International Journal of Health Economics and Policy
2025, Vol. 10, No. 1, pp. 13-24
https://doi.org/10.11648/j.hep.20251001.12

Research Article

The Contribution of a Voucher Scheme to the Antenatal Care Attendance in the Adamawa Region-Cameroon

Abdoulnassir Amadou[1, *], Njoumemi Zakariaou[1], Fadimatou Altine[2], Hafsatou Younous Diddi[3], Metogo Ntsama Junie Annick[4], Mossus Tatiana[1], Essi Marie-Jos é[1]

[1]Department of Public Health, Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde, Cameroon

[2]Department of Public Health, Faculty of Medicine and Biomedical Sciences, University of Garoua, Garoua, Cameroon

[3]Adamawa Regional Fund for Health Promotion, Ngaoundere, Cameroon

[4]Department of Obstetric Gynaecology, Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde, Cameroon

Abstract

A voucher-based health financing mechanism (health vouchers) has been implemented in Cameroon since 2015, with the aim of reducing financial inequalities in the use of services. Despite being one of the first beneficiaries in the country, the Adamawa Region (Cameroon) experienced a decline in antenatal care (ANC) attendance, which decreased from 79.5% in 2014 to 70% in 2018. Therefore, the aim of this research was to analyze the contribution of the Health Voucher scheme (HV) to ANC attendance in Adamawa-Cameroon. A quasi-experimental study (with and without voucher) was conducted with participants selected from 10 health facilities in 5 districts of the Adamawa region. A mixed method (quantitative and qualitative) was used. The number of ANCs was less than 4 among 53.4% in the HV group compared to 49.1% in the non-HV group. The gestational age at first ANC was less than 12 weeks in 8.9% and 11.1% of the HV and non-HV groups respectively, with no significant difference between groups. The determinants of low ANC attendance (<4) was the presence of a male health worker at ANC services. While marital status (single), location of health facilities in semi-urban or rural areas and qualification of providers (state nurse or midwife) contributed to improvement. The determinants of late initiation of ANC were the number of living children between 5 and 9, and the location of health facilities in semi-urban or rural areas. The health voucher scheme did not make a positive contribution to ANC attendance, nor to early initiation of ANC in the Adamawa region. The non-financial barriers identified need to be addressed.

Keywords

Contribution, Voucher Scheme, Attendance, Antenatal Care, Adamawa-Cameroon

[*]Corresponding author: abdoulnassir.amadou@fmsb-uy1.cm (Abdoulnassir Amadou)

Received: 14 February 2025; **Accepted:** 26 February 2025; **Published:** 11 March 2025

1. Introduction

Voucher financing is a form of results-based financing used in several sectors, including health, in low- and middle-income countries. It is demand-driven, which means it can be used both as an equity tool and to reduce barriers to access and increase the use of essential health services [1, 2]. In Cameroon, several mechanisms are used to pay for health services, including: (i) direct payment for care by households, (ii) government subsidies for free care, (iii) mutual health insurance schemes, (iv) private health insurance, (v) performance-based financing (PBF), and (vi) voucher-based financing through the health voucher scheme [3]. The latter, began in Cameroon with an initial phase covering the northern regions of the country (Adamawa, Far North and North), which had the worst maternal and neonatal health indicators.

This will be followed by an extension to the East and South regions in 2023, and then to the Northwest and Southwest regions in 2024, still with the aim of reducing financial inequalities, improving access to healthcare and hence reducing maternal and neonatal mortality [4, 5].

The maternal mortality ratio in Cameroon was estimated at 406 deaths per 100,000 live births (LB) in 2018, a decrease of about 48% compared to the previous 7 years, when it was 782 deaths per 100,000 LB [3, 6]. At the same time, the neonatal mortality rate fell from 31 to 28 deaths per 1000 LB [3]. However, these reductions are still insufficient to meet the third Sustainable development goal (SDG) targets of 70 per 100,000 LB for maternal mortality and 12 per 1,000 LB for neonatal mortality [3]. The difficulties in achieving these targets are closely linked to the problem of access to health care. According to the fifth Demographic and Health Survey conducted in the country in 2018, 72% of women have experienced at least one problem in accessing healthcare, with the main causes being financial difficulties (67%) and distance from the health facility (40%). These are more pronounced in the northern regions (Adamawa 72.8%; Far North 77.1% and North 80.6%) [3].

Antenatal care (ANC) attendance was estimated at 87% and 65% for at least one and four antenatal visits, respectively [3]. The lowest ANC attendance rates in the country were observed in the northern regions (with a completion rate of at least one visit of 70% in Adamawa, 72.6% in the North and 78.2% in the Far North), where the health voucher scheme has been in place for several years. In the Adamawa region in particular, ANC attendance rates have declined over the last four years, from 79.5% to 70% for ANC initiation and from 50 to 43.6% for ANC retention (based on completion of at least four ANC sessions) [3, 6]. The main aim of this study was therefore to analyse the impact of voucher funding on ANC attendance in the Adamawa region. Specifically (i) to determine attendance rates at ANC services in health facilities (HF) that participated or did not participate in the health voucher scheme, and (ii) to identify the determinants of attendance at these services.

