



Article

Factors Influencing the Utilization of Antenatal Services among Women of Childbearing Age in South Africa

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Abstract: Access to quality care before, during, and after childbirth remains an effective means of reducing maternal and neonatal mortality. Therefore, the study identified factors influencing the utilization of prenatal care services among women of childbearing age in South Africa. This is a retrospective study based on secondary data from the South African Demographic Health Survey (DHS) conducted from 1998 to 2016. In South Africa, 21.0% of mothers had used ANC services. Higher odds of seeking prenatal care were found in women aged 35 years and older (cOR = 1.26, 95% CI; 1.08–1.47, $p = 0.003$), married or cohabiting (cOR = 1.13, 95% CI; 1.004–1.27) observed, $p = 0.043$), higher level of education (tertiary education: cOR = 0.55, $p = 0.001$), female residents in urban areas (cOR = 1.35, 95% CI; 1.20–1.52, $p = 0.001$), higher wealth index (cOR = 1.32, 95% CI; 1.15–1.51, $p = 0.001$), employed (cOR = 1.48, 95% CI; 1.29–1.70, $p = 0.001$) and media exposure (cOR = 1.27, 95% CI; 1.12–1.44), $p = 0.001$). The findings of this study provide insight into the need to make maternal health services more accessible, more widely used, and of a higher quality. This requires effective strategic policies that promote patronage to reduce maternal mortality and improve newborn outcomes in South Africa.

Keywords: antenatal care utilization; antenatal care services; South Africa; maternal health



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1. Introduction

Antenatal care (ANC) is an important factor in reducing maternal morbidity and mortality in pregnant women and in achieving a positive pregnancy experience [1–3]. The essence of this care pathway is to make sure that the health of both the unborn child and the pregnant mother is safe by monitoring the progress of the pregnancy vis-a-vis expected indicators for a normal pregnancy. Access to ANC gives a pregnant woman the opportunity to benefit from care services including health promotion, screening and diagnosis, and disease prevention, required to maintain normalcy and for timely identification of abnormalities that can pose a risk to the life of her unborn child and herself. Unfortunately, many women in developing countries do not have access to such services [1,4].

According to the South African Demographic Health Survey [5], there are approximately 536 prenatal deaths per 100,000 in South Africa. It shows that for every 1000 live births, five (5) women died during pregnancy. A higher proportion of women in South Africa receive prenatal care, also known as antenatal care (ANC) from healthcare professionals; doctors (18%), nurses or midwives (70%). Only a small fraction (2%) are cared for by traditional birth attendants, while 10% receive no prenatal care [5]. The benefits of ANC cannot be overstated, particularly when it comes to reducing maternal and prenatal

morbidity and mortality. Maternal morbidity refers to any health condition attributed to, or aggravated by, pregnancy and childbirth that negatively affects the woman's well-being [6,7].

WHO recommendations prior to 2016 call for at least four ANC visits [8] where a pregnant woman receives focused ANC, if eligible. Currently, a pregnant woman needs at least eight visits [9] to receive any significant evidence-based interventions. The South African Department of Health has classified the appropriate ANC based on the WHO criteria above. If a pregnant woman made at least four and eight visits between April 2006 and April 2017, she was considered booked or received an appropriate ANC. A 2.4% increase in the percentage of South African women who participated in at least four ANC visits from 1998 to 2016 was documented by Global Health data [10,11].

During this period, South Africa recorded 150 maternal deaths per 100,000 live births in 1998 [12] and 119 deaths in 2017 [13]. Despite the observed improvement, the country is far below the required 70 deaths per 100,000 live births to meet the Sustainable Development Goals (SDG) 3.1 [14]. Moreover, the rate of skilled delivery use, a predictor of Maternal Mortality Rate (MMR) in the country increased from 84% in 1998 to 97% in 2016 [15]; although, Bobo et al. [16] reported a higher rate of 96.7 percent. When it comes to pregnant women's health, adequate ANC services are essential.

It has been observed that increasing access to skilled attendants, which has a close link to ANC, emergency obstetric care, and family planning services can significantly reduce maternal mortality in low-income settings such as South Africa [17–19]. Despite the obvious importance of maternity care, including ANC, poor access to and utilization of such services remains an important determinant of maternal mortality and morbidity worldwide [11,17].

Previous research has shown a link between ANC utilization and accessibility, socio-demographic factors, knowledge, and the quality of care provided [20–22], but the extent to which these factors influence ANC utilization has not been adequately documented in the region of South Africa. Consequently, this study investigated the critical factors that influence the utilization of ANC and other maternal health services between the years 1998 and 2016 among women of reproductive age in South Africa. The insights provided by this study will further help to shape the strategic policy that South Africa will use to reduce the number of maternal deaths and improve neonatal outcomes.

2. Results

2.1. Characteristics of Maternal Household Factors of Women within Reproductive Age in South Africa

As shown in Table 1, of the 67,645 women included in the analysis, 77.5% were para 1–2, 12% were equally nulliparous, and para ≥ 3 . Timing of ANC (in months) was more among those that have attended between 3–6 months (72.2%), followed by <3 months (17.4%). Almost three-quarters (72.2%) had their first ANC visit between 3–6 months of pregnancy, and slightly above one-sixth (17.4%) attended before three months. More participants resided in the urban area (56.6%), compared to rural (43.4%). The provinces with the most participants were Gauteng (23.5%), Kwazulu-Natal (19.7%), Limpopo (12.6%), and Eastern Cape (12.5%).

