubah	B	S.E.	Wald	Sig.	Exp (B)	Sig. of the Change
Betung	X_{11} (ventilation)	17,563	5,514E3	,000	,997	4,24E7	,000
	X_{16} (temperature of household)	40,339	1,100E4	,000	,997	3,305E17	,000
	Constant	20,919	5,514E3	,000	,997	,000	

In this step all the changes that X_{11} (ventilation) and X_{16} (temperature of households) in the district Betung based persial test results showed all real variables (significant) so that the process is completed

CONCLUSION AND SUGGESTION

Conclusion

1. All of factors that influence the incidence of pulmonary tuberculosis in the district Muara Telang (wetlands) and sub Betung (dry land) Banyuasinie density residential district on the individual level , the air quality at the household level as well as lighting and temperature at the level of the household environment .
2. Consider the results show that the model simultaneously acquired models is significant , meaning that these factors simultaneously have a significant effect on the incidence of pulmonary tuberculosis in the district and sub-district estuary gutter BetungBanyuasin district . The next partial test results show the air quality factor and temperature of each household have a significant effect on the incidence of pulmonary tuberculosis in the district and sub-district estuary BetungBanyuasingutter .

Suggestion

1. For health department
Need to do a home visit by a holder of both pulmonary TB program commissioned in the health care unit in each district as well as commissioned officers in the program of hold health districts , so that pulmonary TB patient can be monitored properly .
- 2 For The Communities
Advisable for people to pay attention to the environment in the household diligently opened the window so that the air exchange. Also plant trees around the residence to catch the dust that is generated by the air pollution that would result in that fresh.
3. For Individuals
Should also be done at efforts to increase knowledge about pulmonary tuberculosis that would increase the self-reliance in addressing the problem of pulmonary tuberculosis.



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