Original Article

Assessment of Prenatal Care Quality and Related Factors after the Implementation of the Family Physician Program in Northwest Iran

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Abstract

Background: Prenatal Care (PNC) is a fundamental topic of the family physician program. This study aimed to evaluate the PNC quality and related factors after the Implementation of the Family Physician Program in northwest Iran. **Materials and Methods:** This cross-sectional study was conducted among 385 pregnant women visiting four Comprehensive Health Services centers in Tabriz City, in 2019. Samples from each center were selected proportionally to the size of the center over 3 months. Data were collected using a researcher-made questionnaire on PNC assessment. Poisson regression analysis was used to evaluate the associations. **Results:** Nearly 95% of participants were homemakers with a mean age of 29.5) 5.74) years, and 60% had planned pregnancies. Participants who visited healthcare providers regularly reported a higher quality of care. The quality of care significantly varied depending on the referral location for receiving care. Lower education levels in mothers, utilization of preconception care, and early referrals to care centers were associated with enhanced care quality (p-value < 0.001). **Conclusions:** The gap between perceived quality of care and actual standards reveals strong associations between care quality and factors such as regular visits, referral sources, maternal education, preconception care, and timely access to care. It is recommended to implement targeted interventions in these areas to enhance PNC quality.

Keywords: *Care quality, family physician, pregnancy, prenatal care*

Introduction

The Almaty Conference in 1976 prompted a significant shift in the management of Iran's primary healthcare (PHC) system, particularly for mothers and children.[1] The outcomes of this transformation, after over 35 years, represent remarkable achievements in reducing maternal and child mortality.[2] The implementation of the Rural Insurance and Family Physician Program (FPhP), which represents a second major revolution in the country's PHC system, has resulted in an increased number of doctors and midwives in health homes—one doctor for every 2500 people and one midwife for every 4000, as well as improved access to healthcare.[3] The FPhP objectives for maternal care are documented in several policy articles and studies, emphasizing key goals such as ensuring continuity of care, strict adherence to prenatal protocols, and comprehensive coverage of maternal health needs from preconception through postpartum.[4] Continuity is maintained by fostering sustained patient–physician relationships that allow consistent monitoring and early detection of complications throughout pregnancy, delivery, and postpartum care.[4] Protocol adherence requires family physicians to follow clinical prenatal guidelines involving assessments like gestational age tracking, vital signs monitoring, lab tests, ultrasounds, and preventive treatments tailored to individual risk profiles.[4] The FPhP hypothesizes that focusing on these objectives will improve the technical quality of prenatal care by enhancing clinical outcomes. For example, continuity facilitates early management of both routine and high-risk conditions, reducing maternal and neonatal morbidity. Protocol adherence ensures the timely and complete delivery of prenatal interventions, reducing missed care opportunities.[5,6] Moreover, integrating maternal care within family practice promotes a holistic approach addressing physical, social, and psychological factors. Empirical evidence from Iran and rural US settings indicates that the FPhP improved

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process indicators like antenatal visits, ultrasounds, and neonatal birth weight[5,6]

Prenatal care (PNC) encompasses a range of actions aimed at identifying risks, providing health education, and managing pregnancy-related conditions, which are essential for monitoring the health of pregnant women. Quality healthcare is defined as delivering the appropriate services at the right time, place, and cost, leading to optimal clinical outcomes. High-quality PNC is crucial for safeguarding women's health during pregnancy, childbirth, and the postnatal period and includes thorough medical assessments and education to reduce complications.[7-9] Research highlights the significant role of PNC in enhancing pregnancy outcomes and the future health of children. Addressing consumer dissatisfaction in services is a cost-effective strategy to improve quality. Globally, many women experience serious health issues during pregnancy and childbirth, contributing to increased risks for mothers and infants. In developing countries, inadequate PNC is linked to higher mortality rates and extended hospital stays for newborns.[10-15] The high social and economic burden of maternal and neonatal disabilities and death could be substantially prevented by adequately administered low-cost PNC.[16,17] Mothers who seek care during pregnancy are more likely to have healthy babies and less likely to die.[18] Pregnancy care services, including services such as antenatal care (ANC) visits, iron-folic acid supplementation (IFA), tetanus toxoid injection, diagnostic tests including blood and urine tests, and health education/counseling, are actively applied in most countries.[19]