Table 1. Characteristics of women within reproductive age in South Africa and factors influencing the use of antenatal care among them ($n = 67,645$).

Variables	Weighted Frequency	Weighted %
Socio-demographics		
Age (years)		
15–24	20,933	30.9
25–34	31,531	46.6

Table 1. Cont.

Variables	Weighted Frequency	Weighted %
35+	15,181	22.4
Marital Status		
Married/Co-habiting	33,683	49.8
Single	33,962	50.2
Educational Level		
No Education	3542	5.2
Primary	12,505	18.5
Secondary	45,612	67.4
Tertiary	5986	8.8
Race		
Black/African	58,172	86.3
White	2256	3.3
Colored	5692	8.4
Indian/Asian	1261	1.9
Obstetric and Household Factor		
Parity		
Nulliparity	7833	11.6
Para 1–2	52,397	77.5
Para ≥ 3	7415	11.5
Timing of ANC (months) ($n = 64,463$) ^γ		
<3	11,217	17.4
3–6	46,549	72.2
6+	6697	10.4
Place of Residence		
Urban	38,295	56.6
Rural	29,350	43.4
Province		
Gauteng	15,928	23.5
Kwazulu-Natal	13,344	19.7
Limpopo	8540	12.6
Eastern Cape	8429	12.5
Mpumalanga	5811	8.6
Western Cape	5624	8.3
North West	52,928	7.7
Free State	3471	5.1
Northern Cape	1286	1.9
Economic Status		
Wealth Index		
Poorest	12,177	18.0
Poorer	15,762	23.3
Middle	15,430	22.8

Table 1. *Cont.*

Variables	Weighted Frequency	Weighted %
Richer	13,007	19.2
Richest	11,269	16.7
Employment Status (<i>n</i> = 65,646) ^γ		
Employed	20,095	30.6
Not employed	45,551	69.4
Own a Car/Truck (<i>n</i> = 66,442) ^γ		
Yes	15,226	22.9
No	51,216	77.1
Own a Motorcycle/Scooter (<i>n</i> = 66,381) ^γ		
Yes	1094	1.6
No	65,287	98.4
Own a Bicycle (<i>n</i> = 66,442) ^γ		
Yes	9420	14.2
No	57,022	85.8
Own a refrigerator (<i>n</i> = 66,336) ^γ		
Yes	39,090	58.93
No	27,246	41.07
Has Electricity (<i>n</i> = 66,417) ^γ		
Yes	45,578	71.6
No	18,839	28.4
Media Exposure factor Own a Television (<i>n</i> = 66,371) ^γ		
Yes	45,720	68.89
No	20,651	31.11
Own a Radio (<i>n</i> = 66,344) ^γ		
Yes	43,316	65.29
No	23,028	34.71
Watches TV everyday/week (<i>n</i> = 67,220) ^γ		
Yes	42,755	63.6
No	24,465	36.4
Listens to Radio everyday/week (<i>n</i> = 67,507) ^γ		
Yes	41,424	61.4
No	26,083	38.6
Reads newspaper regularly (<i>n</i> = 67,491) ^γ		
Yes	24,595	36.9
No	42,595	63.1
Health Institution factor Getting permission to go to the Health facility (<i>n</i> = 14,768) ^γ		
Not a big Problem	12,828	86.9

Table 1. Cont.

Variables	Weighted Frequency	Weighted %
Big Problem	1940	13.1
Getting money to go to the Health facility for treatment ($n = 14,768$) ^Y		
Not a big Problem	10,665	72.2
Big Problem	4103	27.8
Distance to Health facility ($n = 14,768$) ^Y		
Not a big Problem	11,459	77.6
Big Problem	3309	22.4
Not wanting to go to the Health facility alone ($n = 14,768$) ^Y		
Not a big Problem	12,989	88.0
Big Problem	1779	12.0

^Y indicated variables with missing data.

2.2. Characteristics of Women within Reproductive Age in South Africa and Factors Influencing the Use of Antenatal Care among Them

The study analyzed the DHS data of 67,645 women, across South Africa. The majority of the participants (46.6%) were within the age 25–34; 30.9% were within 15–24 years; and 22.4% were 35 years and above. Almost half of the participants (49.8%) were married, and 50.2% were single. Those who have completed secondary education were more with 67.4%, followed by those who have completed primary education (18.5%). Black/ African descent was the majority with 86.3%, followed by those of Colored descent (8.4%), White (3.3%), and Indian/ Asian (1.9%). Among the women included in the analysis, 77.5% had 1 or 2 parities, 11.6% were nulliparous, and those with 3 or more parities were 11.5%. Almost three-quarters (72.2%) had their first ANC visit between 3 and 6 months of pregnancy while slightly above one-sixth (17.4%) attended before three months. More participants resided in the urban area (56.6%), compared to rural (43.4%) and the provinces with the most participants were Gauteng (23.5%), Kwazulu-Natal (19.7%), Limpopo (12.6%), and Eastern Cape (12.5%) as shown in Table 1.

As shown in Figure 1, the overall prevalence of Utilization of Antenatal care services among women of reproductive age in SA was 79%.

