

# The utilization rate of antenatal care after health sector reform implementation in rural areas of Islamic Republic of Iran

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## ABSTRACT

**Background:** Improving the utilization rate of antenatal care is a critical strategy for achieving the reproductive health goals in Iran. The aim of this study was to assess the utilization rate of antenatal care (ANC) by women after health sector reform (HSR) interventions in rural areas of Islamic Republic of Iran (IR Iran).

**Materials and Methods:** This is a retrospective cross-sectional study. The data were gathered by cluster sampling from 400 motherhood records of mothers whose last pregnancies had been terminated in the first 3 months of 2013. Data were collected from 21 rural health centers of Isfahan district during the year 2013. The utilization rate of ANC by mothers was assessed by the number of visits they had, the time of the first ANC visit, the occurrence of pregnancy- or delivery-related complications, and the number of postpartum visits.

**Results:** The mean time of the first ANC was  $9 \pm 5.23^{\text{th}}$  week of gestational age. For 69.3% of pregnant women, the first ANC was before the 12<sup>th</sup> week. Overall, the frequency of ANC visits ranged from 2 to 21, with the average of  $10.6 \pm 3.23$  visits. 93.8% of the utilized ANC visits were adequate. 99.8% of the deliveries took place in the hospital. 99% of mothers had at least one visit in the postpartum period. 4% of the mothers had suffered from pregnancy-related complications.

**Conclusion:** It seems that IR Iran has achieved to one of the important objectives by its reform in health care access, that is, more ANC for pregnant women.

**Key words:** Antenatal care, developing country, family physician, high-risk pregnancy, Iran, Isfahan

## INTRODUCTION

Health sector reform (HSR) emphasizes substantially to improve the health status of populations by promoting and enhancing accessibility, quality, and efficiency of the delivery of health care services. HSR measures in Europe and USA have been introduced principally to manage health care costs, while reform of the health sector in most countries has intended to expand coverage and establish equity in the provision of health care services.<sup>[1]</sup>

Reproductive health initiatives and HSR accomplish the

common goals of increasing equity and efficiency through improving access to high-quality services.<sup>[2]</sup>

Women have greater need of health services than men because of higher susceptibility to morbidity related to pregnancy, childbirth, and the puerperium. Because of greater need, when conditions favor broad access to health care, women consistently tend to use the health services more frequently than men.<sup>[3]</sup>

The 5<sup>th</sup> Millennium Development Goal (MDG 5) has been adopted by the international community to improve maternal health by ensuring access to high-quality services in order to detect and manage life-threatening complications and reduce maternal morbidity and mortality. Antenatal care (ANC) has been established in high-income countries for a long time and has achieved remarkable success in decreasing maternal and neonatal mortality. Most low- and middle-income countries have adopted the same ANC programs with some adjustments for local contexts.<sup>[4]</sup>

Accessing ANC in a timely manner enables women to receive early information about the available screening tests. The World Health Organization (WHO) recommends

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women with uncomplicated pregnancy in developing countries to make at least four ANC visits with compulsory measurement of blood pressure, testing of urine and blood, and optional weight and height measurement at each visit.<sup>[5]</sup> Based on the American College of Obstetricians and Gynecologists, the recommended frequency of visits for an uncomplicated pregnancy is every 4 weeks for the first 28 weeks of gestation, every 2-3 weeks for 28-36 weeks of gestation, and every week after 36 weeks of gestation. Approximately, 4-6 weeks after delivery, the mother should visit her physician for postpartum review and examination.<sup>[6]</sup>

According to the report of World Bank Group in Human Development Sector, "IR Iran now has a good network of primary health care facilities, with a particularly good coverage in most rural areas. By 2000, in addition to infant mortality rate, Iran had also succeeded in improving the maternal mortality rate. 79 percent of expectant mothers had ANC and 89.6 percent of the births were attended by skilled health personnel (trained physicians and midwives)."<sup>[7]</sup> According to the report of World Bank Group in Human Development Sector (2011), the rate of adequate ANC in Iran was 94% and the rate of births attended by skilled health personnel was 97% in the years 2000-2010.<sup>[8]</sup>

