

# Simulator Model for Risk Prediction

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**Submission date:** 14-Feb-2021 12:46PM (UTC+0700)

**Submission ID:** 1509026911

**File name:** C.1.c.3.1.pdf (52.34K)

**Word count:** 2370

**Character count:** 12216

# Simulator Model for Risk Prediction of Below the Red Line at Under Five in Lampung Province

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## ABSTRACT

*Background: Under fives with Below the Red Line (BRL) is the main entrance of nutritional status deterioration. There is no tool to predict the incidence of BRL and provide solutions immediately to improve the under five status with BRL. Objective: The objective in this study is to develop a model that can predict the risk of BRL incidence and provide solutions immediately to improve the under five status' with BRL Methods: The method used in this study is a qualitative and quantitative methods by cross-sectional study design. The final goal is to develop a model that can predict the incidence of BRL. Population is all under five mother' with 2,520 samples taken at Tanggamus, Tulang Bawang & Bandar Lampung. Multiple logistic regression methods used in the multivariate analysis and System Development Life Cycle methodology/SDLC: initiation systems, system requirement analysis, and system design are used to create "Permata Bunda" simulator. Results: The study found that 18.3% under five are BRL, and the results of the multivariate analysis show that there are 11 risk factors to predict the incidence of BGM where the most dominant variable is the energy intake. Based on the results of multivariate analysis, a simulator application model was develop by the name "Permata Bunda ". It can predict the incidence risk of 97% BRL and provide immediate solutions to improve the status of BRL. Conclusions: The simulator model "Permata Bunda" can be used by nutritionist in the health center to predict the incidence of BRL, and also provide a solution immediately so that the incidence of malnutrition among under five can be decreased..*

**Keywords:** BRL, Under five, Simulator Model Permata Bunda

## 1. INTRODUCTION

Under five with Below the Red Line (BRL) is the main entrance of the nutritional status deterioration. Below the Red Line is the condition where the under five weight' below the red line in the Card Towards Health. The result of District & Provincial Health Survey 2013 show that the prevalence of malnutrition in Lampung province are 18.8% in, stunting prevalence 11.8% and wasting prevalence 42.6%. The prevalence of malnutrition is associated with high infant mortality and under-five mortality rate. There is no tool to predict the incidence of BRL and provide solutions immediately to improve the status of BRL. The objective in this study is to develop a model that can predict the incidence risk of BRL and provide solutions immediately to improve under five status' with BRL. Card Towards Health (CTH) used to monitor the under five growth but tis card can't predict the incidence risk of BRL and also it can't give an immediate solution to improve under five nutritional status. By developing this model, it can predict the incidence risk of BRL and provide solutions immediately to improve the under five status of BRL by taking preventive measure.

## **2** 2. METHODS

The method used in this study is a qualitative and quantitative methods by cross-sectional study design. The population was mothers who has under five and live in Tanggamus, Tulang Bawang and Bandar Lampung. A large sample of 2,520 samples were calculated based on the estimation formula. Data was collected by FGD techniques, interviews, observation, literature study and questionnaire. The study was conducted for 6 (months) . The dependent variable in this research: Status of BRL. The independent variables are : gender, age, low birth weight, exclusive breastfeeding, complementary feeding, growth monitoring, immunization status, diet, energy intake, protein intake, diarrhea, respiratory tract infectious disease, tuberculosis, mother's age, mother's education, mother's knowledge, body mass ,

number of family members, parity, income and parenting. Data were analyzed by univariate, bivariate with chi square, multivariate analysis with Multiple Logistic Regression method and simulator modelling use the methodology design system in accordance with the stages of System Development Life Cycle (SDLC), namely: system initiation, system requirement analysis, and system design.