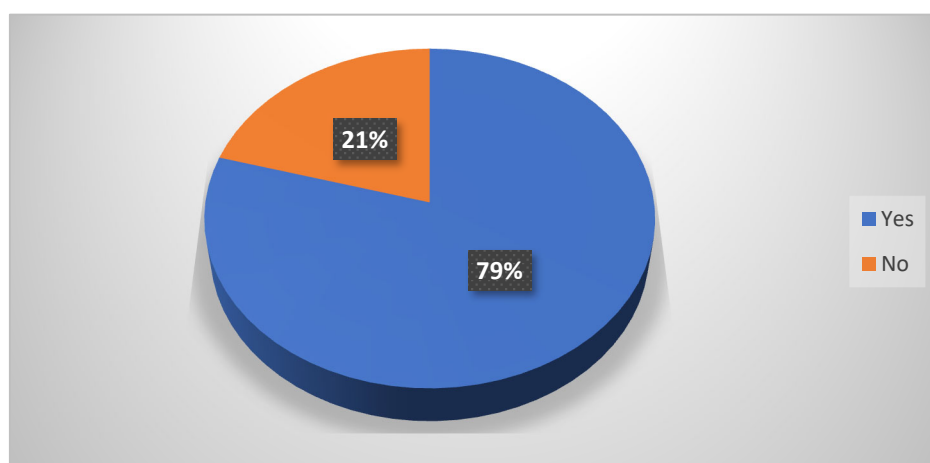


Figure 1. Utilization of Antenatal care services among women of reproductive age in South Africa.

As shown in Figure 2, the prevalence of Utilization of Antenatal care services among women of reproductive age in SA was statistically significantly highest in the province of Western Cape (88.6%), followed by Kwazulu-Natal (82.8%), Northern Cape (81.6%) and Northwest (80.5%) ($\chi^2 = 81.47, p = 0.001$).

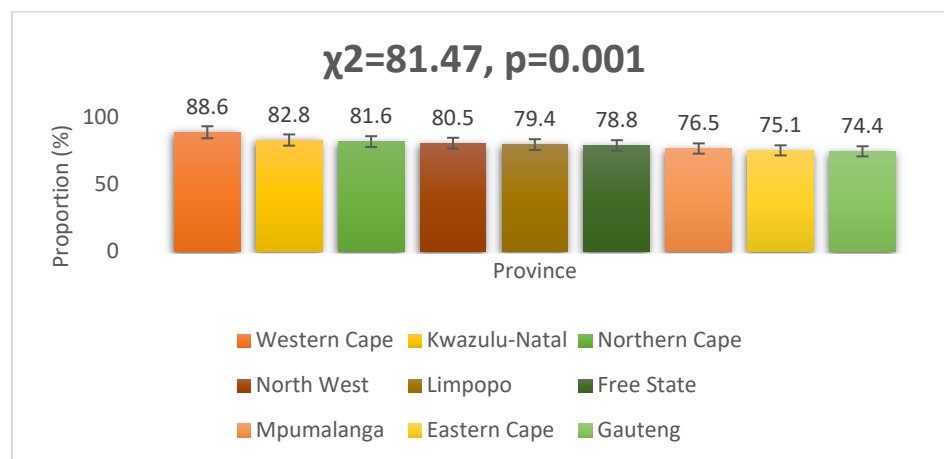


Figure 2. Utilization of Antenatal care by women of reproductive age in SA stratified by province.

Women in the poverty band of the wealth index were the majority (41.3%), those in the middle wealth index were 22.8% and barely one-third belonged to the rich band (35.9%). The majority were not employed (69.4%), and 77.1% neither owned a car, a motorcycle/scooter (98.4%), nor a bicycle (85.8%). A little over half owned a refrigerator (58.93%), and most had electricity (71.6%). Barely two-thirds owned a television (68.89%), a radio (65.29%), watched TV every day/week (63.6%), and listened to the radio every day/week (61.4%) and 36.9% read newspapers regularly. The overwhelming majority of the women had no problem getting permission (86.9%) and money (72.2%) to visit the health facility for treatment; had no problem with the distance to the health facility (77.6%); and had no problem going to the health facility alone (88.0%), as seen in Table 1.

As shown in Figure 1, the overall prevalence of the Utilization of Antenatal care services among women of reproductive age in SA was 79%.

As shown in Figure 2, the prevalence of the Utilization of Antenatal care services among women of reproductive age in SA was statistically significantly highest in the province of Western Cape (88.6%), followed by Kwazulu-Natal (82.8%), Northern Cape (81.6%) and North West (80.5%) ($\chi^2 = 81.47, p = 0.001$).

As shown in Table 2, the utilization of antenatal care varied across socio-demographic variables. Statistically significant higher prevalence of utilization of antenatal care was observed among those between 25 and 34 years in age ($p = 0.038$); married or cohabiting ($p = 0.001$); had a tertiary level of education ($p = 0.001$), and of the Indian/Asian race ($p = 0.001$). For obstetric and household factors, a significantly higher prevalence of utilization of antenatal care was observed among para 1–2 ($p = 0.001$), attended antenatal <3 months ($p = 0.001$), reside in the urban ($p = 0.004$), and the Western Cape Province ($p = 0.001$). Considering economic status, utilization of antenatal care has statistical significance for those in the richest wealth index ($p = 0.003$), are employed ($p = 0.001$), own a car ($p = 0.004$), own a motorcycle/scooter ($p = 0.001$), own a bicycle ($p = 0.032$), own a refrigerator ($p = 0.001$) and have electricity ($p = 0.001$). Moreover, there was statistically significant higher prevalence of utilization of antenatal care among those who own a television ($p = 0.001$), own a radio ($p = 0.001$), watches television every day/week ($p = 0.001$), listens to the radio every day/week ($p = 0.038$) and reads newspaper regularly ($p = 0.039$) under the media exposure factor. However, no statistically significant association was observed between health institutional factors and the utilization of antenatal care ($p > 0.05$).

