



Research Article

Factors Associated with the Completion of Antenatal Care in Podor Health District in 2020 (Senegal)

Ibrahima Ndiaye^{1,2,*} , Oumar Bassoum^{1,2} , Maty Diagne-Camara^{1,2},
Amadou Ibra Diallo^{1,2}, Adama Faye^{1,2}, Ibrahima Seck^{1,2}

¹Preventive Medicine and Public Health Service, Cheikh Anta Diop University, Dakar, Senegal

²Health and Development Institute, Cheikh Anta Diop University, Dakar, Senegal

Abstract

Introduction: The Ministry of Health and Social Action recommends at least four antenatal care (ANC). This indicator is not sufficiently documented in Podor health district. This study aimed to identify factors associated with the completion of ANC in this district. **Methods:** A cross-sectional study was conducted from 19 to 22 June 2020 in Podor health district, located 490 km away from Dakar in northern Senegal. The study population included women who had given birth in the 24 months preceding the survey. A two-stage cluster sampling was carried out. Data were collected during a face-to-face interview using an electronic questionnaire created with Open Data Kit Collect (ODK Collect) software. The adjusted Odds ratio (aOR) and its 95% confidence interval (CI95%) were calculated. **Results:** A total of 832 women were interviewed. Their average age was 26.5 ± 6.6 years, and they were mainly uneducated (54.1%), married (96.2%), and from rural areas (72.8%). The study showed that 51.20% of women surveyed underwent at least four ANC. Married women (aOR= 4.14), those who walked to reach health facilities (aOR=1.69), and those who watched television at least once a week (aOR=1.66) were significantly more likely to undergo at least four ANC. **Conclusion:** We need to raise awareness among women of reproductive age and resource persons through the mass media, and improve the geographical accessibility of health facilities to increase ANC coverage.

Keywords

Antenatal Care, Cross-Sectional Study, Senegal

1. Introduction

According to the World Health Organization (WHO), nearly 287,000 women died in 2015 from complications related to pregnancy and childbirth. Around 70% of these deaths occurred in sub-Saharan Africa [1].

In Senegal, the maternal mortality rate stands for 315 maternal deaths per 100,000 live births [2].

The WHO believes that one of the best ways to save

women's lives is to ensure that all women have access to antenatal care (ANC) during pregnancy [1].

ANC reduces maternal and perinatal mortality and morbidity both directly, through the detection and treatment of pregnancy-related complications, and indirectly, through the identification of women and girls at increased risk of developing complications during labor and delivery, thus ensuring

*Corresponding author: neyaid@gmail.com (Ibrahima Ndiaye)

Received: 17 January 2024; **Accepted:** 14 February 2024; **Published:** 27 February 2024



Copyright: © The Author(s), 2023. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

their transfer to a facility offering an appropriate level of care [3].

In addition, women's contact with ANC services also represents an opportunity for the management of concomitant diseases such as Human Immunodeficiency Virus (HIV) and malaria, which are recognized as indirect causes of maternal mortality (27.5% of all maternal deaths) [4].

In 2017, the WHO published a document entitled "WHO recommendations for antenatal care to make pregnancy a positive experience". This document reports that at least eight contacts are recommended to reduce perinatal mortality and improve women's experience of care [3].

However, in Senegal, the Ministry of Health and Social Action (MSAS) recommends that all pregnant women must undergo at least four antenatal care [5].

Maternal and child health is a priority for the Senegalese authorities. Programmatic objectives have been set in the 'integrated strategic plan for reproductive, maternal, newborn, child and adolescent health 2016-2020'. The plan is to increase the ANC completion rate (at least 4 ANC) from 48% in 2015 to 70% in 2020 [5].

In addition, the investment plan to reduce maternal, neonatal, infant and child, adolescent and youth mortality identifies optimal ANC coverage as one of the high-impact interventions [6].

The availability of data is a condition for the success of health policies. For example, according to the Demographic and Continuous Health Survey conducted in 2019 (2019-DHS) in Senegal, 98% of women received at least one ANC, provided by a skilled caregiver. In contrast, the percentage of women who have undergone at least four ANC is 55.5% [7].

DHS surveys are an important source of information for public policy-making. Too often, however, these surveys provide data at national rather than sub-national level [7]. Consequently, it appeared necessary to have data on ANC at the sub-national level to align actions with local realities.

It is against this backdrop that we conducted this study in Podor health district. The objective was to identify factors associated with the completion of ANC in the Podor health district.