A review of literature evaluating the impact of the FPhP on health indicators reveals two key issues: First, the studies are limited in scope, and second, they primarily depend on vital and official statistics.[3,20-23] We have not found any comprehensive study that has been conducted that assesses the FPhP in terms of inputs, interventions, outcomes, and consequences. This study aims to identify gaps and areas for improvement following the implementation of the FPhP, assessing the current quality of care, and ultimately enhancing health outcomes for mothers and their babies. Prenatal care practices and quality can vary significantly due to cultural, social, and regional factors. By focusing on northwest Iran, this study can offer valuable insights that help tailor healthcare strategies to respect local customs and meet regional needs. By examining various factors related to care quality—such as educational levels, referral practices, and access to healthcare—this study can uncover barriers that prevent access to high-quality PNC. Understanding these challenges can inform targeted interventions designed to overcome them. The findings may provide some recommendations for policymakers and health authorities. By gaining a clear understanding of the current landscape of the FPhP, resources can be allocated more effectively to improve healthcare services in the areas where they are needed most. Additionally, this assessment can raise community awareness about the importance of quality PNC and encourage greater engagement with healthcare services. Considering all these interpretations, this study aimed to evaluate the prenatal care quality and related factors after the Implementation of the Family Physician Program in northwest Iran.

Materials and Methods

This cross-sectional study was conducted among pregnant women referring to four urban Comprehensive Health Services Centers of Azadi, BaniShafi, HokmAbad, and Yaghchian, randomly selected from 20 centers after FPhP in Tabriz City, in 2019. The sample size for the study was estimated by the Cochran sample size table with an error level of 0.05, with a maximum sample size to estimate a 0.05 error margin. Samples from each center were selected proportionally to the size of the center over 3 months. Inclusion criteria were being at the 9th month of pregnancy, residence in Tabriz, receiving at least two visits from the corresponding center, and signing an informed consent. Pregnant women with diseases needing regular care visits were not included in the study. There are different methods for measuring the quality of healthcare. Donabedian considers the quality of healthcare to be measurable at three levels: outcome, process, and structure.[24] There are three perspectives for measuring quality based on the concepts of structure, process, and outcome: Explicit review, Implicit review, and the use of marker events. The implicit and explicit methods focus more on the quality of the process and outcome rather than on structural aspects, while using the marker events method, all aspects of the quality (process, outcome, and structure) are measured.[25-27] Measurement of the quality by the marker events method for the maternal health service includes the use of programs, pregnancy diagnosis, time of the first visit, frequency of care, physician's visit, frequency of control of maternal vital signs, gynecological examination, fetal heart rate control, uterine height, edema or varicose veins examination, examination of Warning signs during pregnancy and training activities such as personal hygiene education, nutrition education and providing nutritional supplements during pregnancy, dental examination, blood, urine, and ultrasound tests.[28,29]

This study was performed within 3 months by referring the researcher to selected urban Comprehensive Health Services Centers. The questionnaire was developed according to the National Standard for Pregnancy Care developed by the Ministry of Health and Medical Education of the Islamic Republic of Iran. The questionnaire used in the study comprised three parts. Before entering the participants into the study, a brief written and oral introduction, including the aim of the research and the way the questionnaire must be answered, was presented to the participants. The first part of the questionnaire included demographic information, including age, occupation, type of insurance, and level

of education. The following section includes items about choosing a service provider, which may include only a specialist, only a health center, or both. It also covered the week of discovering the pregnancy (from the first to the second trimester), perceptions of the quality of care provided (from very poor to very good), and the filing time (first, second, or third trimester). This was completed by the questioners. In the last part of the questionnaire, Questioners by referred to the documents answered 30 various questions on PNC over the previous 8 months of pregnancy period (including 11 questions on clinical services and examinations, two questions about risky signs, nine questions on the training provided during pregnancy, three questions on the dietary supplements offered during pregnancy, and five questions on the para clinical services received during pregnancy) by using a 8-point scale from '0 = never' to '7 = seven times or more than seven times.' To confirm the reliability of the questionnaire, ،we used a pilot study with 30 individuals. A Cronbach's alpha of 0.95 in the pilot study indicated acceptable internal consistency of the questionnaire. The validity of this questionnaire was also confirmed (CVI and CVR for the questionnaire questions were measured as 0.83 and 0.76, respectively).