2. Materials and Methods

2.1. Study Design

This was a quasi-experimental study of the here-and-now type (with and without health voucher) using a mixed method (quantitative and qualitative).

2.2. Study Period and Sites

The study was conducted in health facilities in the Adamawa region, selected according to certain criteria. Data were collected from 1 April 2021 to 1 April 2022.

2.3. Data Sources

The study population was divided into 2 groups according to the method of data collection:

The quantitative phase was conducted using multistage sampling. Non-probabilistic consecutive sampling was used to select primary units (health districts) and secondary units (health facilities), resulting in the inclusion of 5 districts, their duration in the voucher scheme (at least 2 years) was considered. The retained health districts were Banyo, Meiganga, Ngaoundere urban, Ngaoundere rural and Tignere. From these, 2 health facilities per health district were selected, taking into account the pre-defined comparability criteria, in particular the human resources available, the technical platform and the population covered. It should be noted that, in order to control selection bias, all health facilities included in the study (accredited or not in the voucher scheme) were also accredited by other projects related to maternal and child health, particularly the Performance Based Financing (PBF) and HIV user fees. Statistical units (ANC beneficiaries) were selected using systematic sampling.

After calculating the sample size, a total sample of 700 participants was selected for both groups (350 ANC beneficiaries from the voucher scheme group and another 350 ANC recipients from the control group not exposed to the voucher scheme). Data were collected using data collection instruments, in particular: antenatal care registers, birth registers, project outputs (registration registers, complication forms, etc).

The selection of participants for the qualitative phase was based on a reasoned selection of 6 key informants, taking in to account their experience in the programme and the level of the health pyramid at which they were located.

2.4. Study Outcomes

Low ANC attendance defined as when the number of ANCs performed was less than 4. Late initiation of ANC was defined as initiation of ANC after 12 weeks of amenorrhoea.

The determinants of ANC sought were: age, marital status, number of pregnancies, number of full-term pregnancies

(parity), number of preterm deliveries, number of abortions, number of live births, location of health facility (rural, semi-urban, urban), qualifications of staff available for ANC, gender of ANC providers, enrolment in the health voucher scheme (yes or no).

2.5. Statistical Analysis

After data were checked for completeness on the data collection forms, they were entered into Epidata software for statistical analysis using R 4.2.2.

2.5.1. Descriptive Analysis

Quantitative variables were presented as median and interquartile range as they did not follow a normal distribution. Qualitative variables were presented as numbers and frequency.

2.5.2. Bivariate Analysis

Here, variables were compared in pairs to test all potential risk factors individually. The chi-squared test or Fisher's exact probability test (where appropriate) was used to compare proportions, and the Mann-Withney test was used to compare medians. The threshold for inclusion of variables in the multivariate model was 20%.

2.5.3. Multivariate Analysis

The multiple logistic regression model was used to control for confounders using a top-down stepwise procedure to minimise the Akaike Information Criterion (AIC) metric. The significance level was set at 5%.

2.5.4. Qualitative Data Analysis

The data collected after the interview was systematically transcribed and analysed using thematic content analysis, followed by a verbatim report. Microsoft Word 2018 was used for this purpose.

3. Results

3.1. Participant Profile

The median age of participants in the Health voucher group (HV) was 23 years, with an interquartile range (IQR) of [20; 29], while in the Non-HV group it was 24 years, with an IQR of [20; 30]. Table 1 shows the profile of the beneficiaries according to their group (HV or Non-HV).

Table 1. *Profile of beneficiaries (n= 350 x 2).*

Variables	HV Group[a]		Non HV Group[b]		Total	
	Number	%	Number	%	Number	%
Age group						
[15-25]	192	54.9	182	52	374	53.4
[25-35]	119	34	115	32.9	234	33.4
[35-45]	38	10.9	51	14.6	89	12.7
[45-55]	1	0.3	2	0.6	3	0.4
Marital status						
Single	12	3.4	30	8.6	42	6
Married	338	96.6	320	91.4	658	94
Number of pregnancy						
[1-5]	245	70	242	69.2	487	69.6
[5-10]	92	26.3	96	27.4	188	26.9
[10-15]	13	3.7	12	3.4	25	3.5
Parity						
[0-5]	279	79.7	280	80	559	79.9
[5-10]	66	18.9	65	18.6	131	18.7
[10-15]	5	1.4	5	1.4	10	1.4
Number of preterm						

Variables	HV Group[a]		Non HV Group[b]		Total	
	Number	%	Number	%	Number	%
births						
[0-2]	349	99.7	345	98.6	694	99.1
[2-4]	1	0.3	5	1.4	6	0.9
Number of abortions						
[0-2]	338	96.6	337	96.3	675	96.4
[2-4]	11	3.1	11	3.1	22	3.1
[4-6]	1	0.3	2	0.6	3	0.4
Number of live birth						
[0-5]	293	83.7	284	81.1	577	82.4
[5-10]	55	15.7	63	18	118	16.9
[10-15]	2	0.6	3	0.9	5	0.7

[a]: Group of women enroll in the Health voucher scheme
[b]: Group of women not enroll in the Health voucher scheme

Most participants in both groups had between 1 and 4 pregnancies (69.6%) and parity between 0 and 4 (79.9%). It was also found that almost all had fewer than 2 preterm births (99.1%), fewer than 2 abortions (96.4%) and fewer than 5 live births (82.4%).