2. Materials and Methods

2.1. Study Setting

Senegalese healthcare system is a three-tier pyramid. The central level, the intermediate level, and the operational level. The latter corresponds to the health district, which is the population's first point of contact with the health system, providing preventive care, including ANC [8].

Podor health district is located in northern Senegal and belongs to the department of the same name of Saint Louis region. The district is 490 km away from Dakar. In 2020, the

population was estimated at 247,891, 45% of whom lived more than five km away from the nearest health facility. The population lives in three ecological zones: the Dieri, the Walo, and along the national highway. The Walo is flooded by the Senegal River, making it difficult to access during high-water periods. In winter, the roads in Dieri are impassable [9].

2.2. Study Population and Data Collection

A cross-sectional study was carried out. The study population comprised women who gave birth in the 24 months preceding the survey. A two-stage cluster sampling (1.village/neighborhood and 2.household) was carried out. Data were collected during an individual interview using an electronic questionnaire created with Open Data Kit Collect (ODK Collect) software downloaded onto smartphone tablets. Data collection took place from 19 to 22 June, 2020. The 25 interviewers were students trained in questionnaire administration. Training methods included guided reading, Power-Point, role-playing, and field training. The sample size was estimated at 832 women. Details of how to calculate the sample size can be found elsewhere [10].

2.3. Studied Variables

The variables collected were as follows:

Dependent variable

It corresponded to ANC completion, meaning the completion of at least four ANCs. This variable was collected using the following questions:

Did you see anyone for ANC when you were pregnant with 'NAME'? (1. Yes, 2. No)

During this pregnancy, how many times did you receive ANC? (1. Number of times, 2. Don't know)

Independent variables

Individual characteristics: age, level of education, marital status, gender, frequency of newspaper reading, frequency of radio listening, frequency of television use.

Household characteristics: place of residence, distance between home and health facility, professional status of husband/partner, socio-economic level, family security grant, affiliation to a health insurance scheme, and types of transport used.

2.4. Statistical Analysis

Quantitative variables were described by means and standard deviation. Qualitative variables were expressed as absolute and relative frequencies (%). All these variables were represented by tables.

For analytical statistics, a bivariate analysis was firstly performed using the chi-2 test. Then, variables for which the p-value is less than or equal to 0.25 are included in a top-down stepwise binary logistic regression model. The

significance level is set at 0.05. The adjusted Odds ratio (aOR) and its 95% confidence interval (CI95%) were calculated. All analyses were performed with R software version 4.0.5.

2.5. Ethical Considerations

The study obtained ethical approval from the 'Research Ethics Committee' (CER) of Cheikh Anta Diop University, Dakar, Senegal (reference 0253/2017 / CER / UCAD). This study was conducted in accordance with the guidelines set out in the Declaration of Helsinki. Verbal informed consent was obtained from the participants after the presentation of the study objectives. The participant was informed of her right to refuse to participate in the study or to withdraw her consent at any time, without justification. Data were collected anonymously and confidentially.

3. Results

3.1. Characteristics of Participants

A total of 832 women with an average age of 26.75 years (± 6.95) were involved in the study. More than half of the participants (59.38%) had no formal education. In terms of marital status, most of the women surveyed were married (96.76%). Just over three-quarters of the women were from rural areas (75.72%). To get to the health facility, the majority (64.18%) traveled less than five kilometers. Concerning different sources of information, the majority of respondents (84.13%) did not read the newspaper at all. Almost half the women (52.76%) listened to the radio almost every day, while more than half did not watch television at all (54.69%). The majority of women did not benefit from a family security grant (94.47%). Similar proportion were not affiliated with any health insurance scheme (95.07%). Most participants were paucigest (37.14%) (Table 1).

Table 1. Socio-demographic characteristics of participants, Podor health district, 2020, N=832.

Socio-demographic characteristics	Absolute frequency (N)	Relative frequency (%)
Individual characteristics		
Age		
< 20 ans	110	13,22
20-29 ans	439	52,76
30-39 ans	246	29,57
≥ 40 ans	37	4,45
Education level		
None	494	59,38
Primary	147	17,67
Medium	90	10,82
Secondary	77	9,25
Superior	24	2,88
Marital status		
Married monogamous	505	60,70
Married polygamist	300	36,06
Single	22	2,64
Divorced	5	0,60
Number of pregnancies		
Nulligest (0)	90	12,53
Primigest (1)	177	21,27
Paucigest (2-3)	309	37,14
Multigest (4-5)	183	22,00