Table 2. Associated factors for utilization of antenatal care services.

Variables	Utilization of Antenatal Care Services Weighted Freq (%)		Total	Chi-Square, <i>p</i> -Value
	Yes <i>n</i> = 53,726	No <i>n</i> = 13,919		
Socio-Demographics				
Age (Years)				
15–24	16,283 (77.8)	4650 (22.2)	20,933(100.0)	$\chi^2 = 10.12$, <i>p</i> = 0.038
25–34	25,570 (81.1)	5961 (18.9)	31,531(100.0)	
35+	11,873 (78.2)	3308 (21.8)	15,181(100.0)	
Marital Status				$\chi^2 = 20.37$, <i>p</i> = 0.001
Married/Co-habiting	26,990(80.1)	6693 (19.9)	33,683 (100.0)	$\chi^2 = 33.78$, <i>p</i> = 0.001
Single	26,736(78.7)	7226 (21.3)	33,962 (100.0)	
Educational Level				
No Education	2611 (73.7)	931 (26.3)	3542 (100.0)	$\chi^2 = 44.38$, <i>p</i> = 0.001
Primary	9728 (77.8)	2777 (22.2)	12,505 (100.0)	
Secondary	36,140 (79.2)	9472 (20.8)	45,612 (100.0)	
Tertiary	5247 (87.7)	739 (12.3)	5986 (100.0)	$\chi^2 = 29.59$, <i>p</i> = 0.001
Race				
Black/African	45,504 (78.2)	12,668 (21.8)	58,172 (100.0)	
White	1952 (86.5)	304 (13.5)	2256 (100.0)	$\chi^2 = 984.32$, <i>p</i> = 0.001
Colored	4921 (86.5)	771 (13.5)	5692 (100.0)	
Indian/Asian	1179 (93.5)	82 (6.5)	1261 (100.0)	
Obstetric and Household factor				
Parity				
Nulliparity	5852 (74.7)	1981 (25.3)	7833 (100.0)	$\chi^2 = 8.21$, <i>p</i> = 0.004
Para 1–2	42,373 (80.9)	10,024 (19.1)	52,397 (100.0)	
Para ≥ 3	5501 (74.2)	1914 (25.8)	7415 (100.0)	
Timing of ANC (months)				$\chi^2 = 81.47$, <i>p</i> = 0.001
<3	10,881 (97.0)	336 (3.0)	11,217 (100.0)	$\chi^2 = 81.47$, <i>p</i> = 0.001
3–6	39,923 (85.8)	6626 (14.2)	46,549 (100.0)	
6+	2804 (41.9)	3893 (58.1)	6697 (100.0)	
Place of Residence				
Urban	30,565 (79.8)	7730 (20.2)	38,295 (100.0)	$\chi^2 = 81.47$, <i>p</i> = 0.001
Rural	23,161 (78.9)	6189 (21.1)	29,350 (100.0)	
Province				
Western Cape	4981 (88.6)	643 (11.4)	5624 (100.0)	$\chi^2 = 81.47$, <i>p</i> = 0.001
Eastern Cape	6334 (75.1)	2095 (24.9)	8429 (100.0)	

Table 2. Cont.

Variables	Utilization of Antenatal Care Services Weighted Freq (%)		Total	Chi-Square, <i>p</i> -Value
	Yes <i>n</i> = 53,726	No <i>n</i> = 13,919		
Northern Cape	1049 (81.6)	237 (18.4)	1286 (100.0)	
Free State	2734 (78.8)	737 (21.2)	3471 (100.0)	
Kwazulu-Natal	11,055 (82.8)	2289 (17.2)	13,344 (100.0)	
North West	4195 (80.5)	1017 (19.5)	5212 (100.0)	
Gauteng	11,856 (74.4)	4072 (25.6)	15,928 (100.0)	
Mpumalanga	4446 (76.5)	1365 (23.5)	5811 (100.0)	
Limpopo	7076 (82.9)	1464 (17.1)	8540 (100.0)	
Economic Status Wealth Index				$\chi^2 = 25.11$, <i>p</i> = 0.003
Poorest	9205 (75.6)	2922 (24.4)	12,177 (100.0)	
Poorer	12,185 (77.3)	3577 (22.7)	15,762 (100.0)	
Middle	12,563 (81.4)	2867 (18.6)	15,430 (100.0)	
Richer	10,554 (81.1)	2453 (18.9)	13,007 (100.0)	
Richest	9219 (81.8)	2050 (18.2)	11,269 (100.0)	
Employment Status				$\chi^2 = 27.07$, <i>p</i> = 0.001
Employed	16,706 (83.1)	3389 (16.9)	20,095 (100.0)	
Not employed	35,291 (77.5)	10,260 (22.5)	45,551 (100.0)	
Own a Car/Truck				$\chi^2 = 21.95$, <i>p</i> = 0.004
Yes	12,753 (83.8)	2473 (16.2)	15,226 (100.0)	
No	40,056 (78.2)	11,160 (21.8)	51,216 (100.0)	
Own a Motorcycle/Scooter				$\chi^2 = 36.18$, <i>p</i> = 0.001
Yes	950 (86.8)	144 (13.2)	1094 (100.0)	
No	51,831 (79.4)	13,456 (20.6)	65,287 (100.0)	
Own a Bicycle				$\chi^2 = 6.27$, <i>p</i> = 0.032
Yes	7776 (82.5)	1644 (17.5)	9420 (100.0)	
No	45,033 (79.0)	11,989 (21.0)	57,022 (100.0)	
Own a refrigerator				$\chi^2 = 27.92$, <i>p</i> = 0.001
Yes	31,917 (81.7)	7173 (18.3)	39,090 (100.0)	
No	20,788 (76.3)	6458 (23.7)	27,246 (100.0)	
Has Electricity				$\chi^2 = 29.54$, <i>p</i> = 0.001
Yes	38,627 (81.2)	8951 (18.8)	47,578 (100.0)	
No	14,164 (75.2)	4675 (24.8)	18,839 (100.0)	

Table 2. Cont.