3.2. Use of ANC Services: Number of ANC Visits and Timing of Initiation

In the HV group, 53.4% of women had fewer than 4 ANC visits, compared with 49.1% in the non-HV group. The gestational age at the first ANC visit was less than 16 weeks in 20.9% of the HV group and 19.1% of the non-HV group. No significant differences were observed between the two groups (HV and Non-HV) in terms of number of ANC visits (p-value = 0.635) or gestational age at first ANC visit (p-value = 0.38).

In terms of the qualitative approach, most of the providers interviewed were aware of the 2016 WHO recommendations regarding the initiation of ANC (before 12 weeks) and the minimum number of 8 visits that every pregnant woman should have. However, they agreed that in practice the older recommendations were still being applied, citing reasons such as the lack of an updated national policy document and the absence of changes to data collection tools such as ANC registers, which in most cases only allowed data to be collected on 4 ANC visits.

As one source in the Adamawa Regional Health Voucher Management Office (AD-RHVMO) mentioned: *"...you know better than me that there must be guidelines for different interventions...the proof is that even the ANC register has never been updated, so if the ministry updates the standards, the project will also see how to adapt...especially if we look at the 4 other ANC visits that will be added, there is no specific assessment; we just plan another visit and follow her clinically, so it shouldn't be a huge cost...*". Another source in a health district confirmed non-adherence to the new recommendations, stating: "*Women are not aware that ANC visits have increased to 8... sometimes we are even surprised that even among health workers they say they know it's 4 and the first ANC should be done before 16 weeks...*"

Cultural habits were also highlighted, with the tradition that a woman must have her husband's permission before attending ANC causing delays and leading her to seek these services in the third trimester, despite the benefits of HV, as confirmed by this source in the AD-RHVMO: *"... the pregnant woman should go to ANC as early as possible to benefit from the services... but we find that women always go very late, which means that the old habit of going to the first ANC at 28-30 weeks has not changed... we attribute this phenomenon to culture*". Another source in the health district confirmed that the delay in initiating ANC in the second or third trimester was linked to cultural factors, but also to women's busy schedules and low awareness among health workers: "*There are many reasons for this... often it's lack of awareness; they're not informed, they think it should be done in the second trimester... also it's women's occupations; we did a survey here in the city because we were wondering why so many health facilities are close to homes... but despite the health voucher, women still go late. We found that their busy schedules were a big factor... it was even the working women, those with means, who were late... especially since they often want to hide the pregnancy in the early stages...*".

3.3. Determinants of ANC Service Use

3.3.1. Determinants of Number of ANC Visits

The proportion of patients with low ANC attendance was estimated at 51.3%. Of these, 84.7% were younger than 35 years, 30.6% had a gestational age greater than 5 years and 21.2% had a parity greater than 5. Almost all patients had fewer than 2 abortions (99.2%) and fewer than 2 premature births (97.8%). The number of living children was greater than 5 in 19% of cases. The marital status of being married was 96.1% for those with low ANC attendance and 91.8% for those with 4 or more ANC visits.

Regarding health facility data, in the low ANC attendance group, 30.3% were in semi-urban areas and 38.2% were in rural areas. The presence of at least one qualified nurse or midwife at ANC services was 78.8%. The presence of at least one male staff member at the ANC service was observed in 41.5%. Of these women with low ANC attendance, 52.1% were enrolled in the HV scheme.

Table 2. *Bivariate analysis by variables related to ANCs attendance (n=700).*

Variables	ANC [1 – 4] [c]		ANC [4 - 8] [d]		Total		p value
	Number	%	Number	%	Number	%	
Age group							
[15-25]	193	53.8	181	53.1	384	53.4	0.22
[25-35]	111	30.9	123	36.1	234	33.5	
[35-45]	53	14.8	36	10.6	89	12.7	
[45-55]	2	0.6	1	0.3	3	0.4	
Number of pregnancy							
[1-5]	249	69.4	238	69.8	487	69.6	0.99
[5-10]	97	27	91	26.7	188	26.8	
[10-15]	13	3.6	12	3.5	25	3.6	
Parity							
[0-5]	283	78.8	276	80.9	559	79.9	0.76
[5-10]	71	19.8	60	17.6	131	18.7	
[10-15]	5	1.4	5	1.5	10	1.4	
Number of preterm births							
[0-2]	356	99.2	338	99.1	694	99.1	1
[2-4]	3	0.8	3	0.9	6	0.9	
Number of abortions							
[0-2]	351	97.8	324	95	675	96.4	0.09
[2-4]	7	1.9	15	4.4	22	3.1	
[4-6]	1	0.3	2	0.6	3	0.5	
Number of live birth							
[0-5]	291	81	286	83.9	577	82.5	0.51
[5-10]	66	18.4	52	15.2	118	16.8	
[10-15]	2	0.6	3	0.9	5	0.7	
Marital status							
Single	14	3.9	28	8.2	42	6.1	0.02
Married	345	96.1	313	91.8	658	93.9	

