

Factors Influencing the Use of Prenatal Care: A Systematic Review

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ABSTRACT

Background & aim: Prenatal care is a key strategy for achieving public health goals, primary healthcare objectives, and the Millennium Development Goals. The aim of this study was to investigate the factors influencing the use of prenatal care services in order to design suitable interventions and promote the use of these services.

Methods: In this systematic quantitative literature review, studies published in years 2010-2014 were evaluated. For this purpose, two international electronic databases, i.e., Scopus and PubMed, were explored to find English-language articles by using relevant keywords; moreover, the reference lists of the articles were hand-searched. We reviewed all cross-sectional and prospective studies, which focused on factors associated with the use of prenatal care services within the specified period of time.

Results: In total, 17 relevant articles were included in our review. The results showed that late initiation and inadequate use of prenatal care services are independently associated with multiple variables, including demographic characteristics, socioeconomic factors, predisposing cultural and religious factors, social support, factors related to healthcare providers, women's awareness and attitude, unintended pregnancy, high-risk medical or obstetric history, and health behaviors.

Conclusion: Based on the literature review, proper use of prenatal care cannot be achieved merely by establishing healthcare centers. Utilization of maternal health services may be achieved and improved via developing socioeconomic factors and addressing patients' basic needs including education and financial independence.

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Introduction

Utilization of healthcare services is associated with the link between three factors, i.e., provision of services, physical and social access to services, and cultural and behavioral factors (1, 2). Physical and social access determines whether the public has access to healthcare services. It should be noted that quality of care can affect an individual's decision regarding the use of services (3). According to reports by World Health

Organization, lack of access to adequate resources and facilities providing local healthcare services majorly contributes to the relatively slow progress in meeting the Millennium Development Goals (MDGs) (4, 5).

Although the relationship between inadequate prenatal care and high maternal mortality is complex and controversial, identification of this relationship can help determine, control, and overcome the risks of

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pregnancy (6-8). In fact, there is substantial evidence indicating the impact of prenatal care on pregnancy outcomes (8); this influence is more highlighted in developing countries and underserved populations.

Despite improvements in prenatal care, which can help obtain better prenatal outcomes, we still face various pregnancy, childbirth, and neonatal complications. Various studies have shown that problems related to prenatal care, including delayed care and treatment, inadequate care and medical advice, and poor adherence to medical suggestions, could lead to the persistence of such adverse outcomes (9).

In order to improve maternal and neonatal health, the available interventions regarding maternal and neonatal care need to be enhanced. According to previous studies, prenatal and neonatal care can influence the contributing factors and patterns of neonatal mortality. In addition, prenatal care may play an indirect role in reducing maternal mortality by promoting safe deliveries (10).

The role of timely and adequate prenatal care visits in ensuring maternal and neonatal health cannot be underestimated. Early prenatal care provides an opportunity for primary screening of complications, patient referral, and treatment. Moreover, adequate prenatal care visits facilitate the follow-up and monitoring of fetal growth and maternal health by physicians. In addition, prenatal care provision can create a friendly atmosphere for care providers and mothers, which is a prerequisite for safe delivery (11).

During prenatal care visits, mothers can be informed about the warning signs and symptoms during pregnancy, preventive care and treatment strategies, proper nutrition, breastfeeding, and use of contraceptive methods for family planning (11). Overall, the mentioned issues show the critical need for early initiation of antenatal care (ANC) and adequate prenatal care visits. Accordingly, many countries have made targeted efforts to ensure the provision and utilization of timely and adequate ANC (11). In fact, delayed care provision can result in missed opportunities for the diagnosis of gestational hypertension, gestational diabetes, or sexually transmitted

diseases (12-15).

According to several studies, inadequate prenatal care visits can result in a significantly higher risk of severe complications associated with pregnancy (16, 17). ANC is a key strategy for achieving public health goals, primary healthcare objectives, and MDGs (8). The aim of this study was to investigate the factors influencing the use of prenatal care services in order to design proper interventions and promote the use of such services.

Materials and Methods

In this study, we reviewed the available literature by exploring two international electronic databases including Scopus and PubMed, using the following keywords: "Socioeconomic factors", "risk factors", "socioeconomic determinants", "prenatal care", "postnatal care", "maternal health services", "delivery", "obstetric", "rural health services", "urban health services", "prenatal care, organization, and administration", "maternal health services, organization, and administration", "postnatal care, organization, and administration", "pregnancy", "prenatal care/standards", "preconception care", and "postnatal care".

English-language publications were searched, using relevant keywords, and the reference lists of the articles were hand-searched. In this literature review, a systematic search was performed on studies published in years 2010-2014. Relevant articles were fully examined, using a data extraction sheet. We reviewed all cross-sectional and prospective studies, which focused on factors associated with the use of prenatal care services within the specified period of time.

Study selection was completed in three phases. In the first phase, the reviewer examined the study titles, according to the selection criteria. In the next phase, abstracts of the selected articles were reviewed to assess their eligibility. After reviewing the abstracts, in case an article met one or more of the exclusion criteria (based on the reviewer's opinion), it was removed from the analysis. The last phase was performed independently by two reviewers to determine if the full manuscripts should be included in

data extraction. Disagreements regarding the inclusion of full-text articles were resolved by discussion, consensus, or third-party adjudication.

A total of 28,565 articles, published during 2010 and 2014, were investigated. In total, 7,364 duplicate studies were removed. Moreover, 21,127 papers were excluded due to lack of consistency with the study objectives. Therefore, studies which evaluated the determinants of prenatal care utilization by specific groups (e.g., teenage pregnancies or high-risk women), without making comparisons with the general population, as well as studies which provided no new empirical data (i.e., reviews, letters to the editor, and brief reports), were excluded from the analysis.

