

## ORIGINAL RESEARCH ARTICLE

# Prevalence and Factors Associated with Late First Antenatal Care Visit in Kaya Health District, Burkina Faso

DOI: 10.29063/ajrh2020/v24i2.2

Anthony Somé<sup>1,2,\*</sup>, Adama Baguiya<sup>1,2</sup>, Abou Coulibaly<sup>1,2</sup>, Vincent Bagnoa<sup>1,2</sup> and Seni Kouanda<sup>1,2,3</sup>

Research Institute of Health Sciences, Ouagadougou, Burkina Faso<sup>1</sup>; Kaya Health and Demographic Surveillance System, Kaya, Burkina Faso<sup>2</sup>; African Institute of Public Health, Ouagadougou, Burkina Faso<sup>3</sup>

\*For Correspondence: Email: *sthony2000@yahoo.fr*; Phone: (+226) 70 69 50 11

## Abstract

Early first antenatal consultation during pregnancy is important to identify women at risk of complications and to increase the probability of institutional delivery, with skilled birth attendants. However, most women in developing countries begin their antenatal visits after the first trimester. The purpose of this study was to estimate the extent of this phenomenon and to identify its main associated factors. We conducted a secondary data analysis using Kaya Health and Demographic Surveillance System Data (Kaya HDSS), which was collected between February 1<sup>st</sup>, 2013 and January 31<sup>st</sup>, 2014. This study included 704 women of reproductive age who permanently reside on Kaya HDSS area. The dependent variable was the time until the first antenatal consultation. The factors associated with late first antenatal consultation were identified by logistic regression. The prevalence of late first antenatal consultation was 62.93%. The multivariate analysis demonstrated that women of age 25 and over (OR=1.77; p=0.002), multiparity (OR=1.72; p=0.036), the women's lack of education (OR=2.72; p=0.001) and the household's poor socio-economic level (very low: OR=2.89; p<0.001) were factors associated with late first antenatal consultation. Sanitary education, community implication and free healthcare for mothers and children can contribute in reducing this phenomenon in our context. (*Afr J Reprod Health 2020; 24[2]: 19-26*).

---

**Keywords:** Antenatal care; Late initiation; Associated factors; Burkina Faso

---

## Résumé

Une première consultation prénatale précoce pendant la grossesse est importante pour identifier les femmes à risque de complications et augmenter la probabilité d'accouchement en institution, avec des accoucheuses qualifiées. Cependant, la plupart des femmes dans les pays en développement commencent leurs visites prénatales après le premier trimestre. Le but de cette étude était d'estimer l'ampleur de ce phénomène et d'identifier ses principaux facteurs associés. Nous avons effectué une analyse des données secondaires à l'aide des données du système de surveillance sanitaire et démographique de Kaya (Kaya HDSS), qui ont été collectées entre le 1<sup>er</sup> février 2013 et le 31 janvier 2014. Cette étude a inclus 704 femmes en âge de procréer qui résident en permanence dans la région de Kaya HDSS. La variable dépendante était le temps jusqu'à la première consultation prénatale. Les facteurs associés à la première consultation prénatale tardive ont été identifiés par régression logistique. La prévalence de la première consultation prénatale tardive était de 62,93%. L'analyse multivariée a démontré que les femmes de 25 ans et plus (OR = 1,77; p = 0,002), la multiparité (OR = 1,72; p = 0,036), le manque d'éducation des femmes (OR = 2,72; p = 0,001) et les pauvres du ménage le niveau socio-économique (très bas: OR = 2,89; p <0,001) étaient des facteurs associés à la première consultation prénatale tardive. L'éducation sanitaire, l'implication communautaire et la gratuité des soins pour les mères et les enfants peuvent contribuer à réduire ce phénomène dans notre contexte. (*Afr J Reprod Health 2020; 24[2]: 19-26*).