Variables	ANC [1 – 4] [c]		ANC [4 - 8] [d]		Total		p value
	Number	%	Number	%	Number	%	
Location of health facility							
Rural	137	38.2	167	26.1	304	32.1	
Semi urban	109	30.3	85	24.9	194	27.6	0.01
Urban	113	31.5	89	49	202	40.3	
Qualifications of staff available for ANC							
Auxiliary nurse	76	21.2	48	14.1	124	17.7	
Auxiliary nurse & Nurse or Midwife	192	53.5	224	65.7	416	59.6	0.003
Auxiliary nurse & Nurse & Midwife	91	25.3	69	20.2	160	22.7	
Gender of ANC providers							
Female	210	58.5	245	71.8	455	65.1	
Male	64	17.8	46	13.5	110	15.7	<0.001
Female/ Male	85	23.7	50	14.7	135	19.2	
Enrolment in the health voucher scheme							
Yes	187	52.1	163	47.8	350	49.9	0.28
No	172	47.9	178	52.2	350	50.1	

[c]: Group of women with less than 4 ANCs
[d]: Group of women who have between 4 and 8 ANCs

At the end of the bivariate analysis, factors such as number of abortions, marital status, location of the health facility, qualifications of the staff providing ANC, and gender of the ANC provider were found to be potentially associated with low ANC attendance (with a significance threshold of 20%), as shown in Table 2.

Variables such as patient age, gestational age, parity, number of preterm births, number of abortions, number of live children and enrolment in HV were not statistically associated with the number of ANC visits.

The multiple logistic regression model was constructed after selecting variables with a p-value of less than or equal to 20% from the bivariate analysis. The selected variables were then entered into the model using a stepwise downward procedure to minimise the Akaike Information Criterion (AIC). Table 3 shows the multivariate analysis model, which isolated marital status (single) (aOR = 0.45), the presence of qualified ANC staff (nurse or midwife) (aOR = 0.40 compared to services with only auxiliary nurses) and the location of the health facility in semi-urban (aOR = 0.59) or rural areas (aOR = 0.26) as significantly associated with a reduction in low ANC attendance. The presence of male staff in ANC services was significantly associated with an increase in low ANC attendance, with a higher risk for services with only male staff (aOR = 4.98), followed by those with both male and female staff (aOR = 3.06), compared with services with only female staff.

Table 3. *Multivariate analysis associated with performing less than 4 ANCs.*

Variables	ANC [1 – 4] Number (%)	aOR[e]	CI 95%[f]	Valeur p
Number of abortions				
[0-2]*	351 (97.8)	1	-	
[2-4]	7 (1.9)	0.46	[0.17-1.15]	0.11
[4-6]	1 (0.3)	0.76	[0.03-8.68]	0.83
Marital status				

Variables	ANC [1 – 4] Number (%)	aOR[e]	CI 95%[f]	Valeur p
Married*	345 (96.1)	1	-	
Single	14 (3.9)	0.45	[0.21-0.91]	0.03
Location of health facility				
Urban*	113 (31.5)	1	-	
Rural	137 (38.2)	0.26	[0.16-0.42]	<0.001
Semi urban	109 (30.3)	0.59	[0.37-0.94]	0.03
Qualifications of staff available for ANC				
Auxiliary nurse*	76 (21.2)	1	-	
Auxiliary nurse & Nurse or Midwife	192 (53.5)	0.40	[0.24-0.66]	<0.001
Auxiliary nurse & Nurse & Midwife	91 (25.3)	0.65	[0.36-1.16]	0.15
Gender of ANC providers				
Female*	210 (58.5)	1	-	
Male	64 (17.8)	4.98	[2.88-8.74]	<0.001
Female/ Male	85 (23.7)	3.06	[1.90-4.99]	<0.001

*Reference; [c]: Group of women with less than 4 ANCs; [e]: Adjusted Odds ratio
[f]: 95% Confidence interval

3.3.2. Determinants of Gestational Age at ANC Initiation

The proportion of patients who started ANC late was 89.9%. Of these, 86.5% were under 35 years old, with gestational age and parity less than 5 in more than half (68.5% and 78.4%, respectively). The number of premature births and abortions was less than 2 in almost all cases (99.4% and 96.5% respectively). The number of living children was less than 5 in 81.1% and 93.5% were married.

In terms of health facilities attended, more than half of the women who started ANC early were in urban areas. Of those who initiated ANC late, 82.4% attended a service with qualified staff (nurse or midwife), 63.9% attended services where the providers were predominantly female and 50.6% were enrolled in the health voucher scheme. Table 4 summarises the results of the bivariate analysis.