Also, after the assessment of titles and abstracts, articles which only provided qualitative data, failed to report the sampling method, used a non-representative sampling method, or selected participants through non-probability sampling were excluded from our analysis. Moreover, 57 papers were removed due to lack of access to the original article (owing to language differences, etc). Finally, 17 papers and their reference lists were included in the final analysis (Figure 1). These studies were reviewed and the required information was extracted and documented in the data extraction sheet. Finally, the data extraction sheet was used to summarize the data.

The extracted data for the analysis were as follows: general information (i.e., study title, place of study, publication year, study year, journal, and population characteristics), methodological information (i.e., study design, sample size, and sampling method), and study results (details of relevant findings). The quality of the studies was assessed by two reviewers according to the Crowe Critical Appraisal Tool. The extracted data, along with a narrative synthesis, are presented in Table 1.

Results

Table 1 presents the general characteristics of the included studies. All 17 studies were either cross-sectional or prospective. The literature review showed that delayed or inadequate utilization of prenatal care may be attributed to personal characteristics, cultural,

ethnic, religious, and socioeconomic factors, personal health behaviors, and factors associated with the characteristics of prenatal care providers. In this section, each of these factors will be discussed in detail:

Graphics factors

Demographic and background factors included age, educational level of parturient women and their partners, parity, birth order, birth interval, and ethnicity (18).

1.1. Age

Several studies have assessed the relationship between age and prenatal care. A number of these studies have introduced maternal age as one of the barriers against timely and adequate prenatal care visits. In fact, a significant relationship has been reported between maternal age (< 20 years) and infrequent use of prenatal care services (19, 20). According to a previous study, time and frequency of prenatal care visits are significantly associated with maternal age (11). Also, the results of a previous review study revealed that maternal age is a factor associated with the use of prenatal care services (21).

1.2. Education

Several researchers have studied the relationship between education and prenatal care. A number of these studies have shown that low educational level (< 9 years) is associated with the reduced use of prenatal care services, late initiation of care, and inattention to such services (19). Also, based on a previous research, time and frequency of prenatal care are significantly associated with the educational level of mothers and their partners (11). According to the findings, literate women are exposed to social media and are more likely to use both prenatal and neonatal care services (10).

Several studies have shown that low maternal education is one of the barriers against receiving timely and frequent prenatal care (19, 22, 23). In fact, inadequate use of prenatal care services has been reported

Table 1. The main characteristics of the evaluated studies (N=18) including design, sample size, determinants, main outcomes, and main findings

Study	Design	Samples	Determinants	Main outcomes	Main findings (only significant results adjusted for the confounders)
Tarekegn, Lieberman et al. (2014) Ethiopia (68)	Community-based, analytical, cross-sectional study	17,817 households	Place of residence, age, marital status, religion, ethnicity, educational level, household income, parity, partner's education, woman's autonomy in healthcare decisions, partner's occupational status, woman's occupational status, and frequency of reading newspapers, listening to the radio, and watching television	At least one antenatal care (ANC) visit, frequency of ANC visits during pregnancy, and timing of the first ANC visit	Sociodemographic characteristics and accessibility-related factors were the major determinants of prenatal care utilization. There was a high inequality in service utilization among women with different levels of education, household income, autonomy, and place of residence.
Chomat, Solomons et al. (2014) Guatemala (47)	Cross-sectional analysis	100 pregnant and breastfeeding women	Maternal age, extreme poverty, knowledge of Spanish language, and vehicle ownership	Access to informal versus formal health sectors and home versus hospital delivery	A variety of factors affected the utilization of maternal health services by indigenous women in rural areas of Quetzaltenango. These factors included socioeconomic disparities, ethnic and linguistic variations, and poor access to basic resources. The results showed that women, who were not born in Italy, had a higher probability of making their first prenatal visit after the 12 th week of pregnancy; also, low frequency of prenatal visits was reported in these women. The estimated odds ratio for the analyzed indicators ranged from 2.25 to 3.05. Inadequate prenatal care use was also observed in younger and less educated individuals. In addition, employment improved the use of services, possibly through transferring information on the negative consequences of delayed or infrequent prenatal visits. This study indicated a substantial decline in the number of pregnant women who did not properly use prenatal care services. Factors associated with ANC utilization included marital status, education, proximity of healthcare facilities to the place of residence, and partner's occupational status. Use of institutional delivery care was mainly associated with parity, educational level, ANC suggestions, history of complicated/prolonged labor, and partner's occupation. Failure in timely detection of pregnancy and poor access to care services were the most common causes of delayed prenatal care. Earlier access to these services was reported among white pregnant women with higher educational levels, primiparous mothers, and married women. Delayed prenatal care was significantly associated with inadequate consultation, as reported in pregnant adolescents. Overall, black women received inadequate prenatal care and the performed tests were insufficient.
Chiavarini, Lanari et al. (2014) Italy (20)	Cross-sectional survey	37,000 mothers	Demographic variables: age, mother's nationality, marital status, educational level, and employment Pregnancy-related factors: gravidity	Frequency of prenatal visits and timing of the first visit	
Tsegay, Gebrehiwot et al. (2013) Ethiopia (69)	Community-based, cross-sectional survey	1,115 women	Mother's age, educational level, partner's occupational status, proximity of the place of residence to healthcare facilities, parity, history of obstructed or prolonged labor, and ANC recommendations	At least one ANC visit during pregnancy	
Domingues, Leal et al. (2013) USA (9)	Cross-sectional study	2,353 pregnant women	Socioeconomic characteristics: maternal education and occupation Demographic Characteristics: age, ethnicity, reproductive history, and parity History of obstetric risk factors: maternal morbidity and history of chronic diseases Social support: marital status Healthcare facility: type of unit	Adequacy of prenatal care, timely care provision, adequate frequency of consultation, and adequacy of medical tests and vaccination	
Agus and Horiuchi (2012) Indonesia (70)	Descriptive study	200 women	Sociodemographic factors such as age, place of residence, health insurance status, educational level, mode of transport to healthcare facilities, distance from healthcare facilities, employment, history of	ANC visits	Parity was the main factor influencing women with less than four ANC visits during pregnancy. Increased number of women with ANC visits during pregnancy and improved number of visits, especially in primiparous women, were important findings. The results also indicated that traditional beliefs, followed