Variables	Utilization of Antenatal Care Services Weighted Freq (%)		Total	Chi-Square, <i>p</i> -Value
	Yes <i>n</i> = 53,726	No <i>n</i> = 13,919		
Media Exposure factor Own a Television				$\chi^2 = 20.69$, <i>p</i> = 0.001
Yes	37,023 (81.0)	8697 (19.0)	45,720 (100.0)	
No	15,712 (76.1)	4939 (23.9)	20,651 (100.0)	
Own a Radio				$\chi^2 = 19.02$, <i>p</i> = 0.001
Yes	35,104 (81.0)	8212 (19.0)	43,316 (100.0)	
No	1766 (76.5)	5417 (23.5)	23,028 (100.0)	
Watches TV every day/week				$\chi^2 = 37.82$, <i>p</i> = 0.001
Yes	34,964 (81.8)	7791 (18.2)	42,755 (100.0)	
No	18,462 (75.5)	6003 (24.5)	24,465 (100.0)	
Listens to the Radio every day/week				$\chi^2 = 6.58$, <i>p</i> = 0.038
Yes	33,306 (80.4)	8118 (19.6)	41,424 (100.0)	
No	20,293 (77.8)	5790 (22.2)	26,083 (100.0)	
Reads newspaper regularly				$\chi^2 = 7.41$, <i>p</i> = 0.039
Yes	20,211 (81.2)	4685 (18.8)	24,896 (100.0)	
No	33,393 (78.4)	9202 (21.6)	42,595 (100.0)	
Health Institution factor α Getting permission to go to the Health facility				$\chi^2 = 0.253$, <i>p</i> = 0.687
Not a big Problem	10,013 (78.1)	2815 (21.9)	12,828 (100.0)	
Big Problem	1483 (76.4)	457 (23.6)	1940 (100.0)	
Getting money to go to the Health facility for treatment				$\chi^2 = 3.66$, <i>p</i> = 0.167
Not a big Problem	8439 (79.1)	2226 (20.9)	10,665 (100.0)	
Big Problem	3057 (74.5)	1046 (25.5)	4103 (100.0)	
Distance to Health facility				$\chi^2 = 1.75$, <i>p</i> = 0.274
Not a big Problem	8832 (77.1)	2627 (22.9)	11,459 (100.0)	
Big Problem	2664 (80.5)	645 (19.5)	3309 (100.0)	
Not wanting to go to the Health facility alone				$\chi^2 = 1.75$, <i>p</i> = 0.274
Not a big Problem	10,028 (77.2)	2961 (22.8)	12,989 (100.0)	
Big Problem	1468 (82.5)	311 (17.5)	1779 (100.0)	

Statistically significant ($p < 0.05$); α = A drop in sample population as institutional factor variables were not observed in the 1998 DHS data, rather only in the 2016 DHS data.

2.3. Multilevel Multivariate Logistic Regression Results

As shown in Table 3, statistically significant explanatory variables in the Chi-Square test of association were included for the multilevel multivariate logistic regression.

Table 3. Multilevel Multivariable Logistic Regression Results for Factors Associated with the Utilization of Antenatal Care Services among Women of Reproductive Age in South Africa ($n = 67,645$).

Variables	Model I cOR (95% CI)	Model II aOR (95% CI)	Model III aOR (95% CI)	Model IV aOR (95% CI)
Age (years)				
15–24 ^R				
25–34	0.98 (0.84–1.16)			
35+	1.26 (1.08–1.47) *			
Marital Status				
Single ^R				
Married/Co-habiting	1.13 (1.004–1.27) *			
Educational Level				
No Education ^R				
Primary	0.38 (0.26–0.53) ***			
Secondary	0.45 (0.34–0.60) ***			
Tertiary	0.55 (0.42–0.72) ***			
Race				
Black/African ^R				
White	0.25 (0.12–0.55) ***			
Colored	0.46 (0.19–1.09)			
Indian/Asian	0.35 (0.16–0.76) **			
Parity				
Nulliparity ^R				
Para 1–2	1.33 (1.06–1.68) **	0.95 (0.71–1.26)		
Para ≥ 3	1.63 (1.37–1.93) ***	1.29 (1.03–1.68) *		
Timing of ANC (months)				
<3 ^R				
3–6	41.91 (29.46–59.61) ***	0.029 (0.020–0.042) ***		
6+	9.73 (8.15–11.62) ***	0.29 (0.21–0.40) ***		
Place of Residence				
Rural ^R				
Urban	1.35 (1.20–1.52) ***	1.24 (1.04–1.49) *		
Province				
Western Cape ^R				
Eastern Cape	1.54 (1.09–2.18) *	0.54 (0.30–0.95) *		
Northern Cape	0.56 (0.45–0.69) ***	0.33 (0.19–0.58) ***		
Free State	0.94 (0.71–1.24)	0.23 (0.13–0.41) ***		
Kwazulu-Natal	0.84 (0.63–1.09)	0.31 (0.17–0.57) ***		
North West	0.98 (0.77–1.25)	0.38 (0.21–0.68) ***		
Gauteng	0.93 (0.49–0.81) ***	0.27 (0.15–0.50) ***		
Mpumalanga	0.63 (0.49–0.81) ***	0.34 (0.20–0.60) ***		
Limpopo	0.70 (0.55–0.89) ***	0.25 (0.15–0.43) ***		

