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Assessment of Adequacy of Prenatal Care Utilization Index and its Affecting Factors

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ABSTRACT

Background: The adequacy of prenatal care can play an important role in reducing maternal and neonatal mortality. The adequacy of prenatal care is determined using various indicators, and it can be related to several factors.

Aim: This research assessed the adequacy of prenatal care and determined the factors affecting it in Shiraz, Iran.

Methods: The research population comprised 413 women who referred to Shiraz Medical Sciences Hospitals in 2017; data was collected from information available in the patients’ prenatal care and maternity records. Descriptive statistics, one-way ANOVA, and the chi-square test were used to analyze the data.

Results: The results of this research showed 94.4% of pregnant women received prenatal care for the first time in the first four months of pregnancy, while prenatal care was initiated in the third trimester of pregnancy for 0.7% of women. According to the Kotelchuck Index, 70.94% of pregnant women received adequate-plus care. Data analysis indicated a significant relationship between adequacy of prenatal care and prenatal care provider (p<0.001). In addition, there was a significant relationship between adequacy of prenatal care and sector of maternal and child health system. There was also a significant relationship between adequacy of prenatal care and pregnancy intention status from both the women’s (p=0.004) and their husbands’ (p<0.001) perspectives.

Conclusion: Making the decision to use prenatal health services is a complicated process affected by individual, family, and health system factors. Therefore, it is important that prenatal care providers pay attention to factors affecting the receipt of such care.

Keywords: Adequacy of prenatal care utilization index, Kotelchuck Index, Prenatal care, Pregnant women, Iran.

INTRODUCTION

Prenatal care was designed in the early 1900s. Its purpose is to monitor maternal and fetal health, diagnose complications, resolve pregnant women’s problems, prepare for delivery, promote healthy behaviors, and ultimately reduce maternal and neonatal mortality1. Researchers believe that the benefits of receiving prenatal care may be transferred into the women’s lives and future generations(2). The health system, family, and community are responsible for creating opportunities and facilities to support pregnant women in receiving prenatal care(3). Moreover, prenatal care should enable women to consult with prenatal care providers about their problems and needs so they can make informed decisions and experience a sweet and pleasant pregnancy4,5. To achieve these goals, prenatal care should be helpful6.

To assess the quantitative adequacy of prenatal care, various indicators are often used7,8. Kessner et al. introduced an index evaluating data regarding the duration of pregnancy, prenatal care initiation, and number of prenatal visits9. Kotelchuck proposed the Adequacy of Prenatal Care Utilization Index (APNCU) in 1994 after assessing Kessner’s prenatal care adequacy index. This standard index evaluates the adequacy of prenatal care by considering prenatal care received for the first time and the adequacy of its numbers. Kotelchuck believed that his proposed index provides a more complete and comprehensive set than Kessner’s index10,11. There is a general agreement on the importance of early prenatal care, and its supporters believe that early prenatal care provides an opportunity for the screening and early diagnosis of problems and the treatment of pregnant women12,13. If prenatal care is delayed, the opportunity to diagnose gestational hypertension, gestational diabetes, or sexually transmitted diseases may be lost14.

The number of prenatal care visits is a controversial topic among experts. Some studies have shown that reducing the number of prenatal care visits to at least four does not increase the adverse outcomes of pregnancy. On the other hand, several studies have reported that frequent referral to prenatal care centers makes it possible to diagnose more pregnancy complications, such as preeclampsia, intra-uterine growth restriction, and stillbirth15,16,17,18. Cochrane researchers reviewed ten clinical trials of women with low-risk pregnancies and concluded that increased prenatal care can reduce adverse maternal outcomes19. In addition, if women receive adequate prenatal care, the number of premature births and low birth weights will be reduced, and fewer newborns will suffer from disease19,20.

The number of prenatal care visits varies among countries. In Finland and Norway, 14 visits, and in Switzerland 3-4 visits are standard. In Indonesia, it is recommended that pregnant women receive prenatal care at least four times, and according to the instructions provided by the American College of Obstetricians and Gynecologists, the number of prenatal care visits for low-risk pregnancies is 1421. In the standard guidelines of Iran, it has been mentioned that if a pregnant woman is healthy enough, she should be regularly visited 8 times within weeks 6-10,16-20, 26-30, 31-34, 35-37, 38, 39, and 4022. A
study conducted in Iran showed that 82% of women received moderate care. Some researchers believe that various factors can affect the receipt of prenatal care and, ultimately, its adequacy. A study carried out on immigrant women in Taiwan indicated that women's employment increased the receipt of adequate prenatal care. Another research conducted on pregnant women in the Philippines indicated that maternal education was the most important factor in receiving prenatal care. In addition, the chance of receiving prenatal care was reduced by the increased number of children and a woman's age. A review study reported that younger women and less educated women received less prenatal care.