---

**Mots-clés:** Soins prénatal; Initiation tardive; Facteurs associés; Burkina Faso

---

## Introduction

The estimated number of maternal deaths worldwide resulting from pregnancy and delivery

complications in 2015 was 303.000<sup>1</sup>. The maternal mortality rate in developing countries is 15 times higher than in developed countries<sup>2</sup>. Furthermore, sub-Saharan African countries have the highest

maternal mortality rates, with an average of 546 maternal deaths per 100.000 live births<sup>1</sup>.

Many of these maternal and neonatal deaths could be avoided by proper pregnancy follow-ups<sup>3</sup>. Since 2001, the World Health Organization (WHO) recommends at least four antenatal visits at regular intervals during pregnancy, the first one occurring before 12 weeks of pregnancy<sup>4</sup>. In 2016, the WHO issued new series of recommendations to improve the quality of antenatal care to reduce the risk of stillbirths and pregnancy complications and give women a positive pregnancy experience. WHO's new antenatal care model increases the number of contacts a pregnant woman has with health providers throughout her pregnancy from four to eight<sup>5</sup>.

Despite having made considerable progress on an international level in terms of increasing the accessibility and use of antenatal care, the proportion of pregnant women receiving a least four antenatal consultations still remains too low<sup>6</sup>. Moreover, the first consultation usually occurs at a late stage of pregnancy, even though, to obtain a maximal effect, antenatal care (ANC) should be initiated earlier<sup>4</sup>.

Many studies have shown the influence of certain factors on the delay for the first antenatal visit (ANC1). Late ANC1 has repeatedly been associated with age, place of residence, ethnicity, education level, occupation, socio-economic level of the household and parity or obstetrical history of the woman<sup>7-11</sup>. Other studies also show that these obstacles are contextual, and can vary depending on different regions and cultures<sup>8,12,13</sup>.

Our study is justified by the fact that, in sub-Saharan Africa, nearly all studies on late ANC1 were conducted within hospital setting. Also, on the sub-regional level of West Africa, no other studies, which we know as of today, have analyzed the factors associated with delaying ANC1 in the population. Therefore, our study allows an estimation of the extent of this delay and identifies its principal associated factors in Kaya health district, Burkina Faso.

## Methods

### *Setting*

This study was conducted on Kaya Health and Demographic Surveillance System (Kaya HDSS), which is in North Central region of Burkina Faso in the health district of Kaya, 100 km from the capital, Ouagadougou. The Kaya HDSS is a platform for the evaluation of health interventions and clinical trials. It covers the 7 urban sectors and the 18 surrounding villages of the district. There are seven health centers, including 4 of which that are urban and three that are rural, as well as a regional hospital. At the end of 2011, the population under surveillance in Kaya HDSS was 64.480 inhabitants living in 10.587 households. The population was 70% urban and 30% rural. The majority of this population was female, with 51.8 % women, a proportion nearly as identical as the one observed in the global population of Burkina Faso<sup>14</sup>.

### *Type of study*

This was a secondary data analysis using the 6<sup>th</sup> round of data collection conducted by Kaya HDSS between February 1<sup>st</sup>, 2013 and January 31<sup>st</sup>, 2014.

### *Study population*

The study population was composed of all women of reproductive age permanently residing on Kaya HDSS catchment area. Women included in this study met the following criteria: permanently residing in Kaya HDSS, having delivered on Kaya HDSS catchment area since the last data collection, having had at least one antenatal consultation and having an ANC card available during the data collectors visit.

### *Data collection*

The data collection consisted in a long-term follow-up of the population residing on Kaya HDSS in order to record vital events (pregnancy, delivery, birth, maternal and infant morbidity, mortality, migration). The data collection

procedure on Kaya HDSS was described by Kouanda *et al.*<sup>14</sup>. Thus, during the data collection, data collectors visited each household covered by the site, with tablets which already contained information about the households previously captured during the last data collection. All vital events occurring since the previous visit were recorded. For each vital event, the data collectors had to administer a specific questionnaire to the appropriate respondent in the household. When data collection ended, the data was transferred from tablets to a computer where they are centralized.