pregnancy, traditional beliefs, and promoting factors

by family income, influenced the selection of caregivers.

Continue Table 1:

Study	Design	Samples	Determinants	Main outcomes	Main findings (only significant results adjusted for the confounders)
Nwaru, Klemetti et al. (2012) China (71)	Cross-sectional survey	4,364 rural women	Maternal socioeconomic indices (principal component analysis was used to construct socio-economic status indices) <i>Income index:</i> household ownership of television and telephone, type of house, and family total income <i>Occupational index:</i> paternal and maternal occupational status <i>Educational index:</i> paternal and maternal education	Inadequate prenatal care	After adjusting the demographic factors and village wealth indices, higher levels of the introduced indices were inversely associated with inadequate prenatal care.
Abel, Françoise et al. (2012) Congo (30)	Cross-sectional study	1,460 women	Age, marital status, profession, educational level, parity, complications in previous deliveries, antenatal consultation, place of delivery, childbirth complications, and desire for pregnancy	At least one ANC visit, antenatal consultations, delivery in a healthcare facility, and postnatal consultations	In comparison with women with two or three previous deliveries, primiparous and grand multiparous women were twice as likely not to use ANC services during pregnancy. Women who had unplanned pregnancies were also more likely not to use ANC services, compared to those with planned pregnancies. Women who had not used ANC services were also more likely not to use prenatal care. Women with uncomplicated deliveries were more likely not to use prenatal care services, compared to those who experienced complications during childbirth.
Jat, Ng et al. (2011) India (18)	Cross-sectional study	15,782 ever married women	Demographic variables: maternal age, level of education, occupational status, birth order, religion, household socioeconomic status, poverty index, and partner's educational level Community-level variable: place of residence District-level variable: tribal population in the district	Use of ANC services during pregnancy	Household socioeconomic status and maternal education were the most important factors associated with the use of ANC services. The community-level variable was significantly associated with receiving ANC services, while none of the district-level variables were found to be influential in the use of maternal health services.
Bbaale (2011) Uganda (11)	Descriptive study	4,088 women	Maternal education, partner's education, place of residence, religion, health decision, financial status, frequency of using the media (e.g., radio), age cohort, caesarean delivery, complications during pregnancy, wanted pregnancy, birth order, maternal occupation, and partner's occupation	Time and frequency of ANC visits	Time and frequency of ANC visits were significantly associated with education of the mother and her partner, financial status, regional disparities, religious differences, access to media, maternal autonomy in making health decisions, occupation of the mother and her partner, timing of pregnancy, birth history, and birth order.
Regassa (2011) Southern Ethiopia (10)	Cross-sectional, population-based study	1,094 households	Maternal age, religion, household size, Marital status, maternal education, occupational status, land area of the household, parity, wanted or unwanted pregnancy, and frequency of listening to the radio	Type of ANC and prenatal care services and type of immunization	Based on the logistic regression analysis, the predicted probabilities showed that literate women with exposure to media and those with low parity were more likely to use both ANC and prenatal care services.
Islam and Odland (2011) Bangladesh (35)	Cross-sectional study	374 women	Age, place of residence, religion, school attendance, occupational status, birth order, source of drinking water, toilet facilities, distance from healthcare facilities (km), means of transportation, and access to mass media	ANC visits	Factors associated with ANC visits included the place of residence, age, level of education, distance from healthcare facilities, and exposure to mass media.

Continue Table 1:

Study	Design	Samples	Determinants	Main outcomes	Main findings (only significant results adjusted for the confounders)
Ye, Yoshida et al. (2010) Kham District, Xieng Khouang Province, Lao PDR (46)	Cross-sectional study	310 women	Sociodemographic characteristics: age, occupation, ethnicity, educational level, average monthly income, parity, and number of children Knowledge: source of information and attitude Accessibility: distance from the nearest ANC facility (km), status of roads to the nearest ANC facility, public transportation to the nearest ANC facility, cost of transportation, cost of provided services, and waiting time for ANC services (min) Social support: supportive sources	ANC visits, number of visits, and time of visits	Among all factors, limited knowledge, negative attitudes, and misconceptions about ANC services were the major causes of infrequent utilization of ANC services.
Amin, Shah et al. (2010) Bangladesh (25)	Cross-sectional analysis	3,498 women	Socioeconomic indicators: maternal education, paternal education, wealth index, paternal occupation, and media exposure Other indicators: age, total decision-making score, and access to pharmacies in the area Individual determinants: <i>Predisposing characteristics:</i> age, marital status, nationality, educational level, and occupational status <i>Contributing characteristics:</i> equivalent income, health insurance coverage, welfare benefits, and regular care by obstetricians and general practitioners Pregnancy-related characteristics: parity, wanted pregnancy, medically assisted pregnancy, history of obstetric risks, gestational age at the initiation of care, and high-risk status during ANC	Trained ANC provider and tetanus toxoid injection	Mothers in the highest wealth quintile were significantly more likely to receive help from trained providers for ANC, compared to those in the lowest quintile ($P < 0.01$). The differences were less pronounced in terms of other examined factors, such as education, age, and relative decision-making autonomy of women in both bivariate and multivariate analyses.
Beeckman, Louckx et al. (2010) Brussels (22)	Prospective, observational study	333 women	Pregnancy-related characteristics: parity, wanted pregnancy, medically assisted pregnancy, history of obstetric risks, gestational age at the initiation of care, and high-risk status during ANC	Frequency of ANC visits	The multivariate analysis showed that women of Maghrebi or Turkish origin had 14% fewer ANC visits, compared to European women. Highly educated women had more ANC visits, compared to those with a low educational level. Also, women with high income levels had more antenatal visits, compared to those with low income. Fewer antenatal visits were reported in multiparous women, women with care initiation after 14 weeks of gestation, mothers without medical risks during pregnancy, and those with continuity of care index of 50% or more.
Ali, Osman et al. (2010) Sudan (72)	Community-based, cross-sectional survey	900 women	Age, parity, educational level, residence, and education; mother's place of residence, and partner's education	Use of ANC services	Inadequacy of ANC utilization was associated with high parity and low level of partner's education. According to the findings, more efforts should be made to increase the health coverage of women, especially those with high parities.