The researchers of the current study believe that the precise assessment of prenatal care in Iran can help improve the available services and ultimately improve the outcome of pregnancy and childbirth. Since factors affecting the adequacy of prenatal care have not been investigated in Shiraz, the current study assessed the adequacy of prenatal care and determined the factors affecting it in Shiraz, Iran.

**METHODOLOGY**

This is a descriptive-analytical study that was approved by the Ethical Review Board of Shiraz University of Medical Sciences, Iran. The study population comprised all women hospitalized in the postpartum unit of Shiraz University of Medical Sciences hospitals in 2017. Based on the research population and a Cochran's formula for calculating sample size of infinite population with \( \alpha = 0.05 \), \( Z = 1.96 \), \( d = 0.05 \), and \( p = 1 - p = 0.5 \), and with the probability of 10% attrition, the sample size for this study was determined to be 422. Sampling was carried out daily and randomly in three educational hospitals based on the number of people referring to these centers from November 2017 to February 2018. After obtaining permission from Shiraz University of Medical Sciences, the researchers referred to the relevant hospitals daily, and data was collected using 422 forms related to prenatal care, maternal records, infant cards, and (where necessary) through interviews conducted by the researcher. The data collection form was prepared based on the framework of prenatal care forms related to mothers' health records and hospital documentations. This form included three sections, the first of which included questions related to personal and familial information, the second of which contained questions about the obstetrical history, and the third of which included recorded information of prenatal care in the present pregnancy.

After examining these forms, nine forms with incomplete data were excluded from the study, and ultimately, 413 samples that met the inclusion criteria were selected. Inclusion criteria was being of Iranian nationality, having a low-risk pregnancy, having no known mental disease, being interested in participating in the research, and signing the participation consent form.

The Kotelchuck Index was used to determine the adequacy of prenatal care, calculated based on the month in which care was first received and the number of prenatal visits from the first one to delivery time. This index was calculated according to the pattern of referrals of pregnant women and the latest instructions provided by the Ministry of Health and Medical Education of Iran; it was classified as explained below.

Adequate-plus prenatal care included care initiated within the first four months of pregnancy and including eight or more visits throughout the pregnancy. Adequate prenatal care started in the first four months and included 6–7 visits. Moderate care was initiated in the first four months and included 4–5 visits. Inadequate prenatal care was initiated after the first five months or within the first four months but included less than 4 visits.

Data was analyzed using descriptive statistics (frequency, mean), one-way ANOVA, and chi-square tests, and SPSS 23. A p-value less than 0.05 was considered to be statistically significant.

**RESULTS**

The mean ages± standard deviations of pregnant women and their husbands were 28.77± 5.90 years and 33.72± 6.28 years, respectively. Out of the 413 eligible participants in this study, 31(7.51%), 28(6.78%), 61(14.77%), and 293(70.94%), respectively, received inadequate, moderate, adequate, and adequate-plus prenatal care based on the APNCU. The adequacy of prenatal care based on the number of prenatal care visits provided in the Guideline of Iran's Midwifery Services is shown in Table 1.

The data showed that 40% of participating women were experiencing their first pregnancy, 65.4% of women underwent cesarean delivery, and 34.6% of participants had a normal vaginal delivery. 61.3% of participants had received more than eight prenatal care visits, 24.2% of participants received similar care simultaneously from both public and private sectors, and 10.9% of participants attended the eight courses proposed by the Iranian Ministry of Health and Medical Education. The results further showed that 64.6% of the participants and 70.9% of their husbands had wanted the present pregnancy. The relationship between the adequacy of prenatal care and qualitative factors is shown in Table 2.

There was no significant difference between the APNCU and maternal and paternal age (\( p=0.367 \)). There was a significant relationship between prenatal care and number of prenatal care providers (\( p<0.001 \)); this difference was observed between the midwife and Behvarz groups. All women who received prenatal care by Behvarz had received adequate-plus prenatal care. The statistical tests showed that there was a significant relationship between the APNCU Index score and prenatal care sector (\( p=0.003 \)); more than half (54.6%) of the participants with adequate-plus care had referred to the public sector. Data analysis also showed a significant relationship between the APNCU Index score and pregnancy intention status from the perspective of the women (\( p=0.004 \)) and their husbands (\( p<0.001 \)); 76.8% of women who intended the pregnancy had received adequate-plus care, and the wives of 78.1% of men who intended to have a child had received adequate-plus prenatal care. There was a statistically significant relationship between prenatal care provider and the APNCU Index (\( p<0.001 \)); 82% of women who referred to more than one care provider for prenatal care were placed in the adequate-plus care group (Table 2).
**DISCUSSION**

This study was carried out to determine factors affecting the adequacy of prenatal care. There was a relationship between the APNCU Index score and the number of prenatal care providers, care sector, pregnancy intention status for women, paternal pregnancy intention status, and number of prenatal care providers.