### **Variables**

The dependent variable in this study was the time to the ANC1. The gestational age at the time of the ANC1 was obtained from the women's ANC cards. This variable was then categorized into two categories according to WHO's recommendations for gestational age at the time of the ANC1<sup>4</sup>: early ANC1 (ANC1 occurring during the first trimester of pregnancy) and late ANC1 (ANC1 occurring after the first trimester of pregnancy). The independent variables used in our study were based on the literature review and the variables regularly collected on Kaya HDSS. These variables were classified into two categories: sociodemographic (place of residence, age, ethnicity, religion, level of education of the woman, main occupation of the woman, matrimonial status, level of education of the spouse, socioeconomic level of the household) and obstetrical (parity, interval between births, antenatal care during the previous pregnancy).

### **Data analysis**

The software Stata 13.1 was used for the data cleaning, coding and analysis. The Chi-squared test was used to identify association between late ANC1 and the independent variables in a bi-variate analysis. Then, we used a multivariate logistic regression to determine the factors associated with late ANC1. The unadjusted odd ratios were calculated and the independent variables which had a degree of significance lower

than 0.20 (p-value <0.20) during the univariate analysis were retained for the multivariate analysis. The reliability of the retained model was evaluated by a goodness of fit test (Hosmer and Lemeshow's test).

### **Results**

Our analysis included 704 women. The average participant age was  $27.83 \pm 6.14$  years and the median age was 27 years. Most of the women were married (95.03%), of Mossi ethnic origin (94.74%), of Muslim confession (84.09%) and without any education level (78.13%). Almost 2/3 of the women resided in urban settings (65.34%) and 58.95% of them were independent workers (Table 1).

Multiparous women accounted for 85.8% of the participants. Amongst these multiparous women, 85.92% had an interval between births greater than 2 years and 99.01% of them had antenatal care during their previous pregnancy (Table 1). Considering the number of women having their first antenatal care visit after the first trimester of their pregnancy, 62.93% (n=443) of women had late ANC1.

In the univariate analysis, living in a rural setting was associated with late ANC1 (OR=1.4; p=0.027). Women aged 25 years or above had a higher risk for late ANC1 compared to those under 25 (OR=1.6; p=0.001). Concerning the education level, women without any education had 2.5 times higher risk of late ANC1 compared to the ones with a secondary or university level education (p<0.0001). The same observation can be made with the spouse's education level. Finally, women from households with very low (OR=2.8; p=0.0001) or low (OR= 2.1; p=0.0016) socioeconomic status had a higher risk of late ANC1 compared to those in households with highest socioeconomic status. Amongst the obstetric factors, only parity was associated with late ANC1 according to the univariate analysis. Multiparous women had a risk 1.8 times higher for late ANC1 compared to primiparous women (p=0.007) (Table 2). The associated variables for late ANC1 in multivariate analysis were age, education level of the woman, socioeconomic

**Table 1:** Sociodemographic and obstetrical characteristics of women in Kaya Health District, Burkina Faso

Variables	Number (%)
<b>Age (years)</b>	
< 25	240 (34.09)
≥ 25	464 (65.91)
<b>Place of residence</b>	
Urban	460 (65.34)
Rural	244 (34.66)
<b>Matrimonial status</b>	
Single	35 (4.97)
Married / In couple	669 (95.03)
<b>Religion</b>	
Protestant	11 (1.56)
Catholicism	101 (14.35)
Islam	592 (84.09)
<b>Ethnicity</b>	
Mossi	667 (94.74)
Other	37 (5.26)
<b>Education level</b>	
Secondary / University	87 (12.35)
Primary	67 (9.52)
None	550 (78.13)
<b>Main occupation of the woman</b>	
Housewife	236 (33.52)
Student	29 (4.12)
Independent worker	415 (58.95)
State worker / Private	24 (3.41)
<b>Education level of the spouse</b>	
Secondary / University	108 (15.98)
Primary	85 (12.57)
None	483 (71.45)
<b>Socioeconomic status of the household</b>	
Very high	107 (15.20)
High	107 (15.20)
Average	137 (19.46)
Low	193 (27.41)
Very low	160 (22.73)
<b>Parity</b>	
Primiparous	100 (14.20)
Multiparous	604 (85.80)
<b>Interbirth interval (n=604)</b>	
> 2 years	519 (85.92)
1-2 years	85 (14.07)
<b>ANC during the previous pregnancy</b>	
No	6 (0.99)
Yes	598 (99.01)