### 3.RESULT

The incidence risk of Below the Red Line (BRL) when it is found and managed properly will improve under five nutritional status. This study also found that 18.30% under five are BRL and the remaining 81.70% of infants are not BRL, where this result is almost same with result of Provincial and District Health Survey 2013 that found malnutrition prevalence among under five in the Lampung Province was 18.80%. There are 21 variables that were statistically significant with BRL incidence. Candidate variables entered in the multivariate analysis (p value <0.25) are 18 variables. Table 1 shows the results of multivariate variables that significantly related to the incidence of BRL namely energy intake (POR: 4.3), protein intake (POR: 3.5), complementary feeding (POR: 2.4), diet (POR: 2.3), respiratory tract infectious disease (POR: 2.1), growth monitoring (POR: 1.9), immunization status (POR: 1.7), mother's knowledge (POR: 1.7), under five age (POR: 1.6), parity (POR: 1.5) and exclusive breastfeeding (0.44). Final model show that the regression coefficient of exclusive breast feeding is negatif, it means that infant without exclusive breast feeding is not below the red line. It occur because mother who didn't give exclusive breast feeding give complementary feeding instead of breast feeding. They didn't give exclusive breast feeding due to less breastfeeding production, bad technique in giving breast feeding and taking medicine without prescription that decrease the breast milk production.

Tables 1. The Result of Multivariate Analysis of Final Model

No	Variable	B	S.E	Wald	df	P-value	Exp(B)	95% CI for EXP(B)	
								Lower	Upper
1	Energy intake	1.459	0.182	63.889	1	0.0001	4.300	3.007	6.149
2	Protein intake	1.265	0.146	75.368	1	0.0001	3.542	2.662	4.712
3	Exclusive breastfeeding	-0.827	0.193	18.427	1	0.0001	0.437	0.300	0.638
4	Complementary feeding	0.882	0.158	31.391	1	0.0001	2.417	1.775	3.291
5	Respiratory tract infectious disease	0.745	0.282	6.989	1	0.008	2.106	1.213	3.659
6	Under five age	0.474	0.157	9.055	1	0.003	1.606	1.180	2.187
7	Growth Monitoring	0.658	0.119	30.304	1	0.0001	1.930	1.527	2.440
8	Immunization status	0.536	0.192	7.784	1	0.005	1.710	1.173	2.492
9	Diet	0.838	0.346	5.853	1	0.016	2.311	1.172	4.554
10	Mother's knowledge	0.510	0.122	17.370	1	0.0001	1.665	1.310	2.117
11	Parity	0.425	0.131	10.496	1	0.001	1.530	1.183	1.979
	Constant	-3.623	0.178	414.722	1	0.0001	0.027		

Furthermore, based on the the final results of the multivariate analysis, application simulator model was develop by the name of "Permata Bunda". This model can predict the incidence risk of BRL about 97 % and provide immediate solutions to improve the status of BRL.

### 4.DISCUSSION

If the incidence risk of BRL can be predicted immediately, preventive measure can be taken to improve the under five nutritional status in society. This study found that 18.30% under five are BRL, where this number is almost same with Health Research Data (Riskesmas) 2013 that found malnutrition prevalence among under five in the province of Lampung at 18.80% [1]. The results of mutivariat analysis show that there are 11 variables that were statistically significant with the incidence of BRL, namely energy intake (POR: 4.3), protein (POR: 3.5), complementary feeding (POR: 2.4), diet (POR: 2.3), respiratory tract infectious disease (POR: 2.1), Growth Monitoring (POR: 1.9),

immunization status (POR: 1.7), mother's knowledge (POR: 1.7) , under five age (POR: 1.6), Parity (POR: 1.5), exclusive breastfeeding (POR: 0.44) ([3] [4] [5] [6] [7] [8] [9] [10] [11] [12] [13] [14] [15] [16] [17] [18] [19]) where the most dominant factor is energy intake (POR: 4.3, CI: 3.007 to 6.149 ) which means that the energy intake <80% RDA has a risk of BRL 4.3 times compared with the energy intake> 80 standard of nutritional needs. During childhood, they need more energy than other age groups because at this time the body requires more energy for their growth and development. The period of infant and underfive, it is time for growth spurt or also called rapid growth phase. Therefore, the fulfillment of energy intake is absolutely essential, especially for the children growth and development in order to avoid the incidence of BRL.[2]. Based on multivariate analysis, an simulator model application was made by the name " Permata Bunda ". Permata Bunda simulator model can predict the incidence of BRL and provide immediate solutions to improve the status of BRL. Probability of risk factors at under five in this simulator are 97 percent, it means that there were 3 percent of other risk factors that were explored in this study. This happen because in this study the researchers only analyze the risk factors of specific variables, but there are still other sensitive risk factors that act indirectly as a risk factor of BRL at under five. [20].

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