among women with lower levels of education (20), whereas women with higher educational levels benefit from timely prenatal care services (9).

Moreover, many studies conducted in developing countries have shown that

maternal education is one of the main factors influencing the use of maternal care services (while controlling other intervening factors) (7, 24-27). In fact, the documented social and demographic information shows that women with lower educational levels (despite their

access to services) are less likely to use prenatal care services (21, 28, 29).

Continue Table 1:

Study	Design	Samples	Determinants	Main outcomes	Main findings (only significant results adjusted for the confounders)
Ayoola AB et al. (2010) USA (19)	Population-based study	136,373 live births	Time of pregnancy detection (early; within six weeks of gestation, late; after six weeks of gestation), maternal age, parity, marital status, level of education, insurance status, socioeconomic status, race/ethnicity, and previous birth outcomes	Time of the first prenatal visit (first trimester or later) and frequency of prenatal care visits (< 11 or 11-15 visits)	<p>Variables predicting the initiation of ANC before 12 weeks of gestation: Early detection of pregnancy (compared to late detection), no previous experience of childbirth (compared to one or more previous deliveries), marriage (compared to being single), high school education or above (compared to below high school education), and maternal age were among the predictive factors. Also, non-Hispanic whites (compared to black, Asian, and Hispanic women), women with medical and private insurance coverage (compared to those with no insurance), and mothers with a previous premature birth used ANC services before 12 weeks of gestation.</p> <p>Variables predicting < 11 ANC visits compared to 11-15 visits: Late detection of pregnancy (compared to early detection), one or more prior deliveries (compared to no prior experience), being single (compared to being married), below high school education (compared to high school education or above), age range of 16-40 years (compared to age range of 11-15 years), being Hispanic, Asian, American Indian, Alaska native, or black (compared to non-Hispanic white women), and lack of insurance coverage (compared to having medical or private insurance) predicted less than 11 ANC visits.</p>

1.3. Parity

The literature review showed that multiparous women are less likely to use prenatal care services (30). As our investigation revealed, primiparous women start receiving prenatal care earlier than other women (9, 19); also, low-parity women are more likely to use both prenatal and neonatal care services (10). The results of a review study revealed that parity is among factors associated with the use of prenatal care services (21).

1.4. Household dimension, birth order, and birth interval

Household dimension is an important factor in the use of prenatal care. In fact, women from nuclear families are substantially less likely to receive prenatal care, compared to other women (31). Also, according to

several studies, birth order and birth interval are associated with prenatal care (32). In fact, in a previous study, women who had received inadequate care in their previous pregnancies were more likely to have a short subsequent birth interval (32, 33). Therefore, high parity is associated with late initiation or inadequate use of prenatal care services. As documented in a previous study, mothers with a birth interval of three years have more frequent prenatal care visits, compared to those with two-year birth intervals (33).

1.5. Ethnicity

Ethnicity plays an important role in receiving prenatal care. In fact, initiation of prenatal care varies among different ethnicities (33). For instance, based on a previous study, Kurdish women in Turkey are less likely to use prenatal care services (34).

2. Socioeconomic factors

Socioeconomic factors include the socioeconomic status (or household income) and occupational status of parturient women and their partners. Overall, several studies have shown that infrastructure and socioeconomic parameters are among the most important factors affecting prenatal care (35).

2.1. Household income

Time and frequency of prenatal care visits are significantly associated with the level of household income (11). The results of a review study revealed that family income is among factors related to the use of prenatal care services (21). In fact, women in middle-income families use prenatal care services less frequently than other women (36). Overall, economic status of the family has a positive and significant influence on the use of prenatal care services.

Women of higher socioeconomic status are more likely to receive early and adequate prenatal care, compared to those of a lower socioeconomic status (31, 33, 37). In fact, continuity of care during pregnancy is influenced by financial resources and social support (38). Sociodemographic evidence shows that rural women or those residing in relatively poor areas (despite access to services) use prenatal care services less frequently than others (21, 28, 29).

2.2. Occupational status of women and their partners

A number of studies have shown that unemployment is one of the barriers against optimal, timely, and frequent utilization of prenatal care services (39, 40). Overall, timing and frequency of prenatal care visits are significantly associated with the occupational status of parturient women and their partners (11). Based on a previous study, women whose partners were unemployed or workers did not receive full prenatal care, unlike those whose partners were gainfully employed (41).

