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Evaluation factors affecting the maternal mortality among pregnant women during 2001–2011 in Ardabil Province, Iran

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ABSTRACT

Background: considering health indicators, analyzing pregnant women population is an important subject and mortality degree among this population is disastrous. According to the World Health Organization, annually 600,000 women die due to side-effects of pregnancy and delivery; it means that 1600 women die daily and one woman dies in each minute because of progeny side-effects. The average of MMR is 200 in developing countries and it is 20 out of 1000 in developed countries. This study was done aimed to determine the rate of maternal mortality among pregnant women and the factors affecting it in the Ardabil province so that identified dominant effective factors and presented Executive Solutions for reducing maternal mortality.

Methods: This study was conducted as a cross-sectional and descriptive-analysis study by using existing data in the health centre network system of Ardabil province during 2001–2011. According to the information of all maternal deaths (50 cases) in the health care system, the causes of death were extracted by study and evaluation of the documents and questionnaires about and the control group information have been collected randomly in the ratio of 1 to 4 (N = 200). Data was analyzed by using the Statistical tests as Chi-square, t2test and regression with the SPSS.20 software.

Results: findings showed that the proportion of maternal deaths is 20 per 100,000 live births in Ardabil province. 70% of maternal death was direct because of pregnancy's side-effects. 68% of deaths occurred in the postpartum period. The common causes of death were respectively, the bleeding (28%), preeclampsia, eclampsia and its side-effects (16%) were thromboembolic disorders (16%) and infection (8%). The maximum number of deaths were in the years 2003 and 2011 (18%) and the minimum number of these were 2008 (zero). 72% of maternal deaths were in the age range of 18 to 35 years. 33% of mothers were illiterate and less educated (the primary school). 62% of died mothers, lived urban residents. In this study, the relationship between cares before pregnancy, suffering from different diseases during pregnancy and distance between two pregnancy times were evaluated by Logistic regression test which was significant.

Conclusions: The most effective factors to reduce the maternal deaths in the province were increased coverage of pre-pregnancy, pregnancy and postpartum cares and improving its quality.

Key words: mortality, delivery, pregnant mothers, hemorrhage

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Introduction

Research background & statement of problem

Maternal death during pregnancy or during delivery and up to 42 days after the termination of pregnancy for any reason other than accidents is considered maternal mortality resulting from side-effects of pregnancy and delivery [1, 2]. Measurement of maternal mortality is done by an index called maternal mortality

ratio or briefly MMR which shows a number of maternal deaths due to pregnancy and delivery side-effects per 100,000 live births [2]. Average MMR in developing countries and developed countries respectively was 200 and 20% of thousand live births. Comparison of these numbers showed a significant difference in the health status of mothers in developed and developing countries. Proportions of maternal deaths because of the pregnancy and delivery side-effects are the most

effective indicators that represent the development of countries. The reason for choosing this index as the profile development is its potential for evaluating the impact of various social and economic factors on increasing or decreasing of the variable. This index is affected by the women's educational state, rural roads network, accessing to obstetric emergencies, the cost of health care, telecommunications, communication networks, family income and etc. [3].

According to the World Health Organization (WHO), 600/000 women die annually as a result of pregnancy and delivery side-effects. Daily in the world, 1600 women lose their lives due to pregnancy and delivery side-effects. More than 99 percent of these deaths occur in developing countries. 60 to 80 % of maternal deaths are because of hemorrhage, hard delivery, high blood pressure, infections and side-effects of unsanitary abortions that a significant percentage of them (61 %) occur after in the delivery and 78 % of them happen in 24–48 hours after delivery (5). According to the *UN Millennium Development Goals*, the rates of maternal mortality should be decreased to 75 % by 2015 compared to baseline (1990). According to the fifth developmental plan, the maternal deaths statistics should be decreased to 15 per 100 thousand people that are about 22.5 percent now [4]. Maternal deaths are evitable because many causes of death in the world are preventable today, and necessary facilities are available to preventing and a safe pregnancy in currently. The causes of maternal deaths have not been changed to the 21st century. Bleeding, blood pressure and maternal sepsis form mortal triangle. HIV infection and AIDS is considered as the leading causes of deaths in South Africa and Sub-Saharan of Africa today [4]. Some common causes of death are preventable, including septic abortion, uterine rupture, eclampsia, postpartum hemorrhage, puerperal sepsis [6]. Also, amniotic fluid embolism is very controversial today [9]. The new statistics show that the thousands of women die during delivery every day that most of them live in sub-Saharan of Africa and South Asia. The maternal mortality rate has dropped by one-third between 1990 and 2008, while 600 thousand mothers lose their lives in the world annually as a result of pregnancy and side-effects related to delivery time. Iran has achieved the huge results in the reduction of maternal mortality in the past few years and also maternal mortality reduction programs of Iran is known as a global activity, so 80% of maternal mortality is reduced during the past 10 years [10]. So checking the causes of maternal mortality during the different years and comparison of reducing or increasing in the number of deaths and its causes, causes to achieve the predisposing or preventive factors and could enhance the health of mothers. Regarding any background about the present research in Ardabil province, this study is

