

Effect of the Iranian Health Sector Evolution Plan Implementation Focused on the Type of Delivery on Maternal and Neonatal Health Indicators in Selected Hospitals of East Azerbaijan Province

Hossein Jabbari Bayrami¹, Mobin Sokhanvar², Elahe Navvabi³, Salahaddin Asadi^{4*}

¹Tabriz Health Services Management Research Center, Health Management and Safety Promotion Research Institute, Tabriz University of Medical Sciences, Tabriz, Iran.

²Department of Public Health, Khoy University of Medical Sciences, Khoy, Iran.

³Imam Hossein Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁴Iranian Center of Excellence in Health Management (ICEHM), Tabriz, Iran

*Corresponding author: Iranian Center of Excellence in Health Management (ICEHM), Tabriz, Iran. Tel: +98-9374770462, Email: salah.asadi4824@gmail.com

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Abstract

Background: Health systems are making reforms to ensure and promote public health. Measuring the effects of reform is one way to determine its effectiveness and consequences.

Objectives: This study was aimed at investigating the effect of the Iranian Health Sector Evolution Plan (HSEP) implementation with a focus on the type of delivery on maternal and neonatal health indicators in East-Azerbaijan Province.

Methods: This descriptive-analytical study was conducted in 2017. The data of 800 patients were randomly selected through the dataset of eight hospitals equally in the two time periods of before and after the HSEP implementation. A researcher-made checklist was used for data extraction. Data were analyzed by SPSS version 22 using descriptive statistics, t-test, and chi-square.

Results: The mean age of the mothers in both periods was 27 years. Most of the participants did not have a previous delivery and had a diploma or a lower level of education. The rate of natural childbirth increased from 34.5% (before the HSEP) to 44.2% (after the HSEP) ($P < 0.05$). Maternal and neonatal mortality rates decreased from 0.3 and 0.8% to 0.0 and 0.5%, respectively. Maternal and neonatal mortality and stillbirth rates were not significantly different based on the study period and type of delivery ($P > 0.05$).

Conclusions: The findings indicated a significant increase in the rate of natural childbirth after the HSEP implementation. Maternal and neonatal mortality rates had also decreased. These results can guide policymakers in deciding whether to continue or review the reform.

Keywords: Health System Evolution Plan; Maternal and Neonatal Health; Iran

1. Background

The main mission of the health system is to improve the level of health and respond to the needs of the society (1). Gradually, health care systems have faced a wide range of demands for diverse and at the same time qualitative services, and due to the increase in awareness and the recognition of health as a public right, health systems have to respond effectively and efficiently to the conditions created (2, 3). Meeting the needs of people in the society in the current situation has challenged health systems. The main reasons for this are the demand for quality services, changing lifestyle and disease burden, increasing treatment costs, aging population, high levels of chronic diseases and disabilities, and the development of diagnostic treatment technologies (4-9).

The traditional structures of the health care system and their priorities are not able to meet the emerging needs in the field of health. Therefore, the need for structural

and fundamental changes in all health care systems is felt more than ever. These changes are often expressed in the form of major transformations called "reforms". Reform is the process of making fundamental changes to overcome existing weaknesses and pave the way for the development and use of organizational strengths (10). Typically, the goals of reforms in the health sector include increasing financial access to and coverage of health services, targeting inconsistencies and limiting injustice in the health sector, developing basic infrastructure to strengthen the information system, and reorganizing systems providing services to ensure the provision of effective and qualitative health services, patients' education and empowering them, and ultimately supporting the human resources working in the health sector to provide better services and applied research (11-13).

The Iranian HSEP is no exception to the changes and



has experienced various reforms over time to adapt to the new conditions. In the meantime, regarding the latest reforms made in the last decade, we can mention the health system reform plan. This project was implemented in the second half of May 2014 in the country. The plan has eight axes, one of the important of which is the program to promote natural childbirth and reduce cesarean section with the general goal of improving the health indicators of mothers and neonates. In this axis, reducing the rate of cesarean section, increasing the satisfaction of pregnant mothers by maintaining the privacy and optimizing the physical space, reducing the direct payment of patients, and improving the motivation of providers to increase the rate of natural childbirth are pursued as specific goals (14).