Socio-demographic characteristics		Absolute frequency (N)	Relative frequency (%)
Individual characteristics			
Read the newspaper	Large multigest (6+)	73	8,77
	Not at all	700	84,13
	Less than once a week	16	1,92
	At least once a week	38	4,57
	Almost every day	78	9,38
Listen to the radio	Not at all	222	26,68
	Less than once a week	28	3,37
	At least once a week	143	17,19
	Almost every day	439	52,76
Watch television	Not at all	455	54,69
	Less than once a week	17	2,04
	At least once a week	67	8,05
	Almost every day	293	35,22
Household characteristics			
Place of residence			
	Urban	202	24,28
	Rural	630	75,72
Distance between home and healthcare facility			
	Less than 5 km	534	64,18
	Between 5 and 10 Km	141	16,95
	Between 10 and 15 Km	94	11,30
	More than 15 Km	63	7,57
Types of transport used to get to the healthcare facility			
	Walk	451	54,21
	Cart	306	36,78
	Public transport	45	5,41
	Personal vehicle	18	2,16
	Motorcycle	12	1,44
Professional status of husband/partner			
	Employed	790	94,95
	Unemployed	42	5,05
Socioeconomic status			
	Poorest	166	19,95
	Poor	167	20,07

Socio-demographic characteristics		Absolute frequency (N)	Relative frequency (%)
Individual characteristics			
	Medium	166	19,95
	Rich	167	20,07
	Richest	166	19,95
Family security grant recipient			
	Yes	46	5,53
	No	786	94,47
Membership of a health insurance scheme			
	Yes	41	4,93
	No	791	95,07

3.2. ANC Coverage

The study showed that 51.20% of women received at least four ANC (Table 2).

Table 2. ANC coverage, Podor health district, 2020, N=832.

Number of ANC	Absolute frequency (N)	Relative frequency (%)
None	92	11,06
< 4	314	37,74
≥ 4	426	51,20
Total	832	100,00

3.3. Bivariate Analysis of ANC Completion by Socio-Demographic Characteristics

Completion of ANC was related to school enrolment ($p<0.001$), marital status ($p=0.008$), socio-economic level ($p<0.001$), walking to reach the health facility ($p<0.001$), and watching television at least once a week ($p<0.001$) (Table 3).

Table 3. Bivariate analysis of ANC completion by socio-demographic characteristics, Podor health district, 2020, N=832.

Variables	Completion of CPN				P value
	Yes		No		
	n	%	n	%	
Individual characteristics					
Age					
Under 20 years	52	47,27	58	52,73	0,376
20 years and over	374	51,80	348	48,20	
Schooling					
Yes	199	58,00	139	41,12	< 0,001

Variables	Completion of CPN				P value
	Yes		No		
	n	%	n	%	
No	227	45,95	267	54,05	0,008
Marital status					
Married	419	52,05	386	47,95	
Unmarried	7	25,93	20	74,07	0,114
Number of pregnancies					
None	39	43,33	51	56,67	
At least one	387	52,16	355	47,84	0,748
Source of information					
Reads the newspaper at least once a week					
Yes	61	52,59	55	47,41	0,096
No	365	50,98	351	49,02	
Listen to the radio at least once a week					
Yes	309	53,09	273	46,91	<0,001
No	117	46,80	133	53,20	
Watches television at least once a week					
Yes	219	60,83	141	39,17	0,817
No	207	43,06	265	56,14	
Household characteristics					
Place of residence					
Rural	324	51,43	306	48,57	0,126
Urban	102	50,50	100	49,50	
Distance between home and healthcare facility					
Less than 5 km	284	53,18	250	46,82	< 0,001
More than 5 km	142	47,65	156	53,35	
Types of transport used to get to the healthcare facility					
Walk					0,872
Yes	261	57,87	190	42,13	
No	165	43,31	216	56,69	
Professional status of husband/partner					< 0,001
Employed	405	51,27	385	48,73	
Unemployed	21	50,00	21	50,00	
Socioeconomic status					< 0,001
Low (poorest, poor)	146	43,84	187	56,16	
High (medium, rich, richest)	280	56,11	219	43,89	
Family security grant recipient					

Variables	Completion of CPN				P value
	Yes		No		
	n	%	n	%	
Yes	27	58,70	19	41,30	0,295
No	399	50,76	387	49,24	
Membership of a health insurance scheme					
Yes	26	63,41	15	36,59	0,109
No	400	50,57	391	49,43	

3.4. Multivariate Analysis of ANC Completion by Socio-Demographic Characteristics

The results of the study showed that marital status, means of transport, and watching television at least once a week were associated with achieving optimal ANC. Married women were more likely to achieve optimal ANC (aOR = 4.14 [1.69-10.12]). The same trends were found for women who walked to the health facility (aOR=1.69 [1.3-2.27]) and those who watched television at least once a week (aOR=1.66 [1.23-2.25]) (Table 4).