Table 3. *Cont.*

Variables	Model I cOR (95% CI)	Model II aOR (95% CI)	Model III aOR (95% CI)	Model IV aOR (95% CI)
Wealth Index				
Poorest/Poorer ^R				
Middle	1.32 (1.15–1.51) ***	1.08 (0.93–1.25)	1.21 (1.0–1.47) *	
Richer/Richest	1.05 (0.89–1.25)	1.11 (0.94–1.31)	1.23 (1.007–1.51) *	
Employment Status				
Not employed ^R				
Employed	1.48 (1.29–1.70) ***	1.27 (1.102–1.49) ***	1.20 (1.004–1.44) *	
Own a Car/Truck				
No ^R				
Yes	1.44 (1.23–1.69) ***	1.01 (0.85–1.23)	1.15 (0.92–1.43)	
Own a Motorcycle/Scooter				
No ^R				
Yes	2.97 (1.37–6.44) **	2.11 (0.95–4.65)	2.69 (0.91–7.99)	
Own a Bicycle				
No ^R				
Yes	1.18 (0.99–1.41)	0.95 (0.79–1.15)	0.88 (0.71–1.12)	
Own a refrigerator				
No ^R				
Yes	1.58 (1.40–1.79) ***	1.20 (1.01–1.41) *	1.09 (0.89–1.33)	
Has Electricity				
No ^R				
Yes	1.62 (1.43–1.84) ***	1.27 (1.07–1.50) **	1.04 (0.85–1.28)	
Own a Television				
No ^R				
Yes	1.27 (1.12–1.44) ***	1.16 (1.0–1.35) *	1.33 (1.11–1.60)	1.18 (1.02–1.38) *
Own a Radio				
No ^R				
Yes	1.50 (1.33–1.69) ***	0.99 (0.84–1.19)	0.89 (0.72–1.11)	0.86 (0.70–1.04)
Watches TV every day/week				
No ^R				
Yes	1.68 (1.49–1.89) ***	1.44 (1.21–1.72) ***	1.39 (1.12–1.73) *	1.37 (1.15–1.65) ***
Listens to the Radio every day/week				
No ^R				
Yes	1.21 (1.07–1.36) **	0.95 (0.82–1.11)	0.90 (0.75–1.08)	0.95 (0.82–1.10)
Reads newspaper regularly				
No ^R				
Yes	1.47 (1.29–1.68) ***	1.12 (0.97–1.31)	1.18 (0.99–1.42)	1.18 (1.01–1.36) *

cOR = Crude OR, aOR = Adjusted OR, ^R = reference value, * significant at $p \leq 0.05$, ** significant at $p < 0.01$, *** significant at $p < 0.001$.

Model I: Non-adjusted (crude) aggregate model comprising all explanatory variable categories associated with the utilization of Antenatal care services

2.3.1. Socio-Demographic Factors

The study shows higher odds for the utilization of antenatal care among women aged 35 years and older than those 15–24 years (cOR = 1.26, 95% CI; 1.08–1.47, $p = 0.003$). Moreover, being married or cohabiting had higher odds for utilizing antenatal care than singles (cOR = 1.13, 95% CI; 1.004–1.27, $p = 0.043$). The odds for the utilization of antenatal care among women improved from primary to tertiary compared to those with no education (primary: cOR = 0.38, secondary: cOR = 0.45 and tertiary: cOR = 0.55, $p = 0.001$). White or Indian/Asian descent showed lower odds for the utilization of antenatal care compared to black/African (White: cOR = 0.25, Indian/Asian: cOR = 0.35, $p = 0.001$).

2.3.2. Obstetric and Household Factors

Women with Para 1–2 and Para ≥ 3 showed increased odds for the utilization of antenatal care compared to those that are nulliparous, with an increased odds in Para ≥ 3 compared to Para 1–2 (Para 1–2: cOR = 1.33, Para ≥ 3 : OR = 1.63, $p < 0.05$). Women with the timing of ANC at 3 or more months of pregnancy showed increased odds for the utilization of antenatal care compared to those with the timing of ANC less than 3 months (3–6 months: cOR = 41.91, 6+ months: OR = 9.73, $p = 0.001$). Women residing in the urban area showed increased odds for the utilization of antenatal care compared to those in the rural area (cOR = 1.35, 95% CI; 1.20–1.52, $p = 0.001$). Only those residing in Eastern Cape showed increased odds for the utilization of antenatal care compared to Western Cape (cOR = 1.54, 95% CI; 1.09–2.18, $p = 0.014$). The other provinces, Northern Cape (cOR = 0.56, $p = 0.001$), Mpumalanga (cOR = 0.63, $p = 0.001$), Limpopo (cOR = 0.70, 0.001) and Gauteng (cOR = 0.93, $p = 0.001$) showed lower odds for the utilization of antenatal care compared to Western Cape.