Cesarean section is considered as one of the problems in the field of health and treatment due to the numerous consequences it creates for patients, including heavy costs, various complications, and reduced quality of life in patients (15). According to statistics provided by the Ministry of Health and Medical Education (MOHME), the rate of cesarean section in Iran is estimated at 40%, which has a negative impact on maternal and neonatal health indicators (16). In the studies conducted in different cities in Iran, these rates have been reported 58.6% in Ardabil (17), 44.5% in Yazd (18), 26% in Arak (19), 28.4% in Maragheh (20), and 71.9% in Isfahan (21).

The increase in cesarean section rates is not limited to a specific geographical area, and in most parts of the world this rate is higher than the recommendations of the World Health Organization (WHO, 15%) (22-24). The rate of cesarean section in the United States has been increasing, such that in 1965 the overall rate was 4.5% and in 2002 it reached 26.1% (25). Cesarean section rates in the UK, China, Canada, Australia, Taiwan, and Italy are 24.6, 25, 26, 31, 32, and 35% of all deliveries, respectively (26-30).

Among the various axes of the HSEP, reducing cesarean section and promoting natural childbirth are presented as a way to improve the status of maternal and neonatal health indicators. Cesarean section has several complications, and it is expected that by promoting natural childbirth, the rate of these complications will be reduced and as a result, maternal and neonatal health indicators will be improved.

2. Objectives

This study was aimed at investigating the effect of the HSEP implementation with the focus on the type of delivery on maternal and neonatal health indicators in East-Azerbaijan Province.

3. Methods

This was a descriptive-analytical study conducted in 2017. The study population included all mothers and their neonates born in the selected public (Al-Zahra and

Taleghani) and private (Zakaria and Shams) hospitals in Tabriz, Marand, Miyaneh, Osko, and Sarab before and after the HSEP implementation (last six months of 2010 and 2012). The hospitals in Tabriz were selected based on the specialty of the hospital (obstetrics and gynecology) and in the cities around Tabriz based on the geographical area which was located in four regions (north, south, east, west) of the province.

The statistical samples assigned into two groups. For this purpose, an equal number of clinical records of postpartum women in the periods before and after the implementation of the HSEP were selected by the simple random sampling method. In the present study, due to the lack of previous research and the uncertainty of the statistical population, the Morgan table was used to determine the sample size. Therefore, 50 cases in each period (before and after) were selected from different hospitals with an equal distribution. Based on this, the number of samples with 95% confidence and 5% error level in six months of each year in eight hospitals was estimated to be 400 cases.

The medical records were selected to include different months of the relevant with an equal distribution. The final sample size was considered 800 clinical cases. The inclusion criteria were delivery in the studied hospitals and in the studied time period. Mothers and neonates whose necessary information was not complete were excluded from the study. The selected indicators were evaluated by a researcher-made checklist. To collect the data, the researcher presented to the selected hospitals before and after the implementation of the HSEP. In this study, descriptive statistics, t-test, and chi-square were run using SPSS version 22.

4. Results

The results related to demographic characteristics showed that in the period before the implementation of the HSEP, the number of newborn boys was 192 (48%) and the number of girls was 208 (52%). Furthermore, in the period after the implementation of the HSEP, the number of boy neonates was 202 (50.5%) and the number of the girls was 198 (49.5%). The results related to the age of postpartum women showed that the age of mothers who gave birth before the implementation of the HSEP ranged from 15 to 43 years, and in the period after the reform, their age spanned from 14 to 45 years. The mean age of the mothers who gave birth before the implementation of HSEP was 27.05 years, while it was 27.79 years after the reform.

Before the HSEP implementation, out of 400 mothers who gave birth, 227 (56.8%) mothers did not have previous deliveries, 164 (41%) had 1-2 previous deliveries, and 9 (2/3%) mothers had given birth more than two times, while this rate in the period after the HSEP implementation was such that out of 400 mothers, 242 (60.5%) did not have previous deliveries, 142 (35.5%) had 1-2 previous

deliveries, and 16 (4%) mothers had given birth more than two times. Before the HSEP implementation, out of 400 mothers, 187 (46.8%) had undergraduate diplomas, 144 (36%) had diplomas, and 69 (17.3%) mothers had a university degree. While in the period after the HSEP implementation, out of 400 mother, 154 (38.5%) had undergraduate diplomas, 163 (40.8%) had diplomas and 83 (20.8%) mothers had a university degree.