Occupational status of women is among the most common factors affecting the utilization of prenatal care services. Employed women more frequently receive prenatal care, compared to housewives (21, 42, 43); in fact, these women

are more likely to receive timely prenatal care services (32, 33). In contrast, a study in India showed that prenatal care is more common among housewives, compared to employed women (44).

3. Predisposing cultural and religious factors

Several studies have revealed the relationship between prenatal care and women's culture, values, norms, religious beliefs, and language barriers (18, 45, 46). According to a previous study, time and frequency of prenatal care are significantly associated with religious differences (11). For instance, in a previous study, some Muslim women refused to attend prenatal classes since they were not exclusively designed for women (11).

Additionally, women from higher social classes receive more prenatal care services, compared to others (32). Also, according to the literature, language affects the use of maternal health services by local women in rural areas (47). In fact, language barriers are among the main obstacles against prenatal and postpartum care among immigrants, and use of postpartum care by this group is limited to emergency care (48).

4. Social support

Social support by family members can significantly affect the use of prenatal care services. Based on a previous study, older women in Bangladesh do not refer to healthcare centers for receiving prenatal care and advise their daughters accordingly (49). Also, as revealed by the literature review, women who are not supported by friends and family members are less likely to receive prenatal care services (50).

Extent of contact with social networks and receiving information and support from these sources are also related to the use of prenatal care (18). Health and social services can indeed help improve pregnancy outcomes. Therefore, it is important to promote access to social services for women with socioeconomic problems (51).

5. Factors associated with healthcare providers

Factors associated with healthcare providers

affecting prenatal care include access to care services and methods of communication (18, 47).

5.1. Accessibility

Accessibility-related factors influencing prenatal care include long distance from facilities providing services, mode of transport, working hours, booking appointments, and direct or indirect discrimination by prenatal care providers (18, 45). The results of a review study showed that availability of prenatal care services is related to the use of these services (21).

Few studies have been conducted in developing countries in this regard. The reported findings have indicated a significant association between the use of prenatal care services and distance from facilities providing these services, mode of transport (52, 53), and the waiting time to receive services (52, 54). Lack of access to services due to long distance and transport-associated problems are among the main reasons for not receiving prenatal care (35, 43, 55-57).

5.2. Communication methods

Methods of initiating communication between prenatal care providers and women, together with access to information and training materials, are among important factors affecting the use of prenatal care services (45). In fact, poor quality of care and negative attitudes of healthcare providers can hinder the use of healthcare services. Moreover, poor communication between patients and healthcare providers, unfriendly behaviors, and negative attitudes of healthcare providers are among major factors, which inhibit women from receiving healthcare services (34, 41, 58).

Continuity of prenatal care is influenced by the quality of services, which is dependent on women's confidence in healthcare providers and their mutual respect (38). Moreover, patient satisfaction, as an important factor in health care, can influence the use of prenatal care services (59, 60). In fact, a positive relationship has been reported between service quality and service continuity, which is associated with patient satisfaction (61, 62).

6. Women's awareness and attitude

Several studies have exhibited a relationship between women's awareness and attitude and use of prenatal care services during pregnancy. Early detection of pregnancy (before the sixth week of gestation) results in increased chance of receiving prenatal care services (19). In a previous study, some pregnant women did not consider prenatal care to be necessary, unless a complication had occurred in their previous experiences or there was a risk of complication in the current pregnancy (49). Overall, women's understanding and awareness of warning signs during pregnancy are significantly associated with receiving prenatal care services (41, 63). In fact, continuity of prenatal care is influenced by the advantages one attributes to these services (38).

7. Unintended pregnancy

Unintended pregnancy is also associated with prenatal care. Women with unintended pregnancies start prenatal care later and receive fewer prenatal care visits, compared to others (30). Accordingly, a systematic review on the relationship between unintended pregnancy and utilization of prenatal care services showed that in both developing and developed countries, women with unintended pregnancies postpone prenatal care; also, the frequency of prenatal care visits is inadequate for these women (64).

8. High-risk medical or obstetric history

Several studies have shown an association between high-risk obstetric or medical history and use of prenatal care services. Time and frequency of prenatal care are significantly associated with prior delivery experiences (11). Results of previous studies have revealed that women experiencing complications in their previous pregnancies have more frequent prenatal care visits (52). Also, women with a history of premature birth start using prenatal care before the 12th week of pregnancy (19). Similarly, women with a history of fetal loss in previous pregnancies are more likely to use prenatal care services (41, 63).

9. Health behaviors

According to various studies, insufficient utilization of prenatal care is more common among women who smoke during pregnancy (36). In fact, smokers are at a higher risk of delayed prenatal care (after 10 weeks of pregnancy) (65). Moreover, several studies have shown that behavioral risk factors are still significantly associated with improper use of prenatal care services in developing countries (21, 66, 67)..

Conclusion

The results of this study showed that late initiation and inadequate use of prenatal care services are independently associated with several variables such as demographic characteristics, socioeconomic factors, predisposing cultural and religious factors, social support, factors associated with healthcare providers, women's awareness and attitude, unintended pregnancy, high-risk medical or obstetric history, and health behaviors.

Proper use of prenatal care services cannot be achieved merely by establishing healthcare centers. In fact, further qualitative research is required to explore the effects of women's satisfaction and autonomy, as well as the role of gender in the decision-making process; also, socioeconomic status of women should be taken into account.