done aimed to determine the mortality rate of pregnant women and the effective factors in Ardabil province to identify the effective factors and most executive solutions for reducing the mortality rate of pregnant women.

Materials and methods

The present research is a descriptive-analytic and cross-sectional study to investigate the causes and factors affected women's deaths in Ardabil province, which was done during the years 2001–2011. The research population is including the pregnant mothers who were died in 2001–2011 in Ardabil and research sample also includes the live mothers after pregnancy that visit the health centres to be taken care of them. Given that the number of deaths of pregnant women (study group) was about 50 in the province of Ardabil in 2001–2011, so all the eleven-year deaths were studied in order to increase the precision of the investigations in the study. And then, because the impact of impressive maternal and environmental factors to be measured we selected 200 people as the treatment group randomly from the live mothers after pregnancy that visited the health centers to be taken care of them (in a ratio of 1 to 4). According to this that mother's death system is running in the health system and all of the data is available in the form of a survey questionnaire, collected data from questionnaires related to the maternal death system which exists in the Vice President of health and treatment Department of Ardabil University of medical sciences and then the data of the treatment group also was collected from Health Centers affiliated to the province of Ardabil. Descriptive data and demographic data of women took place based on the research sample for data analysis, then was used of Chi-2 or t-test for independent groups for reviews of the relationship between the independent variables with the death of a pregnant mother and for control of confounding factors also was used of the logistic regression model. After data analysis, the related variables to pregnant women mortality in a significant level of 0.1 were inserted in the logistics model. To estimate the risk of each variable, the odds ratios with 95% confidence interval has been used. In this study, the p-value of less than 0.05 was considered statistically significant.

Research findings

According to research findings, the average of pregnant maternal mortality is 20 per cent out of 1000 live births. Also, findings indicated that maternal mortality was 50 cases in and also all births during 2001–2011 were 241783. The changes during 11 years