level of the household and parity (Table 3). Women aged 25 years and above had a 1.8 times higher risk for late ANC1 compared to those under 25 years of age ( $p=0.002$ ). Compared to women

with a secondary or university level education, women without any education level had 2.7 times more risk of late ANC1 ( $p=0.001$ ). As for women from households where the socioeconomic level is very low or low, respectively, had 2.9 times ( $p<0.001$ ) and 2.1 times ( $p=0.005$ ) higher risk for late ANC1 compared to the ones from households where the socioeconomic level is very high. Finally, multiparous women had a risk 1.7 times higher for late ANC1 versus primiparous women ( $p=0.036$ ).

## Discussion

The main result of our study was that more than half of the women had late ANC1. This prevalence is high with regards to the WHO's recommendations, which suggest that every pregnant woman initiates her antenatal care before the end of the first trimester of her pregnancy<sup>4</sup>. This high prevalence is equally found in most studies conducted in African countries concerning the subject. Indeed, studies have shown similar or higher prevalence of late ANC1 than the one found in our study: 59.8% in Democratic Republic of Congo, 61.1% in Rwanda, 68% in Senegal, 70% in Tanzania and in Malawi, 70.3% in Zambia, 81% in Nigeria, 82.6% in Ethiopia<sup>8,15-21</sup>.

The age, the education level, the household's socioeconomic status and parity were significantly associated with late ANC1. The delay was significantly higher in women aged 25 years or higher than in the ones under 25 years of age. Studies conducted in Ethiopia, in Nigeria, in Kenya and in India have found similar results<sup>22-24</sup>. This is probably since younger pregnant mothers might more likely be literate than elder mothers. Alternatively, elder mothers might consider starting ANC at delayed time not as a problem from their previous experiences. However, the study by Adekanle *et al.* in Nigeria showed an inverse association, where younger pregnant women tend to have greater risk of late ANC1 than older pregnant women<sup>8</sup>.

Women without any education also had a higher risk of late ANC1 versus the ones having a secondary or university level education.