Socioeconomic status of the family and maternal education are among the most important factors associated with the use of prenatal care services. Therefore, empowering women and promoting maternal education are effective in increasing the use of maternal health services. The results of this study showed that healthcare providers should consider family power structure, family beliefs, and public opinion concerning the pursuit of medical care.

Midwives as the main providers of prenatal care services should be aware of the potential barriers against receiving prenatal care. These care providers should be familiar with the socioeconomic status of women and traditional/cultural beliefs; they should also have an understanding of their own personal skills to improve communication with women. It seems that care providers' attention to

personal characteristics may play a significant role in improving the quality of care for pregnant women; however, further quantitative and qualitative research is highly required.

The findings of this study showed that utilization of maternal health services may be achieved and improved via developing socioeconomic factors and addressing the basic needs of patients including education and financial independence. According to a report by the World Health Organization in 2013, MDG on maternal health has been neglected, and effective measures are required to achieve this goal by 2015.

To achieve the Sustainable Development Goals, it is crucial to make significant investments in the development of proper maternal health services and promote programs aimed at poverty eradication (MDG-1), universal primary education (MDG-2), and empowerment of women (MDG-3).

The strength of the present study was the use of a comprehensive search strategy with broad search terms. However, we restricted our search to English-language articles, published in two international electronic databases (i.e., Scopus and PubMed); consequently, we may have missed some relevant studies. This review specifically focused on factors affecting prenatal care utilization by women, as discussed in articles published in 2010-2014 (regardless of the study groups). Also, in order to improve the generalizability of the findings, this review study was not restricted to countries with similar levels of accessibility to healthcare facilities.

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Conflicts of interest

The authors declare no conflicts of interest.

References

1. Sarita PT, Tuominen R. Use of health care services in two rural communities in Tanzania. *Community Dentistry and Oral Epidemiology*. 1993; 21(3):133-135.
2. Kumar RA, Singh MM, Kaur M. Impact of health centre availability on utilisation of maternity care and pregnancy outcome in a rural area of Haryana. *Journal of The Indian Medical Association*. 1997; 95(8):448-450.
3. Bertrand JT, Hardee K, Magnani RJ, Angle MA. Access, quality of care and medical barriers in family planning programs. *International Family Planning Perspectives*. 1995; 21(2):64-74.
4. Myer L, Harrison A. Why do women seek antenatal care late? Perspectives from rural South Africa. *Journal of Midwifery & Women's Health*. 2003; 48(4):268-272.
5. Abrahams N, Jewkes R, Mvo Z. Health care-seeking practices of pregnant women and the role of the midwife in cape town, South Africa. *Journal of Midwifery & Women's Health*. 2001; 46(4):240-247.
6. World Health Organization. *Global atlas of the health workforce*. Geneva: World Health Organization; 2007.
7. Ronsmans C, Chowdhury ME, Koblinsky M, Ahmed A. Care seeking at time of childbirth, and maternal and perinatal mortality in Matlab, Bangladesh. *Bulletin of The World Health Organization*. 2010; 88(4):289-296.
8. Campbell OM, Graham WJ. Strategies for reducing maternal mortality: getting on with what works. *The Lancet*. 2006; 368(9543):1284-1299.
9. Domingues RM, Leal MD, Hartz ZM, Dias MA, Vettore MV. Access to and utilization of prenatal care services in the Unified Health System of the city of Rio de Janeiro, Brazil. *Revista Brasileira de Epidemiologia*. 2013; 16(4):953-965.
10. Regassa N. Antenatal and postnatal care service utilization in southern Ethiopia: a population-based study. *African Health Sciences*. 2011; 11(3):390-397.
11. Bbaale E. Factors influencing timing and frequency of antenatal care in Uganda. *The Australasian Medical Journal*. 2011; 4(8):431.
12. Parkhurst JO, Penn-Kekana L, Blaauw D, Balabanova D, Danishevski K, Rahman SA, et al. Health systems factors influencing maternal health services: a four-country comparison. *Health Policy*. 2005; 73(2):127-138.
13. Stephenson R, Baschieri A, Clements S, Hennink M, Madise N. Contextual influences on the use of health facilities for childbirth in Africa. *American Journal of Public Health*. 2006; 96(1):84-93.
14. Babalola S, Fatusi A. Determinants of use of maternal health services in Nigeria-looking beyond individual and household factors. *BMC Pregnancy and Childbirth*. 2009; 9(1):43-56.
15. Singh PK, Rai RK, Alagarajan M, Singh L. Determinants of maternity care services utilization among married adolescents in rural India. *PloS One*. 2012; 7(2):e31666.
16. Barros H, Tavares M, Rodrigues T. Role of prenatal care in preterm birth and low birthweight in Portugal. *Journal of Public Health*. 1996; 18(3):321-328.
17. Raatikainen K, Heiskanen N, Heinonen S. Under-attending free antenatal care is associated with adverse pregnancy outcomes. *BMC Public Health*. 2007; 7(1):268-276.
18. Jat TR, Ng N, San Sebastian M. Factors affecting the use of maternal health services in Madhya Pradesh state of India: a multilevel analysis. *International Journal for Equity in Health*. 2011; 10(1):59-70.
19. Ayoola AB, Nettleman MD, Stommel M, Canady RB. Time of pregnancy recognition and prenatal care use: a population-based study in the United States. *Birth*. 2010; 37(1):37-43.
20. Chiavarini M, Lanari D, Minelli L, Salmasi L. Socio-demographic determinants and access to prenatal care in Italy. *BMC Health Services Research*. 2014; 14(1):174-184.
21. Simkhada B, Teijlingen ER, Porter M, Simkhada P. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. *Journal of Advanced Nursing*. 2008; 61(3):244-260.
22. Beeckman K, Louckx F, Putman K. Determinants of the number of antenatal visits in a metropolitan region. *BMC Public Health*. 2010; 10(1):527-536.
23. Neupane S, Doku DT. Determinants of time of start of prenatal care and number of prenatal care visits during pregnancy among Nepalese women. *Journal of Community Health*. 2012; 37(4):865-873.
24. Ahmed S, Creanga AA, Gillespie DG, Tsui AO. Economic status, education and empowerment: implications for maternal health service utilization in developing countries. *PloS One*. 2010; 5(6):e11190.
25. Amin R, Shah NM, Becker S. Socioeconomic factors differentiating maternal and child health-seeking behavior in rural Bangladesh: a cross-sectional analysis. *International Journal*