Table 4. Bivariate analysis associated with gestational age at the first ANC visit (in weeks).

Variables	Gestational age at ANC1 [4 -12] [g]		Gestational age at ANC1 [12- 42] [h]		Total		P value
	Number	%	Number	%	Number	%	
Age group							
[15-25]	42	59.1	332	52.8	374	56	0.71
[25-35]	22	31	212	33.7	234	32.3	
[35-45]	7	9.9	82	13	89	11.4	
[45-55]	0	0	3	0.5	3	0.3	
Number of pregnancy							
[1-5]	56	78.9	431	68.5	487	73.7	0.20
[5-10]	13	18.3	175	27.8	188	23.1	

Variables	Gestational age at ANC1 [4 -12] [g]		Gestational age at ANC1 [12- 42] [h]		Total		P value
	Number	%	Number	%	Number	%	
[10-15]	2	2.8	23	3.7	25	3.2	
Parity							
[0-5]	66	93	493	78.4	559	85.7	
[5-10]	4	5.6	127	20.2	131	12.9	0.16
[10-15]	1	1.4	9	1.4	10	1.4	
Number of preterm births							
[0-2]	69	97.2	625	99.4	694	98.3	0.10
[2-4]	2	2.8	4	0.6	6	1.7	
Number of abortions							
[0-2]	68	95.8	607	96.5	675	96.2	
[2-4]	3	4.2	19	3	22	3.6	0.62
[4-6]	0	0	3	0.5	3	0.2	
Number of live birth							
[0-5]	67	94.4	510	81.1	577	87.7	
[5-10]	3	4.2	115	18.3	118	11.3	0.04
[10-15]	1	1.4	4	0.6	5	1	
Marital status							
Single	1	1.4	41	6.5	42	3.9	0.11
Married	70	98.6	588	93.5	658	96.1	
Location of health facility							
Rural	26	36.6	278	44.2	304	40.4	
Semi urban	8	11.3	186	29.6	194	20.5	<0.001
Urban	37	52.1	165	26.2	202	39.1	
Qualifications of staff available for ANC							
Auxiliary nurse	13	18.3	111	17.6	124	17.9	
Auxiliary nurse & Nurse or Midwife	45	63.4	371	59	416	61.2	0.63
Auxiliary nurse & Nurse & Midwife	13	18.3	147	23.4	160	20.9	
Gender of ANC providers							
Female	53	74.6	402	63.9	455	69.2	
Male	0	0	110	17.5	110	8.8	<0.001
Female/ Male	18	25.4	117	18.6	135	22	
Enrolment in the health voucher scheme							
Yes	32	45.1	318	50.6	350	47.9	0.45
No	39	54.9	311	49.4	350	52.1	

[g]: Group of women who started ANC before the 12th week of amenorrhea
[h]: Group of women who started ANC at 12 weeks of amenorrhea and more

This bivariate analysis associated with the timing of ANC initiation identified factors such as parity, number of preterm births, number of living children, marital status, location of health facility and gender of provider as potentially associated (at the 20% threshold) with delay in ANC initiation.

The multiple logistic regression model constructed after including all 7 variables with a 20% significance threshold (following the bivariate analysis) and applying a stepwise downward procedure resulted in a model with 4 independent variables and a better AIC (411) as shown in Table 5.

Table 5. *Multivariate analysis associated with late initiation of ANC (in weeks).*

Variables	Gestational age at ANC1 [12- 42] [h] Number (%)	aOR[e]	CI 95%[f]	P value
Number of live birth				
[0-5]*	510 (81.1)	1	-	
[5-10]	115 (18.3)	4.92	[1.76-20.59]	0.008
[10-15]	4 (0.6)	0.85	[0.12-17]	0.89
Marital status				
Married*	588 (93.5)	1	-	
Single	41 (6.5)	3.99	[0.80-72.63]	0.18
Location of health facility				
Urban*	165 (26.2)	1	-	
Rural	278 (44.2)	1.96	[1.03-3.91]	0.04
Semi urban	186 (29.6)	6.55	[2.85-16.97]	<0.001
Gender of ANC providers				
Male*	110 (17.5)	1	-	
Female	402 (63.9)	8.34×10^{-8}	$[1.45 \times 10^{-99}$- $2.42 \times 10^{3}]$	0.98
Female/ Male	117 (18.6)	3.95×10^{-8}	$[1.54 \times 10^{-102} – 3.78 \times 10^{2}]$	0.98

***** Reference

[h]: Group of women who started ANC at 12 weeks of amenorrhea and more.

The results showed that compared to women with less than 5 live births and those attending services in urban areas, women with 5 to 9 live births (aOR = 4.92) and those attending services in semi-urban (aOR = 6.55) or rural areas (aOR = 1.96) were significantly more likely to initiate ANC late.