**Table 2:** Sociodemographic and obstetric factors associated with late ANC1 in the univariate analysis

Variables	Late ANC1 n (%)	Unadjusted OR (CI 95%)	P value
<b>Age (years)</b>			
< 25	132 (55)	1	
≥ 25	311 (67.02)	1.66 (1.20 - 2.29)	0.001
<b>Place of residence</b>			
Urban	276 (60)	1	
Rural	167 (68.44)	1.44 (1.03 - 2.01)	0.027
<b>Matrimonial status</b>			
Single	22 (62.85)	1	
Married / In couple	421 (62.92)	1.00 (0.49 - 2.02)	0.993
<b>Religion</b>			
Islam	372 (62.83)	1	
Catholicism	64 (63.36)	1.02 (0.66 - 1.58)	0.919
Protestant	7 (63.63)	1.03 (0.29 - 3.57)	0.956
<b>Ethnicity</b>			
Other	23 (62.16)	1	
Mossi	420 (62.96)	1.03 (0.52 - 2.04)	0.921
<b>Education level of the woman</b>			
Secondary / University	40 (45.97)	1	
Primary	30 (44.77)	0.95 (0.50 - 1.81)	0.882
None	373 (67.81)	2.47 (1.55 - 3.93)	0.0001
<b>Main occupation of the woman</b>			
Housewife	136 (57.62)	1	
Student	19 (65.51)	1.39 (0.62 - 3.14)	0.416
Independent worker	277 (66.74)	1.47 (0.86 - 1.85)	0.068
State worker / Private	11 (45.83)	0.62 (0.26 - 1.45)	0.267
<b>Education level of the spouse</b>			
Secondary / University	49 (45.37)	1	
Primary	47 (55.29)	1.48 (0.83 - 2.64)	0.172
None	327 (67.70)	2.52 (1.3 - 3.88)	< 0.0001
<b>Socioeconomic status of the household</b>			
Very high	54 (50.46)	1	
High	55 (51.40)	1.03 (0.60 - 1.77)	0.891
Average	82 (59.85)	1.46 (0.87 - 2.44)	0.143
Low	133 (68.91)	2.17 (1.32 - 3.57)	0.0016
Very low	119 (74.37)	2.84 (1.66 - 4.87)	0.0001
<b>Parity</b>			
Primiparous	51 (51.00)	1	
Multiparous	392 (64.90)	1.77 (1.15 - 2.72)	0.007
<b>Interbirth interval</b>			
> 2 years	326 (61.74)	1	
1-2 years	64 (77.10)	1.82 (0.51 - 2.59)	0.892
<b>ANC during the previous pregnancy</b>			
No	4 (66.66)	1	
Yes	388 (64.88)	0.92 (0.16 - 5.09)	0.927

Similar results were found during studies conducted in Nigeria, in Ethiopia, in Vietnam and in Pakistan<sup>8,25-28</sup>. The possible explanation for why education is a key determinant could be that better educated women would likely appreciate the importance of early booking more than the less educated ones.

Concerning the spouse's education level, even though associated with late ANC1 in the univariate analysis, it no longer was in the multivariate analysis. However, studies conducted in Ethiopia have shown that the low education level of the woman and of her spouse were both significantly associated with late ANC1<sup>29,30</sup>. Indeed, the study

**Table 3:** Factors associated with late ANC1 in multivariate analysis

Variables	Adjusted OR (CI 95%)	P value
<b>Age (years)</b>		
< 25	1	
≥ 25	1.77 (1.24 - 2.52)	0.002
<b>Place of residence</b>		
Urban	1	
Rural	1.02 (0.70 - 1.44)	0.901
<b>Education level of the woman</b>		
Secondary / University	1	
Primary	1.11 (0.53 - 2.32)	0.775
None	2.72 (1.53 - 4.84)	0.001
<b>Education level of the spouse</b>		
Secondary / University	1	
Primary	0.90 (0.47 - 1.70)	0.754
None	1.13 (0.67 - 1.91)	0.628
<b>Socioeconomic level of the household</b>		
Very high	1	
High	1.00 (0.56 - 1.80)	0.974
Average	1.40 (0.80 - 2.44)	0.233
Low	2.14 (1.26 - 3.64)	0.005
Very low	2.89 (1.63 - 5.13)	< 0.001
<b>Parity</b>		
Primiparous	1	
Multiparous	1.72 (1.03 - 2.86)	0.036

conducted by Tura *et al.* in Ethiopia showed that women with a secondary or university level education as well as the ones with a spouse with a secondary or university level education respectively had 6 times and 1.5 times less risk of late ANC1<sup>30</sup>. Again, these results highlight the major role of education regarding the use of adequate antenatal care.

Our study also puts forth the relationship between the household's low socioeconomic status and late ANC1. This relationship was also highlighted by some authors during studies conducted in Ethiopia and in Uganda<sup>31,32</sup>. This finding can be explained by the fact that living conditions and better revenues favor the use of health services by populations and increases their capacity to deal with eventual expenses relating to health services.