2.3.3. Economic Status Factors

The study shows higher odds for the utilization of antenatal care among women in the middle wealth index compared to those in the poorest/poorer wealth index (cOR = 1.32, 95% CI; 1.15–1.51, $p = 0.001$). Higher odds for the utilization of antenatal care were observed among women who are employed (cOR = 1.48, 95% CI; 1.29–1.70, $p = 0.001$), own a car (cOR = 1.44, 95% CI; 1.23–1.69, $p = 0.001$), own a Motorcycle/Scooter (cOR = 2.97, 95% CI; 1.37–6.44, $p = 0.006$), own a refrigerator (cOR = 1.58, 95% CI; 1.40–1.79, $p = 0.001$), and have electricity (cOR = 1.62, 95% CI; 1.43–1.84, $p = 0.001$).

2.3.4. Media Exposure Factors

Higher odds for the utilization of antenatal care was observed among women who own a television (cOR = 1.27, 95% CI; 1.12–1.44, $p = 0.001$), own a radio (cOR = 1.50, 95% CI; 1.33–1.69, $p = 0.001$), watch television everyday/week (cOR = 1.68, 95% CI; 1.49–1.89, $p = 0.001$), listen to radio every day or week (cOR = 1.21, 95% CI; 1.07–1.36, $p = 0.002$), and read newspaper regularly (cOR = 1.47, 95% CI; 1.29–1.68, $p = 0.001$).

2.4. Model II: Household Factors, Economic Factors, and Media Exposure Factors Associated with Utilization of Antenatal Care Services, While Controlling for Their Socio-Emographic/Individual Factors

2.4.1. Obstetric and Household Factor

Women with Para ≥ 3 showed increased odds for the utilization of antenatal care compared to those who are nulliparous after adjusting for socio-demographic characteristics (aOR = 1.29, 95% CI; 1.03–1.68, $p = 0.029$). Women with the timing of ANC 3 or more months showed reduced odds for the utilization of antenatal care compared to those with the timing of ANC less than 3 months (3–6 months: aOR = 0.029, 6+ months: aOR = 0.29, $p = 0.001$). Women residing in the urban still showed increased odds for the utilization of antenatal care compared to those in rural areas after adjusting for confounding variables (aOR = 1.24, 95% CI; 1.04–1.49, $p = 0.016$).

All provinces showed lower odds for the utilization of antenatal care compared to Western Cape ($p < 0.05$).

2.4.2. Economic Status Factors

After controlling for socio-demographic characteristics, the study showed no statistically significant association between wealth index and the utilization of antenatal care ($p > 0.05$). Higher odds for the utilization of antenatal care were now observed among women for only those who were employed (aOR = 1.27, 95% CI; 1.10–1.49, $p = 0.001$), own a refrigerator (aOR = 1.20, 95% CI; 1.01–1.41, $p = 0.036$) and have electricity (aOR = 1.27, 95% CI; 1.07–1.50, $p = 0.006$). The variables own a car or own a Motorcycle/Scooter were no longer statistically significant.

2.4.3. Media Exposure Factors

After controlling for socio-demographic characteristics, higher odds for the utilization of antenatal care were still observed among women who own a television (aOR = 1.16, 95% CI; 1.0–1.35, $p = 0.049$) and watch TV every day/week (aOR = 1.44, 95% CI; 1.21–1.72, $p = 0.001$). The variables own a radio, listen to the radio every day or week, and read the newspaper regularly were no longer statistically significant ($p > 0.05$).

2.5. Model III: Economic Factors and Media Exposure Factors Associated with Utilization of Antenatal Care Services, While Controlling for Obstetric and Household Factors

2.5.1. Economic Status Factors

After controlling for obstetric and household factors, the study showed a statistically significant association between the wealth index and the utilization of antenatal care. Higher odds for the utilization of antenatal care among women were observed in those in the middle wealth index (aOR = 1.21, 95% CI; 1.0–1.47, $p = 0.047$) and richer/richest wealth index (aOR = 1.23, 95% CI; 1.007–1.51, $p = 0.043$). Higher odds for the utilization of antenatal care were observed among employed women (aOR = 1.20, 95% CI; 1.004–1.44, $p = 0.046$), own a refrigerator (aOR = 1.20, 95% CI; 1.01–1.41, $p = 0.036$) and have electricity (aOR = 1.27, 95% CI; 1.07–1.50, $p = 0.006$). The variables own a car, own a Motorcycle/Scooter, own a refrigerator, and have electricity were no longer statistically significant ($p > 0.05$).

2.5.2. Media Exposure Factors

Only the variable, watches TV every day/week, was statistically significantly associated with the utilization of antenatal care. Those watching TV every day/week showed increased odds for the utilization of antenatal care services (aOR = 1.39, 95% CI; 1.12–1.73, $p = 0.02$).

2.6. Model IV: Media Exposure Factors Associated with Utilization of Antenatal Care Services, While Controlling for Economic Status Factors

Media Exposure Factors

After controlling for economic status factors, higher odds for the utilization of antenatal care were still observed among women who own a television (aOR = 1.18, 95% CI; 1.02–1.38, $p = 0.030$) and watch TV every day/week (aOR = 1.37, 95% CI; 1.15–1.62, $p = 0.001$). The variables, own a radio, listen to radio every day or week, and read the newspaper regularly, were no longer statistically significant ($p > 0.05$), similar to the findings when controlling for maternal household factors.