Item-by-item fulfilment of the PNC was assessed by the comparison of the mean value of each item to the national standards. Also, the percentage of participants meeting the minimum number of required services was calculated. Total care quality was considered as the count of items meeting the required minimum standard out of 30 items. We also categorized the status of PNC quality as weak (fulfilment of <10 items), medium (fulfilment of 10–20 items), and good (fulfilment of >20 items).

Descriptive statistics were reported as N (%) and M (SD). As the response was the number of items (out of 30 items) meeting the required standard, we used Poisson regression analysis with a backward elimination procedure to assess the factors related to care quality. The assumption of homogeneity of variance was evaluated using the dispersion statistic. We used IBM SPSS Statistics for Windows, Version 20, Armonk, NY: IBM Corp., to analyze the data. The statistical significance level was set at 0.05.

Ethical considerations

Ethical approval of the study was obtained from the Ethics Committee of the Tabriz University of Medical Sciences (IR.TBZMED.REC.1399.112). Signed informed consent was obtained from volunteer participants before their entrance to the study. The participants were assured of the confidentiality of the collected information.

Results

Table 1 shows the characteristics of the participants. The mean age of participants was 29.5 (5.74), where 50% of participants were 21–30 years old. Table 2 presents the mean value of each item in the PNC questionnaire.

Table 1: Characteristics of study participants

	Variable	*n (%)
Age (year)	<20	18 (4.71)
	21-30	196 (51.02)
	>30	170 (44.33)
Occupation	Housewife	365 (94.81)
	Employed	20 (5.21)
Medical insurance	Yes	353 (91.74)
	No	32 (8.36)
Education	Illiterate	7 (1.82)
	Elementary/guidance school	72 (18.75)
	High school	186 (48.31)
	Academic	120 (31.23)
Abortion	Yes	83 (21.71)
	No	299 (78.32)
Stillbirth	Yes	3 (0.81)
	No	382 (99.22)
Planned pregnancy	Yes	227 (58.93)
	No	158 (41.19)
Gravida	1	150 (39)
	2	154 (40)
	3	63 (16.43)
	4	14 (3.65)
	≥5	4 (1)
Para	0	158 (41)
	1	69 (17.93)
	2	102 (26.49)
	≥3	56 (14.54)

*Number (percentage)

Despite a high perception of care quality among 90% of respondents, the majority of PNC indicators fell below the established standards, revealing a concerning gap between perceived and actual care technical quality [Tables 3 and 4].

Dispersion statistics of 1.36 confirmed a sufficient fit of Poisson regression to our data. The backward Poisson regression results [Table 5] showed that care quality was significantly positively linked to several factors: regular visits, referral to both health centers and specialist offices, lower maternal education levels, use of preconception care, and the timing of the first visit to care centers (p-value <0.001).

Discussion

In this study, we evaluated the PNC quality and its related factors after the implementation of FPhP in selected urban health centers in Tabriz, Iran. The results suggest that care quality had a significant association with having regular visits, referral place to receive care, education level of the mother, using family service before pregnancy, and time of first referring to care-providing centers.

Previous studies reported insufficient PNC training as well as clinical examinations in pregnant women in Tabriz.[30] Nevertheless, despite receiving sufficient visits, there are

Table 2: Aspects of prenatal health services for mothers and the percentage of implementation of standards (*n*=385)