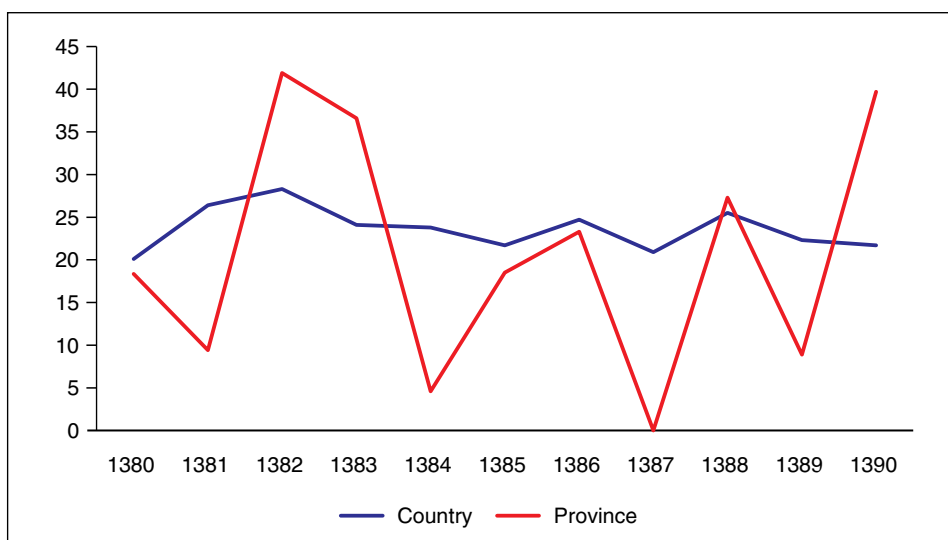


Figure 1. Frequency of mother's mortality in Ardabil province during 2001–2011

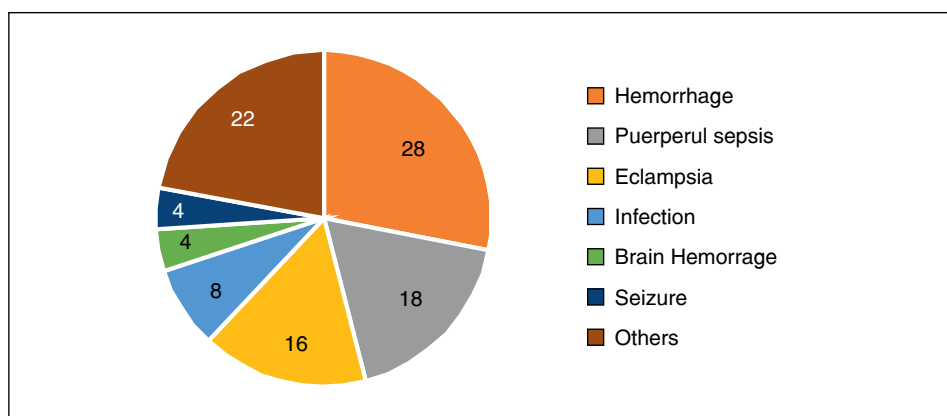


Figure 2. Relative frequency of pregnant women deaths in Ardabil province during 2001–2011

by considering the death because of pregnancy side effects in Ardabil were very frequent and the maximum and a minimum number of maternal deaths were in 2003, 2011 (9 cases) and in 2008 (zero) respectively (Fig. 1).

In 50 pregnant women who died, 70% of maternal deaths were due to pregnancy and 68% of deaths occurred in the period after delivery. In terms of access to health services, there was a 48% delay in family deciding for help, 42% delayed for referring to the hospital and 48% delayed in starting treatments in hospitals (Fig. 2).

Discussion & conclusion

The most important conclusion in the present research is the mortality rate among pregnant women in Ardabil which obtained as 20% of per thousand of live births among them 62% were resident in the city

and 38% were in rural areas. This finding is in agreement with the findings of Bagheri Lankarani [11] and the reported results by health population office, family and schools [10] that dead mothers percentage are 61/2% between 2006–2010. Maternal mortality rates did not follow a specific pattern in Ardabil province and different cities of the province like Bileh Savar, germs, Meshginshahr, Nir were not desirable to evaluate the ratio of births and death (Tab. 1–3).

The most important causes of pregnancy mothers deaths in during 11 years (2001–2011) were hemorrhage which agreed with findings of Akhlaghi [7], Hejazi [1], Bagheri Lankarani [3], Gholami Taramsary [9], Abdollahipour [6], World Health Organization report [10]. In the study by autopsy, Khan and coworkers [3] showed that 80/5% of pregnancy mother deaths were due to pregnancy. Direct and indirect causes formed 64% and 36% of mother deaths respectively in Ilam

Table 1. Descriptive statistics

Variable	Deaths group	Number	Percentage
Types of mother death	Direct in pregnancy	35	70
	indirect	15	30
Time of mother death	pregnancy	16	32
	During delivery	0	0
	After delivery	34	68
Location of mother deaths	house	5	10
	In the way of hospital	6	12
	hospital	39	78
The date of mother deaths	1380–1385	27	54
	1386–1390	23	46
The age of the pregnancy	First trimester	4	8
	Second trimester	5	10
	Third trimester	7	14
	After the delivery	34	68
Delay in decision making	yes	24	48
Delay in refer	yes	21	42
Delay in time	yes	24	48

province in the study of abdollahipour and coworkers [11] that agreed with our study with means 70% for direct causes and 30% for indirect causes (Tab. 1–3).

According to the performance and country's military achievements of maternal death care by the health Bureau of Population, Family and Schools in 2010, the percentage of death women in pregnancy, during delivery and postpartum were 4/24%, 4/3% and 2/72 respectively. In the study of abdollahipour and coworkers [4], the greatest period of pregnant mother deaths occurred after the delivery (68%).

In the study by Gholami Taramsari, 68%, 18% and 14% of mothers, died in hospital, house and in the way of hospital respectively. According to the population health office, the percentage of deaths mothers were 84% in the hospital that matched with results of our study (78% in hospital, 12% in the way of the hospital and 10% in the house) [5].

In the study by Hejazi [10], the gestational age of death mothers was between 15–42 weeks and the most mortality occurred in the third quarter of pregnant that agreed with our study and 14% of mortality occurred in the third quarter in the pregnant death.

According to report of performance and achievement of the country's military maternal mortality by the population health office, family and schools, 24/2% of delay in family decision to get help, 16% of delay in the mother refers from out of hospital into hospital and

39/6% of delay in the start treatment in hospitals were reported that matched with our study (Tab. 1–3).