In early 2005, IR Iran experienced a reform of the health care system that was mentioned by family physician (FP) program. Some of the objectives of HSR are facilitating patients' access to receive comprehensive health care, including outpatient visits, provision of essential medicines, and inpatient services based on referral system. In this manner, FPs play a role as gate keepers to referral system. According to this reform, all citizens in rural areas and cities with fewer than 20,000 population are covered by a uniform health insurance in the first step. Patients in these regions pay 30% of physicians' visit fees and 30% of the drug price, with the exception of pregnant women and neonates for whom the visits are free in the rural health centers and health posts.<sup>[9]</sup>

Eight years after the HSR interventions were introduced in the rural areas of IR Iran, this article reveals the performance of reproductive health system in rural areas of IR Iran based on the utilization rate of ANC and postnatal care that in turn depend upon accessibility (*equity*) of mothers to essential health services in critical periods of their lives. Also, the *efficiency* of HSR performance measured by birth weight, length, and head circumference of neonates and the pregnancy- or delivery-related complications of mothers is discussed.<sup>[10]</sup>

## MATERIALS AND METHODS

In this retrospective cross-sectional study, the utilization of ANC by mothers in the rural regions of Isfahan district after

implementation of HSR was assessed. Isfahan district is located in the central areas of the Islamic Republic of Iran.

### Data collection

There are 21 rural health centers in Isfahan district. On the other hand, totally 2006 neonates were born in the rural areas of Isfahan district in 2012. So, 400 samples were selected. We selected those deliveries that had been terminated in the first 3 months of 2013. Thus, for evaluating 420 motherhood records whose last pregnancies were terminated in the first 3 months of 2013, we estimated that 20 motherhoods records should be evaluated in every health center.

In each of the 21 rural health centers of Isfahan district, two trained personnel assessed 20 motherhood records registered in the mother and child health units of the health centers and their axillary health houses in 2013.

Our questionnaire was similar to the motherhood checklists used in motherhood units of the health centers. Based on this questionnaire, the time of the first ANC visit, the frequency of visits, the executor of ANC, birth weight, length, and head circumference of neonates, pregnancy- or delivery-related complications, and the frequency of postpartum visits were assessed. Also, demographic information of the women, including age, occupation, and also education level and number of children, was obtained from the family records available in those health centers.

Only the records of those mothers who resided in the study rural areas for at least 1 year before pregnancy were included in this study.

Those motherhood records that contained incomplete data or of mothers who migrated to another district before delivery were excluded.

### Data analysis

Utilization of ANC was defined as having at least one antenatal visit before delivery. *Timely* utilization of ANC was defined as having the initial prenatal care visit within the first trimester of pregnancy (i.e. ideally during the first 12 weeks of pregnancy). *Adequate* utilization of ANC was defined as having five or more ANC visits during pregnancy.<sup>[11]</sup> In the current study, timely and adequate utilization were assessed.

High-risk pregnancy was considered if women had any of the following criteria: Nulliparity, age 40 years or older, women with more than four births, women with any experience of abortion, stillbirth, cesarean section, preterm delivery, or neonatal death, and women reporting any condition such as high blood pressure, diabetes, epilepsy, or depression during pregnancy.

Data were analyzed using SPSS for windows version 16.0 (2009 Belmont, CA: Brooks/Cole Cengage Learning) and presented descriptively (minimum, maximum, and mean percentages).

T-Test, regression, and Chi-square tests were carried out. Significance level chosen was 0.05.

### Ethical considerations

All steps of this study from data gathering to data analysis were performed after obtaining permission from the Isfahan University of Medical Sciences' ethical committee. The data gathered from motherhood records was surreptitious and was not used for other purposes.