	*M (SD)	Standard value	**n (%)
Health care providers' visits	**6.30 (1.42)**	6-8	**308 (80.21)**
Physician visits	**2.88 (2.42)**	1-3	**312 (81.22)**
Dentist visits	0.37 (0.79)	1-3	293 (76.13)
Gynecologist examinations	0.98 (1.98)	2	87 (22.74)
Measuring blood pressure	**6.21 (1.63)**	6	**307 (79.91)**
Measuring weight	**6.25 (1.55)**	6	**307 (79.90)**
Checking fetal heart sound	**5.85 (2.03)**	5	**309 (80.24)**
Measuring uterine height	3.34 (3.02)	5	159 (41.52)
Measuring body temperature	3.78 (3.19)	6	102 (26.56)
Measuring the number of breaths	3.84 (3.27)	6	190 (49.37)
Pulse measurement	4.60 (2.98)	6	218 (56.82)
Examination of edema or varicose veins	1.43 (2.49)	6	55 (14.41)
Bleeding and spotting	5.08 (2.69)	6	242 (62.84)
Asking about risk signs	**5.58 (2.33)**	6	**270 (70.33)**
Informing about risk signs	4.78 (2.87)	6	229 (59.64)
Drug allergies training	3.74 (3.12)	6	171 (44.41)
Nutrition supplements and dietary	4.44 (2.87)	6	201 (52.35)
Individual health training	4.73 (2.81)	6	219 (56.87)
Mental and sexual health training	**4.45 (2.95)**	2-3	**284 (73.78)**
Informing about breastfeeding benefits	**4.48 (2.91)**	2-3	**252 (65.49)**
Danger symptoms and baby care training	**4.11 (3.03)**	2-3	**252 (65.63)**
Oral health training	**3.05 (3.05)**	2-3	**133 (34.51)**
Receiving iron tablets	2.92 (2.79)	5	127 (32.33)
Receiving multivitamins	2.67 (2.82)	5	114 (29.71)
Prescribing folic acid	2.95 (2.86)	4	153 (39.82)
Blood tests	**1.87 (1.85)**	2	**204 (53.12)**
Urine tests	**1.69 (1.77)**	2	**184 (47.76)**
Ultrasounds	**3.31 (2.50)**	2-3	**194 (50.32)**

The items meeting required standards are in bold. *Mean (Standard Deviation). **Number (percentage)

Table 3: Status of prenatal care quality among participants based on the number of items meeting the recommended standard value (*n*=385)

Quality level	*n (%) of participants
Weak (<10 items)	90 (23.41)
Medium (10-20 items)	182 (47.42)
Good (>20 items)	112 (29.24)

*Number (percentage)

Table 4: Perceived care quality of participants (*n*=385)

Perceived quality level	*n (%)
Very weak	2 (0.52)
Weak	7 (1.82)
Average	28 (7.31)
Good	131 (34.16)
Very good	214 (55.73)
Do not know	2 (0.52)

*Number (percentage)

still shortages with respect to some items of training and examination during the pregnancy period. It seems that having regular care visits is an essential factor in improving maternal care quality and results. Continuous care emphasizes two fundamental issues of consistent and individualized care that meet individual needs.[31] Regular care is one of the most prominent recommendations during the pregnancy period. Studies show that women who are satisfied with pregnancy care are more likely to participate and pursue their own care plans, which in turn results in desirable health outcomes of pregnancy[32,33]

Preconception care is being recognized as an essential component of reproductive rights, empowering women, and enhancing their status in society.[34] In contrast to previous reports of no correlation between preconception care and the quality of care process, we observed that preconception care improves the PNC quality.[35] Also, the PNC quality depends on when the care begins as a delay in starting PNC could leave a negative impact on both the mother's and the baby's health.[36,37] Also, our results suggested referral time for receiving care as one of the effective factors in the quality of PC. The desirable time of referral for receiving PNC is the first trimester of pregnancy.

It is reported that health literacy in pregnant mothers is associated with pregnancy-related variables, pregnancy care,

Table 5: Results of Poisson regression on factors associated with prenatal care quality (as the number of items meeting required standards)

Variable	Coefficient	Std. Error	*p*
Intercept	6.89	2.17	0.002
Regular care (yes)	0.72	0.063	<0.001
Number of pregnancies	0.029	0.017	0.09
Planned pregnancy (yes)	–0.002	0.027	0.97
Preconception care (yes)	0.14	0.028	<0.001
Week of referring to the center	–0.012	0.023	<0.001
Age	0.004	0.002	0.12
Education			<0.001
< guidance school	0.19	0.039	<0.001
High school/diploma	0.07	0.032	0.026
Academic	ref.	–	–
Service Provider			<0.001
Specialist only	–0.012	0.037	0.75
Health center only	–0.195	0.039	<0.001
Both the health center and the specialist	ref.	–	–

Omnibus test of model fit: LR Chi-square=431.29, df=10, p<0.001

and pregnancy outcome by improving the quality of health services during this period.[33,38,39] A study showed that high levels of health literacy and awareness in people with higher levels of education indicate the role of education in this field.[37] Mothers with lower levels of education receive less PNC services despite adequate access.[40] Nevertheless, in our study, the association between education level and care quality was reversed. One reason for this result could be prioritizing self-care or private providers by educated mothers.[41] This requires further research to evaluate this link and explore the possible reasons within this population. Additionally, it highlights the need for reforms to improve healthcare coverage among highly educated women.