Table 4. Factors associated with ANC completion, Podor health district, 2020, N=832.

Variables	aOR [CI95%]	P value
Individual characteristics		
Marital status		
Married	4,14 [1,69-10,12]	0,002
Unmarried	1	
Watches television at least once a week		
Yes	1,66 [1,23-2,25]	0,001
No	1	
Household characteristics		
Types of transport used to get to the healthcare facility		
Walk	1,69 [1,3-2,27]	0,001
Other types	1	

4. Discussion

4.1. Strengths and Weaknesses

This study has two strengths. The first is the optimal sample size, which helps to ensure the accuracy of the results. The second is that this study is the first of its kind in the Podor health district. As such, it paves the way for further studies on the subject. However, this study also has two limitations. Firstly, the number of ANC performed could be overestimated, with participants tending to give ideal answers, giving rise to a social desirability bias. Secondly, the cross-sectional nature of the study makes it impossible to determine the causal link between the associated factors found and the completion of ANC.

4.2. ANC Coverage

The study showed that 51.20% of women surveyed underwent at least four ANC. This result is comparable to the national average. In fact, according to the DHS, around 56% of women performed at least 4 ANC in 2019 [7]. This result is lower than that of the Ghanaian study (86%) [11] and the Ethiopian study (78.5%) [12]. In contrast, other studies have revealed lower proportions. A Cambodian study of women who had given birth in the last five years found a rate of 32.6% attendance at healthcare services [13]. In northwest Ethiopia, the indicator stood at 21.6% [14].

4.3. Factors Associated with ANC Completion

This study showed that access to ANC services is influenced by individual and contextual characteristics.

Firstly, there was a statistically significant relationship between ANC completion and being married. This result may be due to the support that in-laws and husbands provide to women on the one hand. Conversely, unmarried pregnant women are said to be victims of stigmatization by the general

public and health personnel [15, 16].

In addition, watching television at least once a week was positively related to ANC completion. Similar results were found in Guinea and Ethiopia [17, 18]. This result is encouraging, and demonstrates the importance of mass media in raising public awareness of health-promoting behaviors. Broadcasting messages on television helps to increase women's knowledge of the benefits of ANC. However, in rural Senegal, only 37.8% have a television [19]. This is why, in such an area, two awareness-raising strategies would be necessary. On the one hand, home visits would be more effective. "Bajenu Gox" could play this role. On the other hand, broadcasting messages on the radio would be more effective [20].

In terms of context, access to ANC services on foot proved to be a facilitating factor for ANC completion. This could be explained by the prevalent transport challenges in Podor health district, particularly in the Dieri area. The most likely hypothesis is that women who live close to the nearest health facility are those who use ANC services the most [14]. Tessema ZT et al. argued the same findings in which women who reported that access to health care was not a big problem were more likely to use ANC services than those who reported that access to health care was a big problem [18]. In Senegal, one kilometer is a fifteen-minute walk to a health post [21]. The Cambodian study showed that women living 10-15km from health care services had a 72% lower chance of accessing ANC services, while those living more than 15km away had a 77% lower chance than women living 5km away [13]. Contrariwise, in his study conducted in northwest Ethiopia, Atnafu A showed that the chance of accessing maternal health services was multiplied by 5.59 in women who used motorcycles compared to those who reported walking to the health facility [14].

5. Conclusions

The study showed that the ANC completion rate was low in the Podor health district. In addition, married women, those who walked to reach health facilities, and those who watched television at least once a week were more likely to complete at least four ANC. Given these results, interventions should include raising awareness among women of reproductive age through the mass media and improving the geographical accessibility of health facilities. Further research would be needed to identify other barriers to access to ANC services.

