

Fortran Program Forecasting On Maternal Mortality In Type C Hospitals In East Java Based On Predominant Variables

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Abstract

In Indonesia, the effort to reduce maternal mortality rate remains unsatisfactory and is progressing slowly due to the lack of working ethos, blood facility, communication facility, obstetrician and gynecologists, midwives, nurses, and functionaries of Indonesian Red Cross. Objective. To forecast maternal mortality in all type C hospitals in East Java, 2010 - 2015. This study was a development of clinical management from predominant variables that lead to maternal mortality in type C hospitals in East Java using FORTRAN simulation program. Results. The contribution of working ethos to the clinical management model in reducing maternal mortality in governmental type C hospital was 45.46%, indicating that the contribution if this variable can be expandable to 57.99%. The contributions of blood facility and communication facility were 27.22% and 26.95%, indicating a possible expanding contribution as much as 34.73% and 34.38% respectively.

Keywords: hybrid power plant, savonius helix, solar cell, flashing lights.

I. INTRODUCTION

Maternal mortality, in addition to describe maternal health status, also describes population and social political condition, and one of the most sensitive indicators of the use and outcome of health care. Maternal mortality rate in Indonesia, related to pregnancy and delivery, remains the highest in Southeast Asia. The Household Health Survey (Survei Kesehatan Rumah Tangga, SKRT) by the Department of Health in 1986 showed that the maternal mortality rate was 450 per 100,000 living births, and reduced to 421 in 1992. Furthermore, Indonesian Demographic and Health Survey Survei Demografi dan Kesehatan Indonesia, SDKI) in 1994 and 1997 indicated that the maternal mortality rates were 390 and 334 per 100,000 living births. In Indonesia, the effort to reduce maternal mortality rate remains unsatisfactory and is progressing slowly due to the lack of working ethos, blood

II. METHODE

The Characteristics of Maternal Mortality. The causes of maternal mortality can be classified into direct obstetric death, indirect obstetric death, non-related obstetric death, and undetermined death. The characteristics of maternal mortality are presented in the following tables :

Table 1. The Characteristics of the Cause of Maternal Mortality and Time of Death at Obstetric Unit, Type C Hospitals

No	Characteristics of Maternal Mortality	Average (Year)			
		2002		2003	
		Total	%	Total	%
1	Bleeding				
	HB < 4 gr %)	155	73.08	96	58.9
	HB 4 – 6 gr %)	58	26.92	67	41.1
	Total	213	100	163	100
2	Preeclampsia/Eclampsia				
	T 140 – 140 mm Hg	71	65.38	56	66.66
	T 170 – 200 mm Hg	38	34.62	28	33.34
	Total	109	100	84	100
3	Infection				
	Temperature < 38 °C	107	73.80	69	61.29
	Temperature > 38 °C	38	26.20	42	38.71
	Total	145	100	111	100
4	Time of Death in Hospital				
	2 hours	76	14.6	66	16.6
	2 – 24 hours	184	35.4	130	32.7
	Working days	55	10.6	67	16.8
	Holidays	205	39.4	135	33.9
	Total	520	100	398	100

Table 1 shows that the indicators of death causes and the type of delayed care process remains following the previous pattern, i.e., bleeding (41%), preeclampsia/eclampsia (21%), infection (28%), and undetermined deaths (30%). The Variable of Working Ethos.

Results of descriptive analysis on the variable of working ethos is presented in the following table.

Table 2. The Characteristics of the variable of working ethos at Obstetric Unit, Type C Hospitals

<i>Subvariables</i>	PROFESSIONS				TOTAL
	DOCTOR	MIDWIFE	NURSE	PMI FUNC.	
Income	2.06	2.00	2.02	2.04	8.12
Duties & Obligation	2.00	2.02	2.02	2.05	8.09
Working period	1.50	1.48	1.50	1.50	5.98
Linear Thinking	1.47	1.47	1.49	1.50	5.93
Working Days	1.95	1.95	1.96	1.97	7.83
Holidays	1.98	2.00	2.00	2.01	7.99
Length of Education	2.02	1.97	2.00	2.01	8.00
Profession	2.08	1.00	1.00	1.00	5.08
Standard Proudure	1.38	1.43	1.43	1.38	5.62
Status of Civil Employment	2.08	1.00	1.00	1.00	5.08
Age	1.94	1.99	1.98	1.98	7.89
Sex	2.00	2.01	2.02	2.02	8.05

Source: processed primary data

The Variable of Blood Facility Results of descriptive analysis on the variable of blood facility is presented in the following table.