- for Equity in Health. 2010; 9(9):1-12.
26. Bhutta ZA, Chopra M, Axelson H, Berman P, Boerma T, Bryce J, et al. Countdown to 2015 decade report (2000-10): taking stock of maternal, newborn, and child survival. *The Lancet*. 2010; 375(9730):2032-2044.
 27. Hussein J, Newlands D, D'Ambruso L, Thaver I, Talukder R, Besana G. Identifying practices and ideas to improve the implementation of maternal mortality reduction programmes: findings from five South Asian countries. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2010; 117(3):304-313.
 28. AbouZahr C, Wardlaw T. Antenatal care in developing countries: promises, achievements and missed opportunities-an analysis of trends, levels and differentials, 1990-2001. Geneva: World Health Organization; 2003.
 29. Houweling TA, Ronsmans C, Campbell OM, Kunst AE. Huge poor-rich inequalities in maternity care: an international comparative study of maternity and child care in developing countries. *Bulletin of the World Health Organization*. 2007; 85(10):745-754.
 30. Abel NM, Françoise MK, Dramaix-Wilmet M, Donnen P. Determinants of maternal health services utilization in urban settings of the Democratic Republic of Congo-A Case study of Lubumbashi City. *BMC Pregnancy and Childbirth*. 2012; 12(1):66-79.
 31. Matsumura M, Gubhaju B. Women's Status, household structure and the utilization of maternal health services in Nepal: even primary-level education can significantly increase the chances of a woman using maternal health care from a modern health facility. *Asia-Pacific Population Journal*. 2001; 16(1):23-44.
 32. Navaneetham K, Dharmalingam A. Utilization of maternal health care services in Southern India. *Social Science & Medicine*. 2002; 55(10):1849-1869.
 33. Magadi MA, Madise NJ, Rodrigues RN. Frequency and timing of antenatal care in Kenya: explaining the variations between women of different communities. *Social Science & Medicine*. 2000; 51(4):551-561.
 34. Celik Y, Hotchkiss DR. The socio-economic determinants of maternal health care utilization in Turkey. *Social Science & Medicine*. 2000; 50(12):1797-1806.
 35. Islam M, Odland JO. Determinants of antenatal and postnatal care visits among Indigenous people in Bangladesh: a study of the Mru Community. *Rural and Remote Health*. 2011; 11(2):1672.
 36. Heaman MI, Green CG, Newburn-Cook CV, Elliott LJ, Helewa ME. Social inequalities in use of prenatal care in Manitoba. *Journal of Obstetrics and Gynaecology Canada*. 2007; 29(10):806-816.
 37. Nisar N, White F. Factors affecting utilization of antenatal care among reproductive age group women (15-49 years) in an urban squatter settlement of Karachi. *Journal-Pakistan Medical Association*. 2003; 53(2):47-53.
 38. Downe S, Finlayson K, Walsh D, Lavender T. Weighing up and balancing out: a meta-synthesis of barriers to antenatal care for marginalised women in high-income countries. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2009; 116(4):518-529.
 39. Johnson AA, Hatcher BJ, El-Khorazaty MN, Milligan RA, Bhaskar B, Rodan MF, et al. Determinants of inadequate prenatal care utilization by African American women. *Journal of Health Care for The Poor and Underserved*. 2007; 18(3):620-636.
 40. Beeckman K, Louckx F, Putman K. Predisposing, enabling and pregnancy-related determinants of late initiation of prenatal care. *Maternal and Child Health Journal*. 2011; 15(7):1067-1075.
 41. Ciceklioglu M, Soyer MT, Öcek ZA. 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):533-539.
 42. Miles-Doan R, Brewster KL. The impact of type of employment on women's use of prenatal-care services and family planning in urban Cebu, the Philippines. *Studies in Family Planning*. 1998; 29(1):69-78.
 43. Kabir M, Iliyasu Z, Abubakar I, Sani A. Determinants of utilization of antenatal care services in Kumbotso village, Northern Nigeria. *Tropical Doctor*. 2005; 35(2):110.
 44. Pallikadavath S, Foss M, Stones RW. Antenatal care: provision and inequality in rural north India. *Social Science & Medicine*. 2004; 59(6):1147-1158.
 45. Boerleider AW, Wieggers TA, Manniën J, Francke AL, Devillé WL. Factors affecting the use of prenatal care by non-western women in industrialized western countries: a systematic review. *BMC Pregnancy and Childbirth*. 2013; 13(1):81-92.
 46. Ye Y, Yoshida Y, Sakamoto Junichi J. Factors affecting the utilization of antenatal care services among women in Kham district, Xiengkhouang province, Lao PDR. *Nagoya Journal of Medical Science*. 2010; 72(1-2):23-33.