Abbreviations

ANC: Antenatal Care
ODK: Open Data Kit
WHO: World Health Organization
HIV: Human Immunodeficiency Virus

MSAS: Ministry of Health and Social Action

DHS: Demographic and Health Survey

CER: Research Ethics Committee

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] World Health Organization. Maternal mortality. [Online]. [Accessed March 3, 2022]. Available: <https://www.who.int/fr/news-room/fact-sheets/detail/maternal-mortality>
- [2] World Health Organization, United Nations Population Fund, World Bank Group, and al. Trends in maternal mortality 2000-2017. Geneva, 2019. 14p. Available: <https://iris.who.int/bitstream/handle/10665/332962/WHO-RH-R-19.23-fre.pdf?sequence=1>
- [3] World Health Organization. WHO recommendations on prenatal care to make pregnancy a positive experience. Geneva; 2017. 180p. Available: <https://iris.who.int/bitstream/handle/10665/259584/9789242549911-fre.pdf?sequence=1>
- [4] Say L, Chou D, Gemmill A, et al. Global causes of maternal death: a WHO systematic analysis. *Lancet Glob Health*; 2. Epub ahead of print 2014. [https://doi.org/10.1016/S2214-109X\(14\)70227-X](https://doi.org/10.1016/S2214-109X(14)70227-X)
- [5] World Bank. Reproductive, maternal, newborn, child and adolescent health. [Online]. [Accessed February 26, 2022]. Available: <https://www.banquemondiale.org/fr/topic/reproductivematernalchildhealth>
- [6] Hachem A. Women's reproductive health in Algeria and the Maghreb. [Doctoral thesis]. Oran, Algeria: University of Oran; 2011.
- [7] National Agency for Statistics and Development. Continuous Demographic and Health Survey (Continuous-DHS). Rockville: 2019. 206p.
- [8] Ministry of Health and Social Action. National Health and Social Development Plan (NHSDP) 2019-2028. Dakar, 2019. 134p. Available: <https://sante.gouv.sn/sites/default/files/1%20MSAS%20PNDS%202019%202028%20Version%20Finale.pdf>
- [9] Podor health district. Reaching Every Child Plan2020. Podor, 2021. 26p.
- [10] Bassoum O, Sougou NM, Ba MF, et al. Vaccination against tuberculosis, polio and hepatitis B at birth in Podor health district, Northern Senegal: cross-sectional study of vaccination coverage and its associated factors. *BMC Public Health*; 22. Epub ahead of print 1 December 2022. <https://doi.org/10.1186/S12889-022-12535-Z>

- [11] Sakeah E, Okawa S, Oduro AR, et al. Determinants of attending antenatal care at least four times in rural Ghana: analysis of a cross-sectional survey. *Glob Health Action*; 10. Epub ahead of print 2017.
<https://doi.org/10.1080/16549716.2017.1291879>
- [12] Tizazu MA, Asefa EY, Muluneh MA, et al. Utilizing a minimum of four antenatal care visits and associated factors in debre berhan town, North Shewa, Amhara, Ethiopia, 2020. *Risk Manag Healthc Policy* 2020; 13: 2783–2791.
- [13] Yasuoka J, Nanishi K, Kikuchi K, et al. Barriers for pregnant women living in rural, agricultural villages to accessing antenatal care in Cambodia: A community-based cross-sectional study combined with a geographic information system. *PLoS One* 2018; 13: 1–20.
- [14] Atnafu A, Kebede A, Misganaw B, et al. Determinants of the continuum of maternal healthcare services in northwest Ethiopia: Findings from the primary health care project. *J Pregnancy*; 2020. Epub ahead of print 2020.
<https://doi.org/10.1155/2020/4318197>
- [15] Faye SL. Open forum becoming a mother in Senegal: maternity experiences between social inequalities and failures of health services. 2008; 18: 175–183.
- [16] Niang M, Dupré S, Bédard E. The non-uptake of prenatal care in Burkina Faso. *Public Health (Paris)* 2015; 27: 405–414.
- [17] Ahinkorah BO, Seidu A, Agbaglo E, et al. Determinants of antenatal care and skilled birth attendance services utilization among childbearing women in Guinea: evidence from the 2018 Guinea Demographic and Health Survey data. 2021; 4: 1–11.
- [18] Tessema ZT, Teshale AB, Tesema GA, et al. Determinants of completing recommended antenatal care utilization in sub-Saharan from 2006 to 2018: evidence from 36 countries using Demographic and Health Surveys. *BMC Pregnancy Childbirth*; 21. Epub ahead of print 1 December 2021.
<https://doi.org/10.1186/S12884-021-03669-W>
- [19] National Agency for Statistics and Development. Continuous Demographic and Health Survey (Continuous-DHS) Tables. Rockville: 2019. 423p.
- [20] National Agency for Statistics and Development. Economic and Social Situation of Senegal in 2015. Dakar; 2018. 29p.
- [21] Ministry of Health and Social Action. Volume 5 of the health map Overview of healthcare provision and overall needs. Dakar; 2019. 398p.