There was a significant relationship between the APNCU Index score and number of prenatal care providers. Most women in the adequate-plus care group had received prenatal care from a gynecologist. This finding is consistent with the results of another study, which concluded that pregnant women who received adequate care were under the supervision of a specialist. Another study in Canada showed that women who had a family practitioner as their prenatal care provider had received more adequate prenatal care than those who were visited by a gynecologist. Another group of researchers also
claimed that there seemed to be a deep relationship between the initiation of prenatal care and the characteristics of the provider.

There was a significant relationship between the APNCU Index score and sector of prenatal care; more than half of the participants who received adequate-plus care had referred to the public sector. In a study conducted on pregnant women in Brazil, there was a higher level of inadequate care among pregnant women referring to the public sector than those referring to the private sector. Also, delayed initiation of prenatal care was more in women referring to the public sector than those who were willing to refer to the private sector.

There was a statistically significant relationship between the number of prenatal care providers and the APNCU Index score; the majority of women who referred to more than one care provider for prenatal care received adequate-plus care. The relationship between the number of prenatal care providers and the APNCU Index score has not been studied in any research.

There was a significant relationship between the APNCU Index score and intended pregnancy from the husbands’ perspective; most wives of men who intend to have a child had received adequate-plus prenatal care. A husband’s support for his wife’s utilization of more prenatal care probably plays an important role in the adequacy of the care.

A significant relationship between the APNCU Index score and intended pregnancy from the women’s perspective was seen, and most mothers with an intended pregnancy received adequate-plus care. In Kenya and Bangladesh, women with wanted pregnancies received more prenatal care.

Studies have also shown that one of the most important challenges of an unwanted pregnancy in Tanzania and Ecuador is the delay in receiving prenatal care or the lack of referring to receive prenatal care, which makes a pregnancy high risk. In the current study, no significant relationship was observed between the APNCU Index score and family income. This was consistent with the results of a study conducted in Brazil. However, the results of a study conducted by Bui et al. on the relationship between husband’s income and receiving prenatal care were inconsistent with the findings of the current study.

In the present study, there was no statistical relationship between women’s employment status and the APNCU Index score. The results of one study showed that the employment of immigrant women in Taiwan increased the number of prenatal care visits, and there was a positive relationship between initiating prenatal care and number of visits.

No significant relationship was seen between husband’s job and the APNCU Index score. Cicelkioglu et al reported that in Turkey, the husband’s job and the financial status of the family were inconsistent with receiving prenatal care; if the husband is unemployed, his pregnant wife will probably receive inadequate care.

Although the results of the current study showed no relationship between women’s education level and the APNCU Index score, the findings of some other studies have indicated that a mother’s higher level of education is associated with receiving better prenatal care.

The current study found no relationship between woman’s age and the APNCU Index score. A study conducted in Vietnam confirmed this finding. In another study, a high maternal age was considered as a deterrent to receiving better prenatal care. There was no relationship between husband’s age and the APNCU Index score in this study, but some researchers have reported a significant relationship between these two variables.

The results of the current study showed that there was no relationship between husband’s education and the APNCU Index score, while in previous studies, a husband’s higher education level was associated with a higher number of referrals to receive prenatal care.

In the current study, no relationship between the number of children and the APNCU Index score was seen. Some researchers believe that there is a significant relationship between these two variables and that inadequate prenatal care is observed in overcrowded housing in families due to the lack of a reliable person to support the children.

In the current study, no significant relationship was observed between the interval between the present and previous pregnancies and receiving prenatal care; however, other studies have shown that inadequate prenatal care was observed in women with a shorter interval between pregnancies.

Although there was no relationship between the number of abortions and receiving prenatal care, the results of another research showed that a previous history of abortion can reduce receiving inadequate prenatal care.

One limitation of the present study was that women in private clinics were not investigated. The researchers of this study suggest more studies be done on the relationship between the APNCU Index score and other potentially influential factors.

CONCLUSION

The results of this investigation indicated that adequacy of prenatal care is influenced by various personal, familial, and health factors. Further studies are needed to determine the relationship between the APNCU Index score and other potentially influential factors, and it is important for prenatal care providers to pay attention to these factors.

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Conflict of Interest: There is no conflict of interest to be declared.
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