Regarding the type of delivery performed, the results showed that out of 400 mothers who gave birth in the period before the HSEP implementation, 138 (34.5%) mothers were had normal vaginal delivery and 262 (65.5%) mothers gave birth through cesarean section. However, this rate in the period after the HSEP implementation was as follows, 177 mothers (44.3%) had normal vaginal delivery and 223 (55.8%) underwent cesarean section.

The mortality rate of mothers before and after the HSEP implementation was as follows. Out of 400 mothers in the period before the HSEP implementation, 1 (0.3%) mother died due to childbirth complications and 399 (99.7%) mothers survived, while in the period after the HSEP implementation, the maternal mortality rate was zero. Also, out of 400 neonates born in the period before the HSEP implementation, 3 (0.8%) neonates died after

birth and 397 (99.2%) infants survived. In the period after the HSEP implementation, the neonatal mortality rate was reduced to 2 (0.5%) neonates and 398 (99.5%) neonates survived.

The rate of stillbirth in the period before the HSEP implementation was as follows. Out of 400 newborns, 5 (1.3%) were stillborn and 395 (98.7%) newborns were born alive, while after the HSEP implementation these rates were 6 (1.5%) and 394 (98.5%) neonates, respectively. The means of the anthropometric indices of the neonates (weight, height, head circumference [HC]) for the period before the HSEP implementation were 3216.16 g, 48.76 cm, and 24.19 cm, respectively, which changed to 3163.91 g, 49.40 cm, and 34.57 cm, respectively, after HSEP implementation.

The means of first and second-minute Apgar scores before the HSEP implementation were 8.72 and 9.72, respectively, and in the period after the HSEP implementation they were 8.91 and 9.76, respectively. The mean lengths of hospital stay (LoS) in the period before the HSEP implementation was 1.51 ± 0.92 , and in the period after the HSEP implementation it was 1.59 ± 0.89 . Also, the mean age of newborns (in weeks) was 38.97 ± 2 weeks before the HSEP implementation and 38.37 ± 2 after the HSEP implementation (Table 1).

Table 1. Status of Anthropometric Indices, Apgar Score, Length of Hospitalization, and Age of Newborns Before and After the Health Sector Evolution Plan

Variables	Before HSEP			After HSEP		
	Mean ± SD	Min	Max	Mean ± SD	Min	Max
Anthropometric						
Weight (g)	3216.16 ± 1662.55	900	3250.49	3163.91 ± 538.84	710	5000
Height (cm)	48.76 ± 5.99	9	57	49.40 ± 3.04	22	61
HC (cm)	24.19 ± 4.16	27	47	34.57 ± 2.49	20	39
Apgar						
1	8.72 ± 0.92	-	-	8.91 ± 1.01	-	-
2	9.72 ± 1.19	-	-	9.76 ± 1.43	-	-
Length of hospitalization						
In day	1.51 ± 0.92	1	15	1.59 ± 0.89	1	9
Neonatal age						
In week	38.97 ± 2.0	23	41	38.37 ± 1.99	22	43

Comparison of maternal mortality index in the two periods showed that the frequency of maternal mortality before the HSEP implementation was 1 case out of 400 samples, but in the period after the HSEP implementation it was zero, indicating that this difference was not significant ($P > 0.05$). The results showed that the frequency of stillbirth before the HSEP implementation was 5 out of 400 samples, but in the period after that it was 6 out of 400 samples, which was not significantly different ($P > 0.05$). Also, the comparison of neonatal mortality rate in the two periods showed

that the frequency of neonatal mortality before the HSEP implementation was 3 out of 400 samples, but in the period after that it was 2 out of 400 samples, which was not significantly different ($P > 0.05$). Finally, the frequencies of normal vaginal delivery and cesarean section before the HSEP implementation were 138 and 262 cases, respectively, but in the period after the HSEP implementation, they were 177 and 223 cases, respectively ($P < 0.05$; Table 2).