47. Chomat AM, Solomons NW, Montenegro G, Crowley C, Bermudez OI. Maternal health and health-seeking behaviors among indigenous Mam mothers from Quetzaltenango, Guatemala. *Revista Panamericana de Salud Pública*. 2014; 35(2):113-120.
48. Perreira KM, Crosnoe R, Fortuny K, Pedroza J, Ulvestad K, Weiland C, et al. Barriers to immigrants' access to health and human services programs. ASPE Research Brief Washington, DC: Office of the Assistant Secretary for Planning and Evaluation; 2012.
49. Chowdhury AR, Mahbub A, Chowdhury AS. Skilled attendance at delivery in Bangladesh: an ethnographic study. Bangladesh: Research and Evaluation Division, BRAC; 2003.
50. Robinson P, Comino E, Forbes A, Webster V, Knight J. Timeliness of antenatal care for mothers of Aboriginal and non-Aboriginal infants in an urban setting. *Australian Journal of Primary Health*. 2012; 18(1):56-61.
51. Temple P, Lutembacher M, Vitale J. Limited access to care and home healthcare. *Clinical Obstetrics and Gynecology*. 2008; 51(2):371-384.
52. 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):168-172.
53. Tlebere P, Jackson D, Loveday M, Matizirofa L, Mbombo N, Doherty T, et al. Community-based situation analysis of maternal and neonatal care in South Africa to explore factors that impact utilization of maternal health services. *Journal of Midwifery & Women's Health*. 2007; 52(4):342-350.
54. Effendi R, Isaranurug S, Chompikul J. Factors related to regular utilization of antenatal care service among postpartum mothers in pasar rebo general hospital Jakarta, Indonesia. [Doctoral Dissertation]. Jakarta, Indonesia: Mahidol University; 2008.
55. Trinh LT, Dibley MJ, Byles J. Determinants of antenatal care utilization in three rural areas of Vietnam. *Public Health Nursing*. 2007; 24(4):300-310.
56. Brown CA, Sohani SB, Khan K, Lilford R, Mukhwana W. Antenatal care and perinatal outcomes in Kwale district, Kenya. *BMC Pregnancy and Childbirth*. 2008; 8(1):2-13.
57. Bassani DG, Surkan PJ, Olinto MT. Inadequate use of prenatal services among Brazilian women: the role of maternal characteristics. *International Perspectives on Sexual and Reproductive Health*. 2009; 35(1):15-20.
58. Mathole T, Lindmark G, Majoko F, Ahlberg BM. A qualitative study of women's perspectives of antenatal care in a rural area of Zimbabwe. *Midwifery*. 2004; 20(2):122-132.
59. Teijlingen ER, Hundley V, Rennie AM, Graham W, Fitzmaurice A. Maternity satisfaction studies and their limitations: "what is, must still be best". *Birth*. 2003; 30(2):75-82.
60. Aldana JM, Piechulek H, Al-Sabir A. Client satisfaction and quality of health care in rural Bangladesh. *Bulletin of the World Health Organization*. 2001; 79(6):512-517.
61. Cabana MD, Jee SH. Does continuity of care improve patient outcomes. *The Journal of Family Practice*. 2004; 53(12):974-980.
62. Sans-Corrales M, Pujol-Ribera E, Gene-Badia J, Pasarín-Rua MI, Iglesias-Pérez B, Casajuana-Brunet J. Family medicine attributes related to satisfaction, health and costs. *Family Practice*. 2006; 23(3):308-316.
63. Gleib DA, Goldman N, Rodríguez G. Utilization of care during pregnancy in rural Guatemala: does obstetrical need matter? *Social Science & Medicine*. 2003; 57(12):2447-2463.
64. Dibaba Y, Fantahun M, Hindin MJ. The effects of pregnancy intention on the use of antenatal care services: systematic review and meta-analysis. *Reproductive Health*. 2013; 10(1):50-59.
65. Kupek E, Petrou S, Vause S, Maresh M. Clinical, provider and sociodemographic predictors of late initiation of in England and Wales. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2002; 109(3):265-273.
66. Coimbra LC, Figueiredo FP, Silva AA, Barbieri MA, Bettiol H, Caldas AJ, et al. Inadequate utilization of prenatal care in two Brazilian birth cohorts. *Brazilian Journal of Medical and Biological Research*. 2007; 40(9):1195-1202.
67. Ribeiro ER, Guimarães AM, Bettiol H, Lima DD, Almeida ML, de Souza L, et al. Risk factors for inadequate prenatal care use in the metropolitan area of Aracaju, Northeast Brazil. *BMC Pregnancy and Childbirth*. 2009; 9(1):31-38.
68. Tarekegn SM, Lieberman LS, Giedraitis V. Determinants of maternal health service utilization in Ethiopia: analysis of the 2011 Ethiopian Demographic and Health Survey. *BMC Pregnancy and Childbirth*. 2014; 14(1):161-174.
69. Tsegay Y, Gebrehiwot T, Goicolea I, Edin K, Lemma H, Sebastian MS. Determinants of antenatal and delivery care utilization in Tigray region, Ethiopia: a cross-sectional study. *International journal for equity in health*. 2013; 12(30):1475-9276.

70. Agus Y, Horiuchi S. Factors influencing the use of antenatal care in rural West Sumatra, Indonesia. *BMC Pregnancy and Childbirth*. 2012; 12(1):9.
71. Nwaru BI, Klemetti R, Kun H, Hong W, Yuan S, Wu Z, et al. Maternal socio-economic indices for prenatal care research in rural China. *The European Journal of Public Health*. 2012; 22(6):776-781.
72. Ali AA, Osman MM, Abbaker AO, Adam I. Use of antenatal care services in Kassala, eastern Sudan. *BMC Pregnancy and Childbirth*. 2010; 10(1):67-71.