Table 3. The Characteristics of the variable of blood facility at Obstetric Unit, Type C Hospitals

<i>Variables</i>	PROFESSIONS				TOTAL
	DOCTOR	MIDWIFE	NURSE	PMI FUNC.	
Budget	2.02	2.04	2.01	1.48	7.55
Total Blood	1.95	2.00	1.98	1.98	7.91
Blood Needed	2.11	2.03	2.04	2.02	8.2
Blood Replacement	1.56	1.51	1.50	1.47	6.04
Type of Cooperation	1.52	1.51	1.53	2.03	6.59
Regular Donor	1.97	1.49	1.49	1.52	6.47
Type of Delivery	2.02	1.48	2.00	1.98	7.48

Source : processed primary data.

The Variable of Communication Facility.

Table 4. The Characteristics of the variable of communication facility at Obstetric Unit, Type C Hospitals

<i>Variables</i>	PROFESSIONS				TOTAL
	DOCTOR	MIDWIFE	NURSE	PMI FUNC.	
Standard Procedure	2.03	1.53	2.01	1.97	7.54
Budget	1.53	2.03	1.51	2.01	7.08
Working Ethos	1.59	2.06	1.56	2.05	7.26
Type of Equipment	2.00	1.99	2.04	1.56	7.59
Common Agreement	1.98	2.03	1.98	1.97	7.96
Linear Thinking	1.95	1.98	1.98	1.48	7.39

RESULTS OF ANALYSIS AND OPTIMIZATION OF PREDOMINANT VARIABLES

Table 5. Expandable Sub-Variables

<i>Subvariables</i>	PROFESSION				NOTE
	DOCTOR	MIDWIFE	NURSE	PMI FUNC.	
Linear Thinking (x1)	#				
Income (x2)		#	#	#	
Holidays (x3)	#				
Education (x4)		#	#	#	
Age (x5)					
Blood Count (y1)	#	#	#	#	
Linear Thinking (y2)	#	#	#	#	
Budget (y3)	#	#	#	#	
Linear Thinking (z1)	#	#	#	#	
Budget (z2)	#	#	#	#	
Team Agreement (z3)	#				

Source: expandable capacity

Results of computation analysis Lindo obtained the objective function value 127.157, indicating that the maximum work of the model with existing variable condition and constraint was 57.8% from total ideal value of 220. Results of Optimization of Working Ethos Structural Model.

Table 6. Results of Optimization for the Variable of Working Ethos

Variables	The Value of Object Function ®							
	DOCTOR		MIDWIFE		NURSE		PMI FUNCTIONARY	
	v	s/s	v	s/s	v	s/s	v	s/s
Linear Thinking (x1)	.476	4.52	5.00	0.00	5.00	0.00	5.00	0.00
Income (x2)	.000	5.00	.223	4.77	5.00	0.00	5.00	0.00
Holidays (x3)	.000	5.00	5.00	0.00	5.00	0.00	.736	4.26
Education (x4)	.000	5.00	5.00	0.00	.075	4.92	5.00	0.00
Age (x5)	.000	5.00	5.00	0.00	5.00	3.49	1.51	5.00

Table 6 shows that the contribution of subjects (doctors, midwives, nurses, and PMI functionaries) to the existing sub variables had reached the maximum, but some of them remained expandable. In the subject of PMI functionaries, the expandable sub variables are holidays and age, with non-zero slack or surplus value.

Results of Optimization of Blood Facility Structural Model.

Table 7. Summary of the Results of Optimization for the Variable of Blood Facility

Variables	The Value of Object Function ®							
	DOCTOR		MIDWIFE		NURSE		PMI FUNCTIONARY	
	v	s/s	v	s/s	v	s/s	v	s/s
Blood Count (y1)	.000	0.00	5.00	4.62	.379	0.00	5.00	5.00
Linear Thinking (y2)	.000	4.06	.393	0.00	5.00	0.00	5.00	1.56
Budget (y3)	3.43	0.00	5.00	0.00	5.00	5.00	1.000	5.00

Table 7 shows that the contribution of the subjects (doctors, midwives, nurses, and PMI functionaries) to total blood, linear thinking, and budget has a significant variation. For the subject doctors, the sub variable of linear thinking still has expandable capacity with slack or surplus value of 4.06, while the subject of midwives the sub variable of total blood can be expandable

Results of Optimization of Communication Facility Structural Model

Table 8. Results of Optimization of the Factor for Communication Facility Variable

Variables	The Value of Object Function ®							
	DOCTOR		MIDWIFE		NURSE		PMI FUNCTIONARY	
	v	s/s	v	s/s	v	s/s	v	s/s
Budget (z1)	.000	0.00	2.36	5.00	5.00	0.00	5.00	0.00
Team Agreement (z2)	1.93	4.90	5.00	5.00	.000	0.00	5.00	0.00
Linear Thinking (z3)	5.00	0.00	.990	0.00	.000	0.00	5.00	0.00

Note: v = value s/s = slack or surplus

Above table shows that the sub variable of linear thinking for the subject of doctors provides a maximum contribution to total model contribution of 45.35%. This result is obtained by multiplying value 5 with coefficient (c = 1). It is apparent in these results the sub variable of team agreement from the subject doctor can be expandable to reach the maximum capacity.