Table 2. Comparison of Maternal Mortality, Stillbirth, Neonatal Mortality, and Type of Delivery Indices Before and After the Health Sector Evolution Plan

Variables	Before HSEP	After HSEP	Chi-Square	
			df	Sig.
Maternal mortality			1	0.317
Yes	1	0		
No	399	400		
Stillbirth			1	0.761
Yes	5	6		
No	395	394		
Neonatal mortality			1	0.654
Yes	3	2		
No	397	398		
Type of delivery			1	0.005
Natural	138	177		
Cesarean	262	223		

The differences in the mean first and second-minute Apgar scores and neonatal anthropometric indices between the two periods are reported in Table 3. Based on the results of the t-test, the mean Apgar scores of minutes 1 and 2 in the two periods were significantly different ($P < 0.05$), while this significant difference was not observed for other indicators ($P > 0.05$).

Table 3. Comparison of the Status of Apgar and Anthropometric Indices in the Two Periods Before and After the Health Sector Evolution Plan

Variables	Independent t-test			
	Mean difference	t	df	Sig.
Apgar 1	-0.193	-2.801	798	0.005
Apgar 2	-0.040	-0.429	798	0.668
Weight	856.743	1.050	798	0.290
Height	-0.636	-1.893	798	0.050
Head circumference	-0.383	-1.581	798	0.114

Regarding the effect of route of delivery on maternal mortality, neonatal mortality, and stillbirth indices, the results were as follows. Out of 800 deliveries performed in the periods before and after the HSEP implementation, 315 cases had normal vaginal delivery and 485 cases had cesarean section, of which one death was reported for normal vaginal delivery and zero for cesarean section. The results of the Chi-square test showed that this difference was not significant ($P > 0.05$). Regarding the comparison of neonatal mortality based on the type of delivery, the results exhibited that out of the 800 deliveries performed in the periods before and after the HSEP implementation, 315 were normal vaginal deliveries and

485 were cesarean sections. Zero neonatal deaths were reported for normal vaginal delivery and five for cesarean section. According to the results of the Chi-square test, there was no significant difference in the rate of neonatal mortality in the two routes of delivery ($P > 0.05$). Regarding the effect of the type of delivery on stillbirth, the results were as follows. Out of 800 deliveries performed in the periods before and after the HSEP implementation, 315 were normal vaginal deliveries and 485 were cesarean sections, of which six stillbirths were reported for normal vaginal delivery and five for cesarean section. The results of the chi-square test revealed that this difference was not significant ($P > 0.05$; Table 4).

Table 4. Comparison of Maternal Mortality, Neonatal Mortality, and Stillbirth Indices in Natural and Cesarean Delivery

Variables	Type of Delivery		Chi-Square	
	Natural	Caesarean	df	sig.
Maternal mortality			1	0.214
Yes	1	0		
No	314	485		

Neonatal mortality			1	0.071
Yes	0	5		
No	315	480		
Stillbirth			1	0.300
Yes	6	5		
No	309	480		

Comparison of length of hospitalization based on the two types of delivery using independent t-test showed that out of the 800 deliveries performed before and after the HSEP implementation, 315 had normal vaginal deliveries and 485 were cesarean sections. The mean length of hospitalization related to normal vaginal delivery was 1.39 ± 0.693 days, while the mean length of hospitalization for cesarean section was 1.66 ± 1.01 days. According to the results of the t-test, there was a significant difference in the mean length of hospitalization in the two types of deliveries ($P < 0.05$).

5. Discussion

The results showed that the rates of maternal and neonatal health indicators before the HSEP implementation were different from those after the implementation of the reform, such that in the case of the route of delivery, in the period before the HSEP implementation, 34.5% gave birth naturally and 65.5% by cesarean section. While out of 400 mothers who gave birth in the period after the HSEP implementation, 44.3% gave birth naturally and 55.8% by cesarean section. The results of this study on the type of delivery are consistent with the findings of Kalhor et al. (31) and Yarmohammadian et al. (31).