4. Discussion

4.1. Profile of Beneficiaries

Patients aged between 15 and 24 years were the most represented in the two groups (HV and non-HV), with a gradual decrease with increasing age. This could be explained by the fact that this age group is the most represented in the general population of women of childbearing age in Cameroon, and by the fact that fertility decreases with age. Almost the entire sample was made up of married women (94%), which could be explained by the cultural reasons in force in this part of the country, which advocate giving birth within marriage. More than half of the sample (69.6% and 79.9% respectively) had a parity of less than 5, with an average of 2.3 living children. This is lower than national data from the 2018 Demographic and Health Survey [3], which found an overall average fertility of 5.8 children per woman in Adamawa. The number of preterm births and the number of abortions were between 0 and 1 for almost all patients in the two groups (99.1% and 96.4% respectively).

The comparison of each of these variables between the HV and non-HV groups was almost identical, which could be explained by the fact that the sample of the 2 groups was drawn from the population of the same health districts.

4.2. Use of ANC Services

The HV scheme was set up with the ultimate aim of increasing demand for services by reducing pre-existing financial difficulties; it did not have the desired effect, as low attendance at ANC services (< 4 ANC) was observed more in

the HV group (53.4%) than in the non-HV group (49.1%), and also a low proportion of early initiation of ANC (before 12 weeks of amenorrhea) in the two groups, more marked in the HV group (8.9%) than in the non-HV group (11.1%), although the differences observed were not significant. These data are slightly higher (but still low) if we consider those who started ANC before 16 weeks of amenorrhea (SA), i.e. 20.8% and 19.1% respectively, although the difference is still not significant. This remains lower than the proportion observed in this region (term considered 16 SA), which was 36.6% in 2014 according to the Household Cluster Survey (MICS-2014), and also lower than the national average, which was 41.3% according to the EDS-2018 [3, 7]. This results can be explained by a number of factors, in particular the fact that the HV scheme reimburses only 4 ANCs, as previously recommended by the WHO, and has not adapted the package of services reimbursed to the new recommendations of 2016 [8], which advocate a minimum of 8 ANCs, with the first one before the 12th week of pregnancy. Other factors could be added to this, namely: the lack of an updated national normative document validating the country's move to 8 ANC, the non-harmonization of data collection tools (ANC register limited to 4 ANC) and the practice of systematic enrolment in some health facilities in the region, which could be restrictive for beneficiaries rather than voluntary adherence out of conviction. Given that vouchers are also financing mechanisms that aim to guarantee equity [9], this mixed result of the HV scheme can also be attributed to the lack of vertical equity in its implementation in the country, as well as in some other countries. This is due to the fact that the target of the project is defined in relation to a demographic characteristic, which in this case is pregnant women, and does not take into account the economic level of the beneficiaries, or even the poverty of some of them, by making the enrolment conditional on the prior payment of the sum of 6,000 CFA francs (around €9); this does not help to remove the financial barrier for households that are unable to raise this sum.

Our findings are supported by a study conducted by the World Bank in Kampala, Uganda, in 2016, which found a non-significant difference between the group enrolled in a voucher-based financing mechanism and a control group that was not enrolled in terms of completing at least 4 ANC and postnatal visits [10]. This contradicts another study conducted in Bangladesh, which found a significant difference, with 46% of the group enrolled in this programme completing at least 4 ANC compared to 24% of the non-enrolled group [11]. However, a systematic review of 22 demand-side financing programmes, including conditional cash transfers, unconditional cash transfers, short-term cash transfers (to offset costs) and vouchers for maternal health commodities and services in 20 countries in Latin America, Asia and sub-Saharan Africa, found that these financing mechanisms can increase the use of specific maternal health services, such as ANC, skilled attendance at delivery and postnatal care (in the case of vouchers). However, the effects appear to be programme- and context-specific and may depend on a combination of barriers and facilitators related to either the social environment or the health system in which they are implemented [12].

This would suggest, in the light of all the above elements, that the financial barrier may not be the only barrier to ANC service uptake, and that there is a need to explore other factors that may influence uptake.

4.3. Determinants of the Use of ANC Services

4.3.1. Determinants of ANC Service Uptake

In order to reduce maternal and neonatal mortality, pregnant women should adopt good practices regarding early initiation of ANC (before 12 weeks' gestation) and having at least 8 ANC as recommended by WHO [8]. According to the 2018 Demographic and Health Survey, the financial barrier was the main cause (67%) of the barrier to access to health care reported by women of reproductive age in Cameroon; however, it was accompanied by other factors likely to contribute to low attendance at maternal health services [3].