Results of FORTRAN Program Simulation Year 2005 – 2010

Table 9. Results of Interpolation of Maternal Mortality with Cubic Spline

HOSPITALS	MATERNAL DEATHS					
	2005	2006	2007	2008	2009 (target)	2010 (target)
Dur Gresik	12	10	9	7	5	4
Dur Sidoarjo	11	9	8	7	5	4
Dur Mojokerto	18	13	10	6	5	4
Dur Kenosono	14	11	9	7	5	4
Dur Boyolungga	13	11	8	7	5	4
Dur Jember	16	13	10	8	5	4
Dur Lamongan	18	12	9	7	5	4
Dur Madura	13	13	10	7	5	4
Dur Jember	14	11	9	6	5	4
Dur Magelang	16	13	11	8	5	4
Dur Bojonegara	13	12	9	7	5	4
Dur Pacitan	16	13	12	10	7	4
Dur Ngawi	14	11	9	7	5	4
Dur Blora	16	13	11	8	5	4
Dur Tuban	18	12	9	6	5	4
Dur Trenggalek	16	13	11	8	6	4
Dur Malang	13	13	10	7	5	4
Dur Ponorogo	14	11	10	8	5	4
Dur Probolinggo	16	13	10	9	6	4
Dur Lumajang	18	12	8	6	5	4
Dur Bondowoso	16	13	12	10	7	4
Dur Situbondo	14	11	9	8	6	4
Dur Banyuwangi	13	11	10	8	6	4
Dur Pamekasan	16	13	11	9	6	4
Dur Sampang	13	12	10	7	5	4
Dur Sumantri	13	13	10	8	6	4
Dur Bangkalan	14	11	9	6	5	4
City of Madura	14	11	9	6	5	4
City of Probolinggo	16	13	11	8	6	4
City of Blora	13	12	9	7	5	4
City of Kediri	16	14	11	9	8	4
City of Mojokerto	18	12	9	6	5	4
City of Pamekasan	16	13	12	9	6	4
TOTAL	524	598	524	449	332	332

III. RESULT AND DISCUSSION

Optimization for the Variable of Working Ethos.

The sub variable of linear thinking for the subject doctor provided contribution as much as 0.235% to the total model contribution 57.73%. The results were obtained by multiplying the value 0.45 with coefficient (c = 5). Slack or surplus value indicated that the capacity of linear thinking from the subject doctor can still be expandable. From these results, we found that the capacity of linear thinking for the subjects midwives, nurses, and PMI functionaries had reached the maximum value (5) with slack or surplus value of zero.

Government's policy is mostly focused on midwives, nurses, and paramedics, while actually the medical capability of the doctors themselves remained less optimal, as indicated from the results of analysis showing that an important sub variable, such as linear thinking, was only used 20%. If the 80% of the capability can be optimally employed, the currently prevailing mismanagement can be prevented. It can also be seen in this optimization, that for the sub variables of income, holidays, length of education, and age among the subject

doctors provided less influence. This implies that if the income is increased to a certain level, it may have no influence on their performance.

Optimization for the Variable of Communication Facility

It is apparent in this optimization that the sub variable of team agreement among the subject doctors can still be improved to reach maximum capacity. This demonstrates that standard procedure in communication between medical teams remains not well-adapted. The standard procedure should be socialized in communication until the lowest level.

The reduction of maternal mortality rate to 45% in the condition of crisis, both in the society and government, will not be easy. This study revealed that by dealing with three main variables and twelve sub variables in clinical management, we may reduce maternal mortality rate to 45%.

IV. CONCLUSION

It can be concluded that the contribution of working ethos to clinical management model in reducing maternal mortality in governmental type C hospital was 45.46%, indicating that the contribution if this variable can be expandable to 57.99%; the contribution of blood facility to clinical management model in reducing maternal mortality in governmental type C hospital was 27.22%, indicating that the contribution if this variable can be expandable to 34.73%; and the contribution of communication facility to clinical management model in reducing maternal mortality in governmental type C hospital was 26.95%, indicating that the contribution if this variable can be expandable to 34.38%.

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