ORIGINAL ARTICLE

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 is 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 prenatal care (p=0.003). 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 mortality[1]. 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 pregnancy[4,5]. To achieve these goals, prenatal care should be helpful[6].

To assess the quantitative adequacy of prenatal care, various indicators are often used[7,8]. Kessner et al. introduced an index evaluating data regarding the duration of pregnancy, prenatal care initiation, and number of prenatal visits[9]. 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 index[10,11]. 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 women[12,13]. If prenatal care is delayed, the opportunity to diagnose gestational hypertension, gestational diabetes, or sexually transmitted diseases may be lost[14].

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 stillbirth[15,16,17,18]. Cochrane researchers reviewed ten clinical trials of women with low-risk pregnancies and concluded that increased prenatal care can reduce adverse maternal outcomes[13]. 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 disease[19,20].

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 14[21]. 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 40[22]. A

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study conducted in Iran showed that 82% of women received moderate care[23].

Some researchers believe that various factors can affect the receipt of prenatal care and, ultimately, its adequacy[24,25]. A study carried out on immigrant women in Taiwan indicated that women's employment increased the receipt of adequate prenatal care[26]. 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[27]. A review study reported that younger women and less educated women received less prenatal care[14].

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[28]. 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 the Cochran's formula for calculating sample size of infinite population with α= 0.05, Z= 1.96, d= 0.05, and p= (1-p) = q= 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[22]; 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 4months and included6-7 visits. Moderate care was initiated in the first four months and included4-5 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).

Table 1: Frequency and percentage of adequacy of prenatal care utilization.

Number of prenatal visits Prenatal care initiation	>50%	(50%-79 %)	(80%-109 %)	≥110%	Total
Months 7 to 9	0 (0.0%) Inadequate	0 (0.0%) Inadequate	0 (0.0%) Inadequate	3 (100%) Inadequate	3(0.7%)
Months 5 and 6	3 (15.0%) Inadequate	1(5.0%) Inadequate	25 (5.0%) Inadequate	11(55.0%) Inadequate	20 (4.8%)
Months 3 and 4	7 (1.8%) Inadequate	28(7.2%) Intermediate	61(15.7%) Adequate	292(75.3%) Adequate-plus	388 (93.9%)
Months 1 and 2	1(50.0%) Inadequate	0 (0.0%) Intermediate	0 (0.0%) Adequate	1(50.0%) Adequate-plus	2 (0.5%)
Total	11 (2.7%)	29 (7.0%)	66 (16.0%)	307 (74.3%)	413 (100.0 %)

Table 2: Relationship between the adequacy of prenatal care and qualitative factors