## RESULTS

In this survey, 400 records from mothers whose delivery time was within the first 3 months of 2013 were studied. Twenty motherhood records were excluded as they were incomplete. The age of women ranged from 16 and 42 years, with the average of  $28.25 \pm 4.88$  years. Education status of the majority of women was high school (41.3%); only 1.5% of the women were illiterate. 97.5% of the women were housekeepers.

### Past history of pregnancy

Past history showed that 42.8% of women were gravid 2, followed by 33.5% being primiparous. 18.5% of women were gravid 3 and only 5.2% were gravid 4 or more. 51.3% of women had one live child and 39% did not have any live child.

The body mass index (BMI) of women at the time of pregnancy ranged from 15.4 to 39.95kg/m<sup>2</sup>. The mean was  $26.3 \pm 4.475$ .

67.5% of pregnancies were terminated by cesarean section and 32.5% by normal vaginal delivery. 99.8% of deliveries took place in hospital.

The documentation records revealed that 220 cases of 400 women (55%) were categorized as high-risk pregnancy in their recent pregnancy because of pregnancy conditions and 180 pregnant mothers (45%) had been recognized as normal pregnancy.

The most common cause of high-risk pregnancy was abnormal BMI (31.3%), followed by Rh negative blood type. 24.5% of mothers had a past history of high-risk pregnancy. The less common causes were age over 35, less than 3 years interval between the last pregnancy and the present one, and mother's height below 150 cm.

Among those mothers who had past history of high-risk pregnancy, the most common cause was a past history of cesarean section (25%), followed by a history of gestational diabetes (20%).

22.8% of mothers had underlying medical diseases. The most common diseases were diabetes mellitus (3.5%), thyroid disease (3.8%), hypertension (1.8%), and renal disease (1.3%).

### Antenatal care

The mean time of first ANC was  $9 \pm 5.23^{\text{th}}$  week of gestational age. For 69.3% of pregnant women, the first ANC (*timely* ANC) had been taken place before the 12<sup>th</sup> week. The average frequency of ANC visits done by *behvarzes* (auxiliary trained staff in health houses) was  $5 \pm 1.62$ . The mean frequency of ANC visits done by midwives was  $3.18 \pm 1.46$ . 67.6% of pregnant women had been visited by midwives at least 3 times. The average ANC visits done by FPs was  $2.23 \pm 1.1$  times. ANC done by FPs was at least two visits in 71.6% of cases [Table 1].

97.2% of mothers have had at least four ANC visits by trained auxiliary staff, midwives and FPs, and 93.8% of mothers have had at least five ANC visits. The overall ANC visits for mothers ranged from 2 to 21, with average of  $10.6 \pm 3.23$  visits. On comparing with the standard ANC that has been recommended by the Iranian National Motherhood Cares guideline (eight ANC visits in pregnancy period) by using one-sample *t*-test, there was a significant difference ( $t = 16.18$ ,  $df = 399$ ,  $P = 0.000$ ).

6% of mothers were required to refer to FPs quickly during pregnancy. 93.5% of these mothers referred to doctors in less than 24 h. 31.8% of mothers were required to refer to a physician, but not quickly, among whom 32% referred to doctors in less than 7 days.

All the necessary laboratory tests [such as blood group, blood cell count and differentiation, fasting blood sugar, urinalysis, urine culture, venereal disease research laboratory (VDRL) test, bleeding time, etc.] in the pregnancy period had been performed for the majority of mothers (94% of cases).

On assessing the weights of mothers in the pregnancy period, it was found that majority of them (70%) had inadequate weights [Table 2].

4% of mothers had suffered pregnancy-related complications including anemia, diabetes mellitus, hypertension in pregnancy, etc. Only 0.3% ( $n = 1$ ) had suffered delivery-related complications.