The place of residence was associated with late ANC1 in the univariate analysis but was not in the multivariate analysis. Nonetheless, the association between late ANC1 and rural settings

has been highlighted by many authors<sup>20,29,30,33</sup>. In Africa, this represents the mentality in rural settings, where pregnancy must be kept secret to avoid evil spirits. Women would often hide their pregnancy because of mystical concepts. Indeed, according to certain beliefs, a pregnant woman is considered vulnerable during the first three months. Discretion is hence a way of protection against evil spirits, which co-wives could resort to using by jealousy in polygamous households<sup>21</sup>. Late ANC1 could also be explained the lack of knowledge concerning the importance of antenatal consultation, which is more important in rural settings, and by the remoteness of health services from the pregnant women's living place, as explained by Ndiaye *et al.*<sup>21</sup>.

Multiparous women had a significantly higher risk of late ANC1 compared to primiparous women. This risk has been demonstrated by many authors in studies conducted in Senegal and in Nigeria<sup>21,34,35</sup>. This association between multiparity and late ANC1 could be explained by the fact that the multiparous woman would tend to rely on her previous delivery experiences, especially when they proceeded without any incidents; but also because the multiparous woman felt uncomfortable with the healthcare providers and would dread being reprimanded for her lack of family planning observance, as mentioned elsewhere<sup>36</sup>. Moreover, the primiparous, generally younger, tend to be more educated than the multiparous<sup>37</sup>.

Our study had some limitations. The explanatory variables used in our study are not exhaustive. Indeed, some variables described in the literature (abortion history, neonatal death history, pregnancy planning, distance between the home and the health facility, ...) as potentially being associated with late ANC1 were not included in our study because they were not collected on the Kaya HDSS site.

## Ethical Approval

Kaya HDSS was developed and put in place since 2007 in collaboration with the local administrative and health authorities and received clearance from the National Health Research Ethics Committee as

per the regulation in place for conducting regular data collection on the site. Consent was obtained from all participants after comprehensive explanation of procedure involved. During the data collection and analysis, the anonymity and confidentiality of participants were safeguarded.

## Conclusion

The delay for the ANC1 still remains problematic in Burkina Faso, and in most developing countries. Our study found a high prevalence of late ANC1 in Kaya health district. It has also helped to identify the principal factors associated with the delay. The identification of the principal determinants causing this delay suggests the promotion of targeted strategies, in hopes of influencing the behaviors and attitudes of the most vulnerable persons. Health education, community implication and free healthcare for mother and child can contribute in reducing this phenomenon in our context.

## Acknowledgement

This work is issued from the master thesis in public health completed at the African Institute of Public Health). Anthony Somé received a bursary from WHO/HRP through the LIG Grant/IRSS. We also thank Aurélie Bédard and Elisabeth Nguyen from Laval University, Québec, Canada for their hard work on the translation.

## Contribution of Authors

AS contributed at all stages of the research. He led data analysis and writing of the article. AB contributed to defining the methods, assisted in the data analysis, and revised the manuscript. VB helped analyze the data and revised the manuscript. AC contributed to defining the methods and revised the manuscript. SK oversaw all stages from protocol development to writing the final version of the article. All authors mentioned in the article read and approved the final manuscript.