In this study, there was a significant relationship between lack of care before pregnancy with the mother death ($p = 0.01$).

In our study, the maximum percentage of people in two groups for death mothers and lived mothers were 72% and 86% in the age range 18 to 35 year respectively that agreed with the findings of Gelian Tehrani [4] study and Azimi and Jalilvand [6].

Arshinchi [8] found that the progeny age has not been affected the literacy for mother deaths that agreed with our study. According to the test results of regression logistic in our study are the significant statically difference between the mother pregnant and mother death ($p = 0/01$). In the study of Bagheri Lankaran [10], 76/3% of mothers with high risks and 85/7% mothers with of low risk had distance 24 months with the previous pregnancy and in the study of abdollahipour [11], the interval between pregnancies announced 23% less than 3 years (Tab. 1–3).

In our study, according to regression logistic, there is the significant difference between getting the underlying disease and maternal death ($p < 0/001$) that agreed with study of Abdollahipour [11] and Gholam Taramsari [10]. The results showed that raising the awareness of families about pregnancy and delivery side-effects and appropriate approach meeting with it, attention

Table 2. The frequency of dependent and independent variables (personal, social) in control and treatment groups in Ardabil province dyeing 2001–2011 years

Variable		Treatment group		Lived group		Odds ratio	Confidence interval 95%	P
		Number	Percentage	Number	Percentage			
Residence	City	31	62	136	68	7/0	7/1 – 4/0	8/0
	Village	19	38	64	32			
Husband Job	Employee	7	14	58	29	9/0	2/1 – 6/0	5/0
	Working	9	18	10	5			
	Self-employment	32	64	107	5/53			
Type of pregnancy	Unemployed	2	4	25	5/12			
	Programmed	44	88	170	85	2/1	1/3 – 7/0	1/0
	Mistime	0	0	8	4			
Mother job	Undesirable	6	12	22	11			
	Housewife	47	94	185	5/92	1/1	2/2 – 1/0	5/0
Distance with previous delivery	Practitioner	3	6	15	5/7			
	Less than 36 months	10	8/20	20	10	2/2	5/2 – 7/0	01/0
	More than 36 month	22	8/45	81	5/40			
Mother age	First birthday	16	3/33	99	5/49			
	Under 18 year	3	6	12	6	1	3/1 – 3/0	7/0
	Between 18–35 year	36	72	172	86			
Mother's education level	Olders than 35 year	11	22	16	8			
	Illiterate	33	3/67	55	6/27	5/2	7/6 – 2	06/0
	Upper than primary school	13	5/26	107	8/53			
Spouse's education level	University education	3	1/6	37	6/18			
	Illiterate	33	3/67	55	6/27	87/0	53/1 – 493/0	4/0
	Upper than primary school	13	5/26	107	8/53			
Number of pregnancy	University education	3	1/6	37	6/18			
	3 ≥	37	74	181	5/90	4/2	41/7 – 118/0	
	4 ≤	13	26	19	5/9			

The findings of the regression logistic test showed that there is a significant relationship between pre-pregnancy care, the distance between the two pregnancies, underlying the disease in mother and the child status in both control and treatment groups

to equipment and provision of hospitals to drugs and requirements which are necessary for Midwifery and delivery emergencies.

Increased coverage of care pre-pregnancy and pregnancy and after the delivery, timely identifying and avoiding from delay in the decision making and referring

the high risk cases, non- delay in providing health care to mothers in hospitals and labour centres, preventing from undue cesarean and providing the professional services and based on the evidence will be the most important effective measures in reducing maternal mortality (Tab. 1–3).

Table 3. The frequency of dependent and independent variables (personal, social) in treatment and control groups

Variable	Treatment group	Lived group	Confidence interval 95%		Chance ratio	P value
	Number (percentage)	Number (percentage)				
Pre-pregnancy care	(92) 46	(95) 190	.384	6.163	2/3	.027
The interval between pregnancies	(8/20) 10	(10) 20	.784	2.593	2/2	.013
Underlying disease	(32) 16	(5/2) 5	.364	3.41	5/2	.000
Baby status	(50) 25	(5/99) 199	.015	.195	77/0	.000
Pregnancy care	(76) 38	(5/88) 177	.188	.674	47/0	.999
Appropriateness of care	(76) 38	(5/85) 171	.297	1.889	2/1	.999
Birth place	(56) 28	(100) 200	.502	1.510	1	.357
Type of delivery	(38) 19	(5/50) 101	.368	1.766	1/1	.325
Economic status	(1/27) 214	(4/15) 90	.431	1.765	4/1	.278

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