**Table 1: Frequency of utilization of antenatal care by mothers in rural areas of IR Iran in 2011**

	Antenatal care	Frequency	Percent
The time of first ANC	1 <sup>st</sup> -12 <sup>th</sup> week	277	69.25
	13 <sup>th</sup> -25 <sup>th</sup> week	114	28.5
	26 <sup>th</sup> -40 <sup>th</sup> week	9	2.25
Number of ANC visits delivered by auxiliary personnel	1-3 times	64	16
	4-6 times	262	65.5
	7-9 times	74	74
Number of ANC visits delivered by midwives	0-2	129	32.25
	3-4	198	49.5
	5-7	73	18.25
Number of ANC visits delivered by physicians	0-1	113	28.25
	2-3	237	59.25
	4-5	50	12.5
Number of visits in postpartum period	0	3	0.75
	1-2	233	58.25
	>2	164	41

The majority of mothers (99%) had at least one postpartum visit.

The mean of birth weight of neonates was  $3050 \pm 487.23$  g. 85.6% of neonates had body weight between 2500 and 4000 g at birth. The percentage of low birth weight (LBW) babies (under 2500 g) was 11.3% [Table 2].

At birth, the height of neonates ranged from 37 to 57 cm (with a mean of  $49 \pm 2.717$  cm). The mean head circumference of neonates was  $34.5 \pm 1.828$  cm (ranged from 25 to 39 cm).

A significant correlation between the number of visits made by *behvarzes*, midwives, and physicians during pregnancy and having a high-risk pregnancy condition (regression = 45.07, df = 1,  $f = 17.845$ ,  $P = 0.000$ ) was found in this study.

There was significant correlation between having a high-risk pregnancy and abnormal BMI ( $r = 0.2$ ,  $P = 0.000$ ). There was a reverse correlation between having a high-risk pregnancy and educational status ( $r = -0.126$ ,  $P = 0.01$ ).

Regression analysis revealed that the sum of visits made by pregnant mothers was associated with pregnancy situations and also the education levels of mothers, but it did not have any relation with their age or BMI [Table 3].

## DISCUSSION

The average number of ANC visits in this study that were made by auxiliary staff, midwives, and physicians was  $10.6 \pm 3.23$  visits for every mother. National Motherhood Cares guideline recommends at least eight ANC visits.<sup>[12]</sup>

**Table 2: The frequency of some pregnancy outcomes in rural areas of IR Iran after health sector reform in 2011**

Outcome		Frequency	Percent
Mother's weight in pregnancy	Inadequate	281	70.25
	Adequate	84	21
	Overweight	35	8.75
Pregnancy complication	Yes	4	1
	No	396	99
Delivery complication	Yes	1	0.25
	No	399	99.75
Neonatal birth weight (g)	≤2500	53	13.25
	2500-3500	273	68.25
	>3500	55	13.75
	Unknown	19	4.75

**Table 3: Predictor variables of the sum of antenatal cares in rural areas of IR Iran after health sector reform in 2011**

	$\beta$	$P$ value (significance)
BMI	-0.024	0.618
Age	-0.067	0.192
Education	-0.139	0.006
Past history of high-risk pregnancy	0.215	0.000

BMI; Body mass index

The average number of visits was reported to be 4.4 in the rural areas of Vietnam. In those regions, 69.1% of cases attended ANC during the first trimester. Only 20.3% of rural women received all core ANC services.<sup>[13]</sup>

It was found in a Nigerian study that about 35% of adolescent women had at least four ANC visits, a little over 25% had undergone safe delivery care, and nearly 32% received postnatal care within 42 days of delivery.<sup>[14]</sup>

In China, just under half of women (49.7%) received five or more ANC visits before delivery and only 19.7% of women visited an ANC center during the first trimester.<sup>[15]</sup>

In Myanmar, overall 96% of respondents received ANC at least once and 79% had at least four ANC visits.<sup>[16]</sup>

The median number of prenatal consultations ranged from 4.7 in Bolivia to 6.6 in the Dominican Republic.<sup>[17]</sup>

In this study, 97.2% of mothers have had at least four ANC visits. In a study that was conducted in 2005 in Tehran (Iran's metropolis), before HSR implementation, it was found that 43.5% of women had inadequate utilization (less than five ANC visits) and the first ANC of 11% of them was after 28 weeks of gestational age.<sup>[18]</sup> In our study, only 2.25% of mothers received first ANC visit after 28 weeks of gestational age. Also, in a survey made in 2002 (before HSR in IR Iran), the number of ANC visits was found to be four for 94% of mothers.<sup>[19]</sup>