Characteristics		Adequacy of Prenatal Care Number (%)				p-value
		Inadequate	Intermediate	Adequate	Adequate-plus	χ2 test
Maternal education	Illiterate Under diploma Diploma and higher Bachelor and higher	1 (3.4%) 13(44.8%) 11(37.9%) 4(13.8%)	3(10.0%) 11(36.7%) 8(26.7%) 8(26.7%)	3(4.9%) 23(37.7%) 28(45.9%) 7(11.5%)	14(4.8%) 103(35.2%) 124(42.3%) 52(17.7%)	0.200
Husband's education	Illiterate Under diploma Diploma and higher Bachelor and higher	2 (6.9%) 13 (44.8%) 10 (34.5%) 4 (13.8%)	3 (10.0%) 14 (46.7%) 10 (33.3%) 3 (10.0%)	3 (4.9%) 23 (37.7%) 29 (47.5%) 6 (9.8%)	9 (3.1%) 117 (39.9%) 131 (44.9%) 36 (12.3%)	0.260
Maternal job	housewife Employed	28 (96.6%) 1 (3.4%)	28 (93.3%) 2 (6.7%)	57 (93.4%) 4 (6.6%)	271 (92.5%) 22 (7.5%)	0.982
Husband's job	Self-employed Official	22 (75.9%) 7 (24.1%)	21 (70.0%) 9 (30.0%)	50 (82.0%) 11 (18.0%)	230 (78.8%) 62 (21.2%)	0.612
Family income (USD)	<500 500-700 >700	23 (79.3%) 6 (20.7%) 0 (0.0%)	23 (76.7%) 6 (20.0%) 1 (3.3%)	55 (90.2%) 5 (8.2%) 1 (1.6%)	246 (84.0%) 37 (12.6%) 10 (3.4%)	0.473
Pregnancy number	1 2 ≥3	8 (27.6%) 8 (27.6%) 13 (44.8%)	13 (43.3%) 8 (26.7%) 9 (30.0%)	17 (27.9%) 16 (26.2%) 28 (45.9%)	106 (36.2%) 92 (31.4%) 96 (32.8%)	0.418
Interval between pregnancies (Years)	0 1 ≥2	8 (27.6%) 9 (31.0%) 12 (41.4%)	13 (43.3%) 8 (26.7%) 9 (30.0%)	17 (27.9%) 12 (19.7%) 32 (52.5%)	106 (36.2%) 47 (16.0%) 140 (47.8%)	0.167
Number of abortions	0 1 2 ≥3	22 (75.9%) 7 (24.1%) 0 (0.0%) 0 (0.0%)	24 (80.0%) 3 (10.0%) 3 (10.0%) 0 (0.0%)	37 (60.7%) 15 (24.6%) 9 (14.8%) 0 (0.0%)	207 (70.6%) 69 (23.5%) 16 (5.5%) 1 (0.3%)	0.105
Sector of prenatal care	Without care Private sector Public sector Private & public sectors	2 (6.9%) 2 (6.9%) 20 (69.0%) 5 (17.2%)	0 (0.0%) 6 (20.0%) 21 (70.0%) 3 (10.0%)	0 (0.0%) 15 (24.6%) 37 (60.7%) 9 (14.8%)	0 (0.0%) 50 (17.1%) 160 (54.6%) 83 (28.3%)	0.003
Maternal pregnancy intention status	Intended Pregnancy Unwanted pregnancy Mistimed pregnancy	14 (48.3%) 13 (44.8%) 2 (6.9%)	17 (56.7%) 12 (40.0%) 1 (3.3%)	31 (50.8%) 30 (42.9%) 0 (0.0%)	205 (70.0%) 82 (28.0%) 6 (2.0%)	0.004
Paternal pregnancy intention status	Intended Pregnancy Unwanted pregnancy Mistimed pregnancy	14 (48.3%) 13 (44.8%) 2 (6.9%)	17 (56.7%) 12 (40.0%) 1 (3.3%)	33 (54.1%) 28 (45.9%) 0 (0.0%)	229 (78.2%) 59 (20.1%) 5 (1.7%)	>0.001
Number of prenatal care providers	0 1 ≥2	2 (6.9%) 19 (65.5%) 8 (27.6%)	0 (0.0%) 27 (90.0%) 3 (10.0%)	0 (0.0%) 49 (80.3%) 12 (19.7%)	0 (0.0%) 187 (64.0%) 105 (36.0%)	>0.001

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[29]. Another study in Canada showed that women who had a family practitioner as their prenatal care provider had received more inadequate prenatal care than those who were visited by a gynecologist[30]. 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[31].

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[31].

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[33].

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[34,35]. 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[36,37] or the lack of referring to receive prenatal care, which makes a pregnancy highrisk[38].
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 Brazi[39]. 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[33].

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[26].

No significant relationship was seen between husband's job and the APNCU Index score. Cicekliogl u 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[40].
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[14,41,42].

The current study found no relationship between woman's age and the APNCU Index score. A study conducted in Vietnam confirmed this finding[33]. In another study, a high maternal age was considered as a deterrent to receiving better prenatal care[43].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[23,44].
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[46,45].

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[23,47].

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[47,48].

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[29].

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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REFERENCES