## References

1. WHO. Trends in maternal mortality: 1990 to 2015: estimates by WHO, UNICEF, UNFPA, World Group and the United Nations Population Division. Geneva: WHO; 2015.
2. UN. The Millennium Development Goals Report 2012. New York: United Nations; 2012.
3. WHO. Neonatal and perinatal mortality Country, Regional and Global estimates 2000 WHO publications Geneva: WHO; 2006.
4. Villar J, Ba'aqeel H, Piaggio G, Lumbiganon P, Miguel Belizán J, Farnot U, Al-Mazrou Y, Carroli G, Pinol A, Donner A, Langer A, Nigenda G, Mugford M, Fox-Rushby J, Hutton G, Bergsjø P, Bakketeig L, Berendes H and Garcia J. WHO antenatal care randomised trial for the evaluation of a new model of routine antenatal care. *Lancet Lond Engl*. 2001 May 19;357(9268):1551–64.
5. WHO. Recommendations on Antenatal Care for a Positive Pregnancy Experience. Geneva: World Health Organization; 2016. Executive summary.
6. Finlayson K and Downe S. Why do women not use antenatal services in low-and middle-income countries? A meta-synthesis of qualitative studies. *PLoS Med*. 2013;10(1):e1001373.
7. Trinh LTT and Rubin G. Late entry to antenatal care in New South Wales, Australia. *Reprod Health*. 2006; 3:8.
8. Adekanle DA and Isawumi AI. Late antenatal care booking and its predictors among pregnant women in South Western Nigeria. *Online J Health Allied Scs*. 2008; 7(1): 4.
9. Simkhada B, Teijlingen ER van, Porter M and Simkhada P. Factors affecting the utilization of antenatal care in developing countries: systematic review of the literature. *J Adv Nurs*. 2008 Feb;61(3):244–60.
10. Tsegay Y, Gebrehiwot T, Goicolea I, Edin K, Lemma H and Sebastian MS. Determinants of antenatal and delivery care utilization in Tigray region, Ethiopia: a cross-sectional study. *Int J Equity Health*. 2013 May 14;12:30.
11. Achia TNO and Mageto LE. Individual and contextual determinants of adequate maternal health care services in Kenya. *Women Health*. 2015;55(2):203–26.
12. Magadi MA, Agwanda AO and Obare FO. A comparative analysis of the use of maternal health services between teenagers and older mothers in sub-Saharan Africa: evidence from Demographic and Health Surveys (DHS). *Soc Sci Med* 1982. 2007 Mar;64(6):1311–25.
13. McCaw-Binns A, La Grenade J and Ashley D. Under-users of antenatal care: a comparison of non-attenders and late attenders for antenatal care, with