After implementation of HSR, in which one FP and one midwife were allocated for every 2500 persons in a community near the population residences, in addition to exemption of pregnant women from user fees following expanding unique health insurance in the rural areas, these problems have been resolved gradually. It seems these interventions have led to improvement in utilization of ANC in Iran. It seems HSR measures in IR Iran have achieved one important target of reform in facilitating access (equity) to health care, particularly for poor women at a critical period of their lives.

Although the average number of ANC visits in this study that were made by auxiliary staff, midwives, and physicians was  $10.6 \pm 3.23$  visits for every mother, according to the American College of Obstetricians and Gynecologists, the recommended frequency of visits for an uncomplicated pregnancy is 15 visits.<sup>[6]</sup> It seems the average ANC visits for Iranian women is lower than that in developed countries and it must be increased.

In our study, 55% of pregnancies were categorized as high-risk pregnancy in the last pregnancy. Abnormal BMI (the most common cause, 31.3%), Rh negative blood type, and past history of high-risk pregnancy, such as past history of cesarean section, were the causes of high-risk pregnancy in our study.

The percentage of high-risk pregnancy was 13.4% in the rural areas in the Vietnam study.<sup>[14]</sup>

The selection of cases in our study was random; so, the high ratio of high-risk pregnancy in this study seems to be

coincidental. High-risk pregnancies certainly need more ANC visits to ensure baby's and mother's health care. Surprisingly, there was a significant correlation between existence of high-risk pregnancy and the number of visits made by *behtarzes*, midwives, and physicians during pregnancy. But in the Vietnam study, the percentages of all indicators of ANC used among women with high-risk pregnancy were similar to the percentages of those with low-risk pregnancy.<sup>[20]</sup>

On the other hand, the ratio of pregnancy-related complications or delivery-related complications between two groups of pregnancies (with and without high-risk pregnancy) was not remarkable. Performed ANC, indeed, has led to improve technical efficiency after HSR in Iran.

Birth weight and height (but not head circumference) of neonates between the two groups of pregnancies (with and without high-risk pregnancy) were statistically different. In the rural areas of Isfahan province, the neonatal mortality rate decreased from 13.35 per 1000 live births (before HSR) to 8.8 per 1000 live births after HSR in 2011.<sup>[21]</sup> In 2005, in the Vietnam study, it was reported that more than 80% of all pregnant women had used ANC. So, this may have contributed to a decrease in infant mortality rate from 39 to 18 per 1000 live births.<sup>[14]</sup> Although HSR interventions have led to decrease in neonatal mortality rate, in high-risk pregnancy, there is higher chance of LBW. Also, 55% of the women in the present study had high-risk pregnancy. Probably, more high-risk pregnancy ratio in this study has interfered with the data on birth weight and height of neonates.

In the present study, the first ANC before the 12<sup>th</sup> week (timely ANC) had taken place for 69.3% of pregnant women.

In the United States, the use of timely prenatal care increased slightly to 83.8% in 2002. The use of timely prenatal care was 88.7% for non-Hispanic white women, 75.2% for black women, and 76.8% for Hispanic women, thus narrowing racial disparities.<sup>[11]</sup>

However, the Iranian health policy makers must improve effective availability for pregnant women and encourage all mothers to utilize ANC in the first 12 weeks of their pregnancy in accordance with the international standard guidelines.

In the present study, 99.8% of deliveries took place in hospital and were attended by skilled health personnel, whereas 89.6% of the births were attended by skilled health personnel (trained physicians and midwives) by 2000.<sup>[7]</sup> Following implementation of HSR, if necessary pregnant women are referred to hospital via FPs'

recommendations (upon referral guidelines) also they are benefited from free inpatient cares.