We also found that PNC is associated with the place to which the mothers refer to receive care services. As indicated in previous studies, individual, organizational, and environmental factors could affect the quality of services.[42] Also, the place of referral for receiving care and staff characteristics are essential factors in the quality of care.[43] Those who refer to both specialist offices and health centers are probably more concerned about the fetus and their own health and receive better care than the others.

Paraclinical services are another indicator of the quality of pregnancy care, which has a valuable role in identifying and preventing problems and diseases of mothers and infants. According to a study in Tabriz, all educational items for pregnant mothers were below the standard.[30] A study in Tanzania found that 42% of women were not educated about the danger signs of pregnancy.[44] The provision of nutritional supplements was lower than recommended levels in the sampled population. Our findings are in accord with findings of previous studies in Tabriz and other populations, so that in one of the studies, pregnant mothers had an average of 1.12 urine, 1.15 blood test, and 1.92 ultrasound during pregnancy.[45] Another study in Tabriz reported gynecological examination of 40%, measurement of uterine height of 83.3%, examination for edema of 93.3%, doctor visits of 73.3%, dentist visit of 96.7%, blood pressure measurement of 36.7%, weight measurement of 36.7%, and hearing fetal heartbeat of 16.7%.[46] We observed that the training provided to the pregnant women was not below the recommended values. Improvements in PNC-related training could increase mothers' self-care, self-confidence, and self-esteem and reduce unnecessary referrals. Some studies consider the constant exchange of information as an essential part of a pregnancy care program.[47,48]

Another support program to improve the quality of care is the administration of nutritional supplements by the centers to pregnant mothers. Taking supplements in the prenatal period can benefit the mother and fetus.[49] Despite the existence of health programs that modify supplements as part of antenatal care, the literature shows that iron and folic acid use are lower than expected,[50] which is according to the findings of our study. This decrease could be a result of a lack of supply of supplements in some health facilities[51] or reflect a lack of acceptance and adequate use of supplements by mothers.[52]

Participants were selected from particular urban Comprehensive Health Services centers, where, according to Table 1, 91.74% have medical insurance. Therefore, it may not reflect the broader population of pregnant women, especially those in remote areas or from different socioeconomic backgrounds. For this reason, it is recommended that future studies be conducted in remote areas. Furthermore, the reliance on self-reported data for assessing PNC quality may introduce reporting bias, potentially affecting the accuracy of the results. Also, insufficient literacy among some participants, along with a lack of comprehensive awareness and reminders about the care provided by health centers, may have impacted the data. The reliability of the results can be increased by adequately training the samples by the questioners or by using triangulation with medical records. Also, it is recommended to conduct a follow-up cohort study by recording documents to provide more reliable evidence. Furthermore, measuring the quality-related items on the care-provider side and examining these factors in the amount and quality of delivered care could be very useful.

Conclusion

The findings show that although 90% of respondents perceive high-quality care, most PNC indicators fall below the standards, highlighting a significant gap between perceived and actual care quality. The data emphasize the importance of regular care visits and active engagement with FPhP before pregnancy. Receiving preconception care

has become recognized as a vital part of reproductive rights, empowering women and improving their status in society. Additionally, our results suggest that referral time for care is one of the effective factors influencing the quality of PC. The results emphasize the detrimental impact of delayed referrals to health centers on care quality and also suggest that educational attainment plays an inverse role in the reported perceptions of PNC quality. Notably, dual referrals to both health centers and specialists emerged as a positive factor associated with higher quality PNC. These findings suggest a need for targeted interventions to improve PNC standards, and access to educational resources, and also enhance referral processes to ensure that all women receive adequate and effective pre-pregnancy and prenatal care. Also, based on the findings, the causes of weakness in the provision of these services should be investigated, and necessary interventions should be made. It is recommended that pregnant mothers be given the essential education about diet, nutrition, hygiene during pregnancy, and how to visit medical centers. It is also necessary to intervene to benefit all pregnant women proportionally from nutritional supplements and paraclinical services. The information obtained from this research can play a significant role in the planning of health officials of the country to identify gaps in the family physician program and improve the quality of prenatal care.

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Conflicts of interest

Nothing to declare.

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