1. Berg CJ, Callaghan WM, Henderson Z, Syverson C. Pregnancy-Related Mortality in the United States, 1998 to 2005. Obstet Gynecol. 2011;117(5):1230.
2. Walford HH, Trinh S, Wiencrot A, Lu MC. What is the role of prenatal care in reducing racial and ethnic disparities in pregnancy outcomes? Reducing racial/ethnic disparities in reproductive and perinatal outcomes: Springer; 2011. p. 151-79.
3. Izadirad H, Niknami S, Zareban I, Hidarnia A. Effects of Social Support and Self-Efficacy on Maternal Prenatal Cares Among the First-Time Pregnant Women, Iranshahr, Iran. J Family Reprod Health. 2017;11(2):67-73.
4. Hajifoghaha M, Ebadi A, Kariman N. Persian translation of the Pregnancy Experience Scale (PES)–Brief Version: Confirmatory Factor Analysis. Pakistan Journal of Medical and Health Sciences. 2018;12(1):503-8.
5. Yazdanpanahi Z, Shahamatmanesh M, Babaei A, Hajifoghaha M. Ethics and Sentences in Midwifery. Iranian journal of public health. 2015;44(4):598-9.
6. Jabbari-Beyrami H. Adequacy of prenatal care and its association with pregnancy outcomes: A comparison of indices in Tabriz, Iran. J Anal Res Clin Med. 2015;3(1):12-6.
7. VanderWeele TJ, Lantos JD, Siddique J, Lauderdale DS. A comparison of four prenatal care indices in birth outcome models: comparable results for predicting small-for-gestational-age outcome but different results for preterm birth or infant mortality. Journal of clinical epidemiology. 2009;62(4):438-45.
8. Alexander GR, Kotelchuck M. Quantifying the adequacy of prenatal care: a comparison of indices. Public Health Rep. 1996;111(5):408-18; discussion 19.
9. Cunningham F, Leveno K, Bloom S, Spong C, Dashe J. Williams obstetrics, 24e. New York: Mcgraw-hill; 2014.
10. Kotelchuck M. An evaluation of the Kessner adequacy of prenatal care index and a proposed adequacy of prenatal care utilization index. American journal of public health. 1994;84(9):1414-20.
11. Santos Neto ET, Oliveira AE, Zandonade E, Leal Mdo C. Access to prenatal care: assessment of the adequacy of different indices. Cad Saude Publica. 2013;29(8):1664-74.
12. Silveira DS, Santos IS. Adequacy of prenatal care and birthweight: a systematic review. Cad Saude Publica. 2004;20(5):1160-8.
13. Villar J, Carroli G, Khan-Neelofur D, Piaggio G, Gulmezoglu M. Patterns of routine antenatal care for low-risk pregnancy. Cochrane Database Syst Rev. 2001(4):Cd000934.
14. Hajizadeh S, Tehrani F, Simbar M, Farzadfar F. Factors influencing the use of prenatal care: a systematic review. J midwifery. Reprod Health. 2016;4(1):544-57.
15. Dowswell T, Carroli G, Duley L, Gates S, Gülmezoglu A, Khan-Neelofur D, et al. Alternative versus standard packages of antenatal care for low-risk pregnancy. Cochrane Database Syst Rev. 2010;10(10).
16. Hofmeyr GJ, Hodnett ED. Antenatal care packages with reduced visits and perinatal mortality: a secondary analysis of the WHO antenatal care trial - Comentary: routine antenatal visits for healthy pregnant women do make a difference. Reprod Health. 2013;10:20.
17. Vogel J, Habib N, Souza J, Gülmezoglu A, Dowswell T, Carroli G, et al. Antenatal care packages with reduced visits and perinatal mortality: a secondary analysis of the WHO Antenatal Care Trial. Reproductive health. 2013;10(1):19.
18. Kharaghani R, Shariati M, Yunesian M, Keramat A, Moghisi A. The Iranian Integrated Maternal Health Care Guideline Based on Evidence-Based Medicine and American Guidelines: A Comparative Study. Modern Care Journal. 2016;13(2):e9455.
19. Vahdaninia M, Tavafian S, Montazeri A. Correlates of low birth weight in term pregnancies: a retrospective study from Iran. BMC pregnancy and childbirth. 2008;8(1):12.
20. Xaverius P, Alman C, Holtz L, Yarber L. Risk Factors Associated with Very Low Birth Weight in a Large Urban Area, Stratified by Adequacy of Prenatal Care. Matern Child Health J. 2016;20(3):623-9.
21. Esfandiarinezhad P. The Study of the Compliance of Pregnancy Care Provisions with the National Standard in Ahvaz Health Care Centers in 2011. Ahvaz, Iran: Ahvaz Jundishapur University of Medical Sciences; 2011.
22. Ministry of health and medical education department of health. Integration of care of mothers. Office of family and population health. Office of maternal health. Tehran, Iran. Country Guide for the provision of obstetric services (Third Review) [Last accessed 30 Feb 2018]
23. Khanjari S, F. Molla, F. Hosseini, M. Faragollahi. Prenatal Care Utilization and Factors Affecting to Receive Prenatal Care from Clients' Perspectives. Iran Journal of Nursing. 2006;19(45):37-48.
24. Domingues RM, Viellas EF, Dias MA, Torres JA, Theme-Filha MM, Gama SG, et al. Adequacy of prenatal care according to maternal characteristics in Brazil. Rev Panam Salud Publica. 2015;37(3):140-7.
25. Cokkinides V. Health insurance coverage-enrollment and adequacy of prenatal care utilization. J Health Care Poor Underserved. 2001;12(4):461-73.
26. Liang Y-W, Chang H-P, Lin Y-H, Lin L-Y, Chen W-Y. Factors affecting adequate prenatal care and the prenatal care visits of immigrant women to Taiwan. Journal of immigrant and minority health. 2014;16(1):44-52.
27. Rogan S, Olveña M. Factors affecting maternal health utilization in the Philippines. 9th National Convention on Statistics Manila: National Statistics Office. 2004.
28. Kotelchuck M. An evaluation of the Kessner adequacy of prenatal care index and a proposed adequacy of prenatal care utilization index. American journal of public health. 1994;84(9):1414-20.
29. Paredes I, Hidalgo L, Chedraui P, Palma J, Eugenio J. Factors associated with inadequate prenatal care in Ecuadorian women. International Journal of Gynecology & Obstetrics. 2005;88(2):168-72.
30. Debessai Y, Costanian C, Roy M, El-Sayed M, Tamim H. Inadequate prenatal care use among Canadian mothers: findings from the Maternity Experiences Survey. Journal of Perinatology. 2016;36(6):420.
31. Kupek E, Petrou S, Vause S, Maresh M. Clinical, provider and sociodemographic predictors of late initiation of antenatal care in England and Wales. BJOG: An International Journal of Obstetrics & Gynaecology. 2002;109(3):265-73.
32. Ribeiro E, Guimarães A, Bettiol H, Lima D, Almeida M, Silva A, et al. Risk factors for inadequate prenatal care use in the metropolitan area of Aracaju, Northeast Brazil. BMC pregnancy and childbirth. 2009;9(1):31.
33. Ha BT, Tac PV, Duc DM, Duong DT, Thi LM. Factors associated with four or more antenatal care services among pregnant women: a cross-sectional survey in eight south central coast provinces of Vietnam. International journal of women's health. 2015;7:699.
34. Ochako R, Gichuhi W. Pregnancy wantedness, frequency and timing of antenatal care visit among women of childbearing age in Kenya. Reproductive health. 2016;13(1):51.
35. Rahman M, Rahman M, Tareque M, Ferdos J, Jesmin S. Maternal pregnancy intention and professional antenatal care utilization in Bangladesh: A nationwide population-based survey. PloS one. 2016;11(6):e0157760.
36. Exavery A, Kanté A, Hingora A, Mbaruku G, Pemba S, Phillips J. How mistimed and unwanted pregnancies affect