However, in this study, 67.5% of pregnancies were terminated by cesarean section, while in Guatemala, Peru, and Bolivia, more than 45% of deliveries took place at home. The highest rate of cesarean delivery was in Brazil (36.4%) and the lowest rates (<12%) were in Peru and Guatemala.<sup>[17]</sup> In 2002, in the United States, 26.1% of births were delivered by cesarean section.<sup>[11]</sup> Therefore, Iran has the highest frequency of cesarean section among the above-mentioned countries, which decreases the technical efficiency in motherhood programs.

In the present study, the majority of mothers (99%) had at least one postpartum visit. 43% had two visits and three visits were made by 40.8% of cases, while in the study performed in Myanmar, 56.6% of women received at least one postnatal care visit.<sup>[16]</sup> In Congo, only 34.6% of postnatal women had attended postnatal care by 42 days after delivery.<sup>[22]</sup> However, Iranian National Motherhood Cares guideline has recommended three visits postpartum. It seems that it would be improve postpartum visits in Iran.

In this study, only 4% of mothers have suffered pregnancy complications including anemia, gestational diabetes, thyroid disease, preeclampsia, and renal disease. Only 0.3% ( $n = 1$ ) suffered delivery complications. The rate of pregnancy complications reported by the women surveyed was 16.7% in Brazil, 17.9% in Guatemala, 42.1% in Colombia, 42.5% in Nicaragua, 43.0% in the Dominican Republic, 51.7% in Bolivia, and 51.8% in Peru.<sup>[17]</sup> As mentioned earlier, motherhood and infant care has been done and followed up in an active manner in the rural areas of IR Iran. Obviously, ANC and postnatal care have been followed better than in similar developing countries. Consequently, the rate of pregnancy- or delivery-related complications has been decreasing slightly.

The percentage of LBW babies (under 2500 g) in our study was 11.3%. The percentage of LBW babies was 7.8% in the United States of America in 2002,<sup>[11]</sup> while 5.2% of term births in the Teheran study were LBW neonates.<sup>[23]</sup> The percentage of LBW per live birth per year is approximately 15.5% worldwide and more than 95% of LBW infants are born in developing countries.<sup>[23]</sup> The frequency of LBW in our study was more than that of above-mentioned studies. The important point is that this study was carried on rural pregnant women with low socioeconomic status. Because agriculture is the main job of men and majority of women are homemakers, due to the recent drought, Isfahan district population that resides in rural areas has suffered from income limitation. Obviously, due to these conditions, the majority of pregnant mothers (70%) had

inadequate weight during pregnancy. In addition, there was significant correlation between having a high-risk pregnancy and abnormal BMI. These women have more chances of having LBW neonates. It seems that rural pregnant women in our study have suffered multiple complications due to drought phenomenon. So, the Iranian health policy makers should not only develop the effective availability of the services for pregnant women but also improve the quality of motherhood care and decrease the side effects of poverty on mother's and child's health.

In our study, there was no significant correlation between mothers' age and job and ANC service utilization. However, regression analysis revealed that the sum of pregnant mothers' visits was associated with pregnancy situations and the education levels of mothers. The reverse correlation between the literacy status and ANC service utilization has been emphasized in studies from China,<sup>[15]</sup> Myanmar,<sup>[16]</sup> Rhode Island,<sup>[24]</sup> Bangladesh,<sup>[25]</sup> Ethiopia,<sup>[26]</sup> and Kenya.<sup>[27]</sup> Iran has a good network of primary health care facilities, with a particularly good coverage in most of the rural areas. Because of broad population coverage of the health care services and active follow-ups, particularly in rural areas, mothers' use of pregnancy care takes place in despite of their demographic characteristics like age, job, and literacy; therefore, they utilize these services equally.

## CONCLUSION

It seems following the HSR measures in IR Iran, one important objective of reform has been achieved, that is, offering improvement in access to health care, particularly ANC for women in a critical period of their lives. On the other hand, less incidence of pregnancy- or delivery-related complications reveals improvement in the efficiency of Iranian health system.

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