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

Sardjana Atmadja[1], Gulam Gumilar [2]
[1]Syarif Hidayatullah State Islamic University, [2]Gajah Mada University

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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, midwifes, 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 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. Household Health Survey (Survey Kesehatan Rumah Tangga, SKRT) by the Department of Health in 1986 showed that the maternal mortality rate was 450 per 100,000 living birth, 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 birth. 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 ^{0}C	107	73.80	69	61.29
	Temperature > 38 ^{0}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 Working days Holidays	184 55 205	35.4 10.6 39.4	130 67 135	32.7 16.8 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.

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

Subvariables	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 Produre	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

Variables	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.

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

Variables	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 OPTIMATION OF PREDOMINANT VARIABLES

Table 5. Expandable Sub-Variables

Subvariables	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 contraints was 57.8% from total ideal value of 220.

Results of Optimation of Working Ethos Structural Model.

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Table 6. Results of Optimation 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 subvariables had reached the maximum, but some of them remained expandable. In the subject of PMI functionaries, the expandable subvariables are holidays and age, with non-zero slack or surplus value.

Results of Optimation of Blood Facility Structural Model.

Table 7. Summary of the Results of Optimation 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	.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 subvariable of linear thinking still has expandable capacity with slack or surplus value of 4.06, while the subject of midwives the subvariable of total blood can be expandable

Results of Optimation of Communication Facility Structural Model

Table 8. Results of Optimation 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 = slac or surplus

Above table shows that the subvariable of linear thinking for the subject of doctors provides 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 subvariable 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)
Dist. Gresik	12	10	9	7	5	4
Dist. Sidoarjo	11	9	8	7	5	4
Dist. Mojokerto	18	13	10	6	5	4
Dist. Kerosono	14	11	9	7	5	4
Dist. Bojonegoro	13	11	8	7	5	4
Dist. Tuban	16	13	10	8	6	4
Dist. Lamongan	18	12	9	7	5	4
Dist. Madiun	18	13	10	7	5	4
Dist. Ngawi	14	11	9	8	6	4
Dist. Magetan	16	13	11	8	6	4
Dist. Ponorogo	13	12	9	7	5	4
Dist. Pacitan	16	13	12	10	7	4
Dist. Nganjuk	14	11	9	7	5	4
Dist. Blitar	16	13	11	8	6	4
Dist. Tulungagung	18	12	9	6	5	4
Dist. Trenggalek	16	13	11	8	6	4
Dist. Malang	18	13	10	7	5	4
Dist. Pasuruan	14	11	10	8	6	4
Dist. Probolinggo	16	13	10	9	6	4
Dist. Lumajang	18	12	8	6	5	4
Dist. Bondowoso	16	13	12	10	7	4
Dist. Situbondo	14	11	9	8	6	4
Dist. Banyuwangi	13	11	10	8	6	4
Dist. Pamekasan	16	13	11	9	6	4
Dist. Sampang	13	12	10	7	5	4
Dist. Sumeneg	18	13	10	8	6	4
Dist. Bangkalan	14	11	9	6	5	4
City of Madiun	14	11	9	8	5	4
City of Probolinggo	16	13	11	8	6	4
City of Blitar	13	12	9	7	5	4
City of Kediri	18	14	11	9	6	4
City of Mojokerto	18	12	9	6	5	4
City of Pasuruan	16	13	12	9	6	4
TOTAL	521	395	324	249	183	132

III. RESULT AND DISCUSSION

Optimation for the Variable of Working Ethos.

The subvariable 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 valued 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 midwifes, nurses, and PMI functionaries had reached the maximum value (5) with slack or surplus value of zero.

Government's policy is mostly focused to 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 subvariable, 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 optimation, that for the subvariables of income, holidays, length of education, and age among the subject doctors provided less influence. This implies that if the income is increased to certain level, it may have no influence on their performance.

Optimation for the Variable of Communication Facility

It is apparent in this optimation that the subvariable 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 lewest lovel.

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 subvariables 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%.

REFERENCES

1. Affandi, B. Gerakan Sayang Ibu. Simposium Gerakan Sayang Ibu: Pertemuan Ilmiah Tahunan X POGI. Ujung Pandang, Juli 1997.
2. Allen P. Accountability for clinical governance. Developing collective responsibility for quality in primary care. BMJ.2000.
3. Budiarso, L.R., Bakri, Z., Susanto,S.S., Daramadi,S., Djaja, S., Kristianti, C.M., Iskandar, J., Siagian, B.T. Survey Kesehatan Rumah Tangga 1986. Badan Penelitian Dan Pengembangan Kesehatan Pusat Penelitian Ekologi Kesehatan Depkes RI. Jakarta, 1986.
4. Giordano, F.R. and Weir, M.D. A First Course in Mathematical Modelling. Brooks/Cole Publ. Company. California. p. 382. 1985.
5. Li, W., Zhou, R.. The Analysis of the Causes and Changes in The Maternal Mortality in 42 Years. Chung-hua fu chan ko tsa chih Jan: 27-9, 1995
6. Mc Coll A dan Roland M. Knowledge and information for clinical governance. BMJ. 2000.
7. Meyer, W.J. concepts of Mathematical Modelling. Mc graw-Hill Inc. New York. p. 439. 1987.
8. Sardjana, Faktor Penentu kematian Ibu di Rumah Sakit Kepanjen Wlingi dan Pasuruan (Hasil Penelitian), 2000.