timing of antenatal care initiation in three districts in Tanzania. BMC pregnancy and childbirth. 2013;13(1):35.
37. Eggleston E. Unintended pregnancy and women's use of prenatal care in Ecuador. Soc Sci Med. 2000;51(7):1011-8.
38. Poorheidary M, Khosravi A, Shamaiian-Razavi N, Hamidzadeh A. A Comparison of Prenatal Maternal Care between Wanted and Unwanted Pregnancies Knowledge & Health. 2011;5(4):7-13.
39. Carvalho RA, Santos VS, Melo CM, Gurgel RQ, Oliveira CC. Assessment of the adequacy of prenatal care according to family income in Aracaju, Sergipe State, Brazil, 2011. Epidemiol Serv Saude. 2016;25(2):271-80.
40. Cicekliogiu M, Soyer M, Öcek Z. Factors associated with the utilization and content of prenatal care in a western urban district of Turkey. International Journal for Quality in Health Care. 2005;17(6):533-9.
41. Ajayi I, Osakinle D. Socio demographic factors determining the adequacy of antenatal care among pregnant women visiting Ekiti state primary health centers. Online Journal of Health and Allied Sciences. 2013;12(2 (4)).
42. Nwosu J, Odubanjo M, Osinusi B. The Nigerian Academy of Science, Reducing Maternal and Infant Mortality in Nigeria. West African Book Publishers Limited, Lagos. 2009;15.
43. Mojahed S, parsai S, Dafeei M. Factors Affecting on Pregnancy Care in Mothers Referring to Hospitals in Yazd. Journal of Shahid Sadoughi University of Medical Sciences. 1999;7(1):45-50.
44. Khayat S, Dolatian M, Navidian A, Mahmoodi Z, Kasaeian A, Fanaei H. Factors Affecting Adequacy of Prenatal Care in Suburban Women of Southeast Iran: A Cross-sectional Study. Journal of Clinical & Diagnostic Research. 2018;12(4):QC01-QC5.
45. Eshraghian M, Amiri-Poor S, Ghaffari J, Mohammad K. Factors associated with utilization of prenatal care. Payesh 2006;5(1):15-20.
46. Joshi C, Torvaldsen S, Hodgson R, Hayen A. Factors associated with the use and quality of antenatal care in Nepal: a population-based study using the demographic and health survey data. BMC pregnancy and childbirth. 2014;14(1):94.
47. Riazi H, Mani-Kashani K. The Frequency and Mode of Pregnant Women for Prenatal Care and Factors Affecting Them. Scientific Journal of Hamadan Nursing & Midwifery Faculty. 2006;13(2):26-36.
48. Weir S, Posner HE, Zhang J, Willis G, Baxter JD, Clark RE. Predictors of prenatal and postpartum care adequacy in a medicaid managed care population. Womens Health Issues. 2011;21(4):277-85.