- early attenders. *Soc Sci Med* 1982. 1995 Apr;40 (7):1003–12.
14. Kouanda S, Bado A, Yaméogo M, Nitiéma J, Yaméogo G, Bocoum F, Millogo T, Ridde V, Haddad S and Sondo B. The Kaya HDSS, Burkina Faso: a platform for epidemiological studies and health programme evaluation. *Int J Epidemiol*. 2013 Jun 1;42(3):741–9.
  15. Banda I, Michelo C and Hazemba A. Factors associated with late antenatal care attendance in selected rural and urban communities of the copperbelt province of Zambia. *Med J Zambia* 2012;39:29–36.
  16. Gebremeskel F, Dibaba Y and Admassu B. Timing of first antenatal care attendance and associated factors among pregnant women in Arba Minch Town and Arba Minch District, Gamo Gofa Zone, south Ethiopia. *J Environ Public Health*. 2015;2015:971506.
  17. Manzi A, Munyaneza F, Mujawase F, Banamwana L, Sayinzoga F, Thomson DR, Ntanganira J and Hedt-Gauthier BL. Assessing predictors of delayed antenatal care visits in Rwanda: a secondary analysis of Rwanda demographic and health survey 2010. *BMC Pregnancy Childbirth*. 2014;14:290.
  18. Gross K, Alba S, Glass TR, Schellenberg JA and Obrist B. Timing of antenatal care for adolescent and adult pregnant women in south-eastern Tanzania. *BMC Pregnancy Childbirth*. 2012 Mar 21;12:16.
  19. Mkandawire P. Gestational Age at First Antenatal Care Visit in Malawi. *Matern Child Health J*. 2015 Nov;19(11):2366–74.
  20. Mafuta EM and Kayembe PK. Déterminants de la fréquentation tardive des services de soins prénatals dans les zones de santé de l'Equateur et du Katanga en République Démocratique du Congo. *Ann. Afr. Med.* sept 2011;4(4):845-54.
  21. Ndiaye P, Tal Dia A, Dieudiou A, Dieye EHL and Dione DA. Déterminants socioculturels du retard de la 1ère consultation prénatale dans un district sanitaire au Sénégal. *Santé publique*. 2005; 17(4): 531-538.
  22. Oladokun A, Oladokun RE, Morhason-Bello I, Bello AF and Adedokun B. Proximate predictors of early antenatal registration among Nigerian pregnant women. *Ann Afr Med*. 2010 Dec;9(4):222–5.
  23. Magadi MA, Madise NJ and Rodrigues RN. Frequency and timing of antenatal care in Kenya: explaining the variations between women of different communities. *Soc Sci Med* 1982. 2000 Aug;51(4):551–61.
  24. Navaneetham K and Dharmalingam A. Utilization of maternal health care services in Southern India. *Soc Sci Med* 1982. 2002 Nov;55(10):1849–69.
  25. Ebeigbe PN and Gharoro EP. Obstetric complication, intervention rates and maternofetal outcomes in teenage nullipara in Benin City, Nigeria. *Tropical Doctor*. 2007 37(2): 79-83.
  26. Trinh LTT, Dibley MJ and Byles J. Determinants of antenatal care utilization in three rural areas of Vietnam. *Public Health Nurs Boston Mass*. 2007 Aug;24(4):300–10.
  27. Tariku A, Melkamu Y and Kebede Z. Previous utilization of service does not improve timely booking in antenatal care: cross sectional study on timing of antenatal care booking at public health facilities in Addis Ababa. *Ethiopian Journal of Health Development*. 2010;24(3):226–233.
  28. Yazdoni T, Islam A, Nadeem G, Hayat T and Mushtaq M. Social factors involved in women avoiding early antenatal booking in army setup. *Pakistan Armed Forces Med J* 2008;4:1.
  29. Nigussie M, Haile Mariam D and Mitike G. Assessment of safe delivery service utilization among women of childbearing age in north Gondar Zone, Northwest Ethiopia, Ethiop. *J. of Health Dev*. 2004; 18(3): 45-152.
  30. Tura G. Antenatal care service utilization and associated factors in Metekel zone, Northwest Ethiopia. *Ethiopian J Health Sci*. 2009;19(2):111–118.
  31. Kisuule I, Kaye DK, Najjuka F, Ssematimba SK, Arinda A, Nakitende G and Otim L. Timing and reasons for coming late for the first antenatal care visit by pregnant women at Mulago hospital, Kampala Uganda. *BMC Pregnancy Childbirth*. 2013 May 25;13:121.
  32. Birmeta K, Dibaba Y and Woldeyohannes D. Determinants of maternal health care utilization in Holeta town, central Ethiopia. *BMC Health Serv Res*. 2013 Jul 3;13:256.
  33. Ebeigbe PN and Igberase GO. Antenatal care: a comparison of demographic and obstetric characteristics of early and late attenders in the Niger Delta, Nigeria. *Med Sci Monit*. 2005 Nov; 11(11):CR529-532.
  34. Okunlola MA, Owonikoko KM, Fawole AO and Adekunle AO. Gestational age at antenatal booking and delivery outcome. *Afr J Med Med Sci*. 2008 Jun;37(2):165–9.
  35. Adeyemi AB, Makinde ON, Ajenifuja KO, Soyinka AS, Ayinde AK, Ola BA and Ofili M. Determinants of antenatal booking time in a South-Western Nigeria setting. *West Afr J Med*. 2007 Dec;26(4):293–7.
  36. Rowe RE, Magee H, Quigley MA, Heron P, Askham J and Brocklehurst P. Social and ethnic differences in attendance for antenatal care in England. *Public Health*. 2008 Dec;122(12):1363–72.
  37. Tewodros B, Mariam A, and Dibaba Y. Factors affecting antenatal care utilization in Yem special woreda southwestern Ethiopia. *J Health Sci*. 2009 Mar;19:45-51.