Regarding the maternal mortality rate, the results of this study indicated the positive effect of the reform on reducing the rate of this index, which is consistent with the results of the studies by Barati et al. (32) and Vora et al. (33). Neonatal mortality rate decreased with the HSEP implementation, which is in line with the findings of Haghdoost et al. (34), Barati et al. (32), and Fernandes et al. (35), as in those studies also the rate of this index decreased with the implementation of HSEP.

The results of the this study on the means of first and second-minute Apgar scores showed the positive effect of the HSEP implementation on these indicators. Also, the results of the present study indicated the positive effect of the HSEP implementation on the anthropometric indices (i.e., weight, height, HC), such that the highest values of anthropometric indices (weight, height, HC) before the HSEP implementation were 3250.49 g, 57 cm, and 47 cm, respectively, and the lowest values were 900 g, 27 cm, and 9 cm, respectively. However, after the HSEP implementation, the highest values were 5000 g, 61 cm, and 39 cm, respectively, and the lowest were 710 g, 22 cm, and 20 cm, respectively. The mean of length of hospitalization decreased with the HSEP implementation, such that the maximum and minimum lengths of hospitaliza-

tion before the HSEP implementation were 15 and 1 days, respectively, while after the HSEP implementation they were 9 and 1 days, respectively. The results of the present study were consistent with the reports of Mireki et al. (31).

This study also showed that the stillbirth index increased with the implementation of the HSEP, such that the stillbirth index before the HSEP implementation was as follows: out of 400 newborns, 5 (1.3%) neonates were stillborn and 395 (98.7%) neonates were born alive. These rates were 6 (1.5%) and 394 (98.5%) in the period after the HSEP implementation, respectively. In this respect, the results of this study do not correspond with the findings of Vora et al. (33). Perhaps the reason is the novelty of the HSEP. Regarding the route of delivery (natural or cesarean section), the results showed that the implementation of the HSEP reduced the rate of cesarean section and increased the rate of natural delivery. These findings are consistent with the results of Ahmadi et al. (31) and Afshari et al. (31). Based on the results, although the rate of cesarean section decreased compared to before the HSEP implementation and the rate of natural childbirth rose accordingly, these changes were not significant, which is consistent with the results of Yarmohammadian et al. (36).

Regarding the relationship between the route of delivery and maternal and neonatal health indices, the results showed a significant difference between the types of delivery regarding the first and second-minute Apgar scores and length of hospitalization. However, there was no significant difference between the types of delivery and anthropometric indices and maternal and neonatal mortalities. Our findings demonstrated that health system reforms have the greatest impact on maternal and neonatal health indicators, the rates of cesarean section and natural delivery, stillbirth rate, maternal and neonatal mortality, and childbirth and pregnancy complications. Most studies in the field of health reform and its impact on maternal and neonatal health indicators have been descriptive. Due to the importance of the issue and its scope, as well as comparing the impact of health reforms among different developing countries, it is recommended that systematic, case-by-case, and pilot studies be conducted. Studies have shown that the type of delivery correction affects the total health indicators of mothers and neonates, such that with increasing the rate of natural delivery and reduction of cesarean section, neonatal and maternal mortality rates decrease, although the rate of maternal complications may increase slightly with such corrections (31, 37).

5.1. Conclusion

Monitoring and evaluating health reform is pivotal for more effective health system reform programs. Health care organizations, especially hospitals, need changes in line with environmental conditions to provide more efficient, effective, and quality services. The importance of health sector reform and its impact on maternal and neonatal health indicators has been emphasized by policymakers and managers in the field of health as an effective component and variable. The generalities of this are available, however, there is little evidence in this regard and only few indicators have been mentioned in former studies. Continuous improvement and promotion of health indicators, especially maternal and neonatal health indicators, requires effective measures, changes, and corrections. This study has provided evidence the effects of the Iranian HSEP, and health-sector authorities and policymakers can use these findings to take more effective steps to better implement this plan in terms of maternal and neonatal health indicators. Finally, it can be concluded that although the HSEP is in its early stages, it has been able to lower the rate of cesarean section and increase natural childbirth. In addition, it has effectively improved maternal and neonatal health indicators.

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Ethical Consideration

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