According to the data collected (both quantitative and qualitative), the use of ANC services in the region studied was determined by several factors, independent of HV scheme enrolment, which could be either related to the patients or their families, or to the infrastructure (health facilities and health workers), or to the quality of the services provided. The quantitative data showed that the quality of staff, particularly the availability of auxiliary nurses in conjunction with nurses or midwives in the ANC service, the location of the health facility in a semi-urban or rural area, and marital status (single) were significantly associated with a reduction in low ANC attendance. This may be explained by the implementation of other financing mechanisms, particularly performance-based financing (PBF), which places a premium on ANC being provided by nurses or midwives, and also by the fact that the latter have a higher level of knowledge and skills than auxiliary nurses, which can guarantee a better quality of service. It was also noted that single women are more autonomous in their decision making than married women. Regarding the location of health facilities, those located in semi-urban or rural areas were more likely to provide antenatal care as part of an advanced outreach strategy in certain remote localities and thus achieved better results in terms of the number of ANCs provided than health facilities located in urban areas. On the other hand, the presence of male providers was significantly associated with an increase in low ANC attendance, with a higher risk in facilities with only male staff (aOR=4.98) compared to those with staff of both sexes (aOR=3.06). This may be due to cultural considerations in the region that discourage seeking advice or care from a provider of the opposite sex. Our findings were very similar to those in Ivory Coast in a qualitative study that include community leaders, traditional healers or matrons, pregnant women or women of childbearing age, and men with children under 5 years of age; which identified barriers to the use of reproductive, maternal, new-

born, child, adolescent and nutritional health services (RMNCA+N) as the unavailability of certain equipment or facilities, disrespectful care in certain RMNCA+N services, women's lack of financial and/or decision-making autonomy, and the presence of male providers. The following factors have been identified as contributing to improved use of these services: geographical accessibility of health facilities, involvement of men in raising awareness, and involvement of health workers and community health workers in raising awareness among the population through home visits [13].

4.3.2. Determinants of Gestational Age at ANC Initiation

With regard to late initiation of ANC, the number of live children between 5 and 9 (compared to those with less than 5 live children) and the location of the health facility in a semi-urban or rural area (compared to health facilities in urban areas) were identified as determinants that contributed significantly to its increase. This could be explained by the fact that women with more living children (between 5 and 9) have had several pregnancies and are therefore more careless about initiating ANC early than their counterparts with fewer than 5 living children. In addition, women living in semi-urban or rural areas would be more attached to cultural beliefs that favour concealment of pregnancy in the first trimester.

Some of these elements were also highlighted in the literature review by Sumera Aziz et al on factors influencing ANC service uptake, which showed that maternal age, number of living children, education level, place of residence, occupation, religion and ethnicity were significantly associated with ANC service uptake [14]. However, these factors may be influenced by context, as shown in the cross-sectional study conducted in 4 sub-Saharan African countries, namely Zambia, Nigeria, Mali and Guinea. In Mali, the determinant associated with early initiation of ANC was the availability of money for treatment (aOR = 1.38, 95% CI = 1.03-1.92); in Guinea, it was the spouse's permission to go to the health facility (aOR = 1.62, 95% CI = 1.15-2.33). In addition, in Nigeria, women did not consider the prior availability of money for their care to be a major problem (aOR = 1.38, 95% CI = 1.11-1.73). In contrast, in Guinea, Zambia and Mali, getting spousal permission to go to the health facility, financial availability, distance to the health facility and wanting to be accompanied were not barriers to having the required number of ANC (at least 8) [15].

5. Limitations of the Study

The limitations of this study were that the cross-sectional nature of the data collected did not allow for causality to be established, and that the study only considered the determinants of ANC attendance found in the registries or mentioned by key informants.

6. Conclusion

At the end of this research, which aimed to determine the contribution of health voucher scheme to the uptake of ANC services in the Adamawa region. This showed that the HV did not make a positive contribution to improving the number of ANC visits or early initiation of ANC in the Adamawa region. The determinants of low ANC attendance (less than 4 ANCs performed) were identified as ANC being performed by male health workers. While the provision of 4 or more ANCs was conditioned by: the presence in the facility of auxiliary nurses associated with either nurses or midwives (compared to facilities with only auxiliary nurses), single marital status (compared to married women), and the location of the health facility in a semi-urban or rural area (compared to health facilities in urban areas). In addition, the number of living children between 5 and 9 (compared to women with fewer than 5 living children) and the location of the health facility in a semi-urban or rural area (compared to those in an urban area) significantly contributed to late initiation of ANC (after 12 weeks' gestation).

Abbreviations

AIC	Akaike Information Criterion
ANC	Antenatal Care
AD-RHVMO	Adamawa Regional Health Voucher Management Office
HV	Health Voucher
LB	Live Birth
PBF	Performance-based Financing
RMNCA+N	Reproductive, Maternal, Newborn, Child, Adolescent and Nutritional Health Services

Acknowledgments

Our sincere thanks go to the managers and health staff of the Adamawa Regional Public Health Delegation (AD-RPHD), the Adamawa Regional Health Promotion Fund (AD-RHPF), the Adamawa Regional Health Voucher Management Office (AD-RHVMO) and the management teams of the Banyo, Meiganga, Ngaoundere urban, Ngaoundere rural and Tignere health districts.

Ethical Approval and Consent to Participate

The research protocol was submitted to and approved by the Institutional Ethics Committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé 1 (reference N° 0211/UY1/FMSB/VDRC/DAASR/CSD) and the Adamawa Regional Public Health Delegation. Data collected from pregnant women in the registers were anonymous, and the participation of key informants in the research was subject to their free and informed consent.

Author Contributions

Abdoulnassir Amadou: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft, Writing – review & editing

Njoumemi Zakariaou: Conceptualization, Data curation, Investigation, Methodology, Project administration, Resources, Writing – original draft

Fadimatou Altine: Formal Analysis, Funding acquisition, Resources, Visualization, Writing – review & editing

Hafsatou Younous Diddi: Data curation, Investigation, Visualization, Writing – original draft

Metogo Ntsama Junie Annick: Visualization, Writing – review & editing

Mossus Tatiana: Conceptualization, Visualization, Writing – review & editing

Essi Marie-José Conceptualization, Investigation, Methodology, Project administration, Software, Visualization, Writing – original draft, Writing – review & editing

Funding

This work is not supported by any external funding.

Data Availability Statement

The data is available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Diane McIntyre. Learning from Experience: Health care financing in low an middle-income countries. Glob Forum Health Res. June 2007; p 1-7. Available from: https://www.files.ethz.ch/isn/48554/2007-06%20Health%20care%20financing.pdf

[2] Grignon M. The financing of the health system and mandatory-voluntary sharing: A knowledge review. French Review of Social Affairs. 9 février 2011; (4): 53-73. https://doi.org/10.3917/rfas.104.0053

[3] National Institute of Statistics (Cameroon) and ICF. 2020. 2018 Cameroon Demographic health and surveys. Yaounde/Rockville - Maryland: INS et ICF; 2018. Available from: https://dhsprogram.com/pubs/pdf/FR360/FR360.pdf (accessed 15/12/2023).

[4] Cameroon Ministry of public health. Updated health voucher operational programming document. Yaounde; MINSANTE; 2020.

[5] Cameroon Ministry of public health. Universal Health Coverage phase 1: Procedures Manual. Yaounde; MINSANTE; 2023.

[6] World Health organisation. Tracking 100 core health indicators in Cameroon in 2019 & SDG Focus. Yaounde Cataloguing-in-publication (CIP) data. Available at: https://www.minsante.cm/site/sites/default/files/Tracking%20100%20Core%20HealthIndicators%20%20in%20Cameoon%20in%202019%20%26%20SDG%20%20Focus-En.pdf (accessed 15/12/2023).

[7] National Institute of Statistics. Cameroon Multiple Indicator Cluster Survey 2014 (MICS5), 2014, Final report. Yaounde, Cameroon, NIS; 2015. Available from: https://mics.unicef.org/sites/mics/files/2024-08/Cameroon%202014%20MICS%20KFR_French.pdf (accessed 16/12/2023).

[8] World Health Organisation. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: WHO; 2016. Available from: https://iris.who.int/handle/10665/250796 (accessed 19/12/2023).

[9] Elaine P Menotti, Marguerite Farrell. Vouchers: A hot ticket for reaching the poor and other special groups with voluntary family planning services. Global Health: Science and Practice 2016; 4(3): 384-393. https://doi.org/10.9745/GHSP-D-16-00084

[10] Francis Obare, Peter Okwero, Leslie Villegas, Samuel Mills, Ben Bellows. Increased Coverage of Maternal Health Services among the Poor in Western Uganda in an Output-Based Aid Voucher Scheme. Policy Research Working Paper 7709. June 2016. Available from: https://papers.ssrn.com/abstract=2811357 (accessed 19/12/2023).

[11] Sultana N, Hossain A, Das H, Pallikadavath S, Koeryaman M, Rahman M, et al. Is the maternal health voucher scheme associated with increasing routine immunization coverage? Experience from Bangladesh. Front Public Health. February 2023. https://doi.org/10.3389/fpubh.2023.963162

[12] Hunter BM, Harrison S, Portela A, Bick D. The effects of cash transfers and vouchers on the use and quality of maternity care services: A systematic review. PLoS ONE. 2017. https://doi.org/10.1371/journal.pone.0173068

[13] Agbré-Yacé ML, Kourouma KR, Doukouré D, Ndia FA, Kpébo D, Koumi-Médèdje MD, et al. Barriers and facilitators to the use of reproductive health services in Ivory Coast: A qualitative community study. Santé Publique. 12 oct 2023; Vol. 35(3): 297-306. https://doi.org/10.3917/spub.233.0297

[14] Sumera Aziz Ali, Aftab Ahmed Dero, Savera Aziz Ali, Gulshan Bano Ali. Factors affecting the utilization of antenatal care among pregnant women: A literature review. J Preg Neonatal Med. 2018 October; 2(2): 41-45. https://doi.org/10.1186/s12884-020-03009-4

[15] Ahinkorah. B. O, Ameyaw. E. K, Seidu. AA, Odusina. E. K, Keetile. M, Yaya. S. Examining barriers to healthcare access and utilization of antenatal care services: evidence from demographic health surveys in sub-Saharan Africa. BMC Health Serv Res. 2021. https://doi.org/10.1186/s12913-021-06129-5