3. Discussion

Using nationally representative 1998 to 2016 SADHS data, the goal of this study was to assess factors associated with the utilization of ANC services in South Africa. The cluster sampling methodology used ensured sample representativeness and the reliability of the study results. The study included 67,645 mothers of child-bearing age in nine provinces of South Africa whose complete information was available in the survey. In South Africa,

21.0% of mothers had utilized ANC services. There were variations in all the provinces. The highest provinces with the most prevalence were Western Cape and KwaZulu-Natal. The lowest are Eastern Cape and Gauteng, which could be as a result of the demographic and socioeconomic factors associated with both provinces. According to the findings of this study, women in South Africa's rural areas were less likely than women in the country's urban areas to use ANC services. This could be due to the disparities in the availability and accessibility of healthcare facilities, and women's awareness of ANC services in urban and rural areas. This finding was consistent with the findings of other studies conducted in Pakistan and Vietnam where ANC uptake was lower in rural areas [23,24]. This implies that more attention to health awareness, education, and promotion activities in rural areas is needed to improve ANC uptake. According to Rustagi et al. [25], the higher ANC coverage observed in the urban setting may likely be due to ANC accessibility at primary care facilities in these areas, highlighting the need for policy efforts to strengthen primary healthcare. ANC coverage has been found to be linked to primary healthcare availability in similar studies [26,27].

The present study observed a statistically significant relationship between a woman's age and adequate antenatal care utilization. The older the woman (35 years and older), the more likely she will use antenatal care appropriately. This suggests that young women have less experience with pregnancy care than older women. This is similar to findings to research by Adedokun and Yaya [21], who analyzed information obtained from the Demographic and Health Surveys (DHS) carried out in 31 different countries and involving 235,207 women aged 15–49 years old who had given birth to children within 5 years of the surveys. Similar findings were obtained by Joshi et al. [28] in Nepal, Dairo and Owoyokun [29] in Nigeria, Denny et al. [30] in Indonesia, and Ebonwu et al. [31] in South Africa. This may be due to older women placing more value on ANC, as a lack of knowledge about the benefits of ANC or the pregnancy being unwanted, which are common among adolescents, leads to seeking ANC care less frequently among younger women (including teenagers). Another study in Nigeria discovered that being 35 or older consistently increased the odds of using ANC by more than 200 percent [32]. Therefore, it is imperative for the South African Government to formulate policies that will protect adolescent pregnant women and provide for a tailored ANC to ensure utilization and a favorable pregnancy outcome for them. However, studies investigating the association between a woman's age and the use of ANC have not always reached consistent conclusions; as one study observed, the younger age utilization of ANC was found to be adequate because working women tend to postpone their first pregnancy and are more mature in terms of age during pregnancy than unemployed women [33].

The odds for the utilization of antenatal care among women improved from secondary to tertiary compared to those with no education. The findings indicated that women with higher levels of education have a greater likelihood of making appropriate use of antenatal care than women with lower levels of education. This suggests that a woman's likelihood of utilizing antenatal care increases in proportion to the level of education she possesses, which is similar to findings from previous studies [21,34,35]. A plausible explanation is that education fosters better enlightenment on issues, particularly health-related issues. This finding corroborated a study that alluded to increased utilization of maternal healthcare and women's empowerment through education, wealth, and decision making [36]. The girl child education policy needs to be strengthened, ensuring that no girl child is missed, thus improving their educational status and ANC utilization.

In addition, married or cohabiting had higher odds for utilizing antenatal care than singles. Rurangirwa et al. [33] in their study conducted in Rwanda, observed that the risk of poor utilization of ANC services was higher among single women. This may be due to the support that married and cohabiting women receive from their husbands or partners as a result of the ANC attendance sensitization campaign, which equally targets men and encourages them to follow their wife or partner to the clinic [37]. This is also consistent with the data from similar studies [38,39].

This study observed that women with a better economic status (wealth index) and who are employed had more antenatal care utilization than those with lower wealth indexes. Higher odds for the utilization of antenatal care among women were observed in those in the middle wealth index and richer/richest wealth index. When it comes to prenatal care, women from low-income families may not have the financial means to register at clinics or pay for their services. Studies conducted in Ethiopia and Gabon, and evidence from the Demographic Health Surveys data of 31 countries across sub-Saharan Africa corroborated this finding [21,40,41].

Women living in houses equipped with electricity were found to be utilizers of ANC services. It is possible that the presence of electricity in a household may be an indirect measure of accessibility to media services and may be a sign of a better or higher social class [23].

This study found that women exposed to mass media (own a television and watch TV every day/week, or listen to the radio) had a higher chance of ANC utilization than women who were not, as seen in some similar studies, with the propensity to enjoy essential obstetric care from skilled birth attendants [22,42,43]. This may be due to the fact that mass media can reach a large number of people at once, thereby increasing awareness of the benefits of maternal health services and influencing family behavior.

Limitations and Strengths of the Study

A limitation of this study is that the use of secondary data. One of the strengths of the study is that the DHIS survey is national data with geographical representation; hence, the study results are a true representation of the national data.

4. Materials and Methods

4.1. Research Design

This is a retrospective study based on secondary data obtained from the South African Demographic Health Survey (DHS), which was carried out between the years 1998 and 2016.

4.2. Population

Administratively, South Africa is divided into nine provinces. In 2020, the middle-year population estimated by Statistics South Africa was 59.62 million, of which approximately 51.1% are females. The infant mortality rate for 2020 was estimated at 23.6 per 1000 live births.

4.3. Sample Size and Sampling Frame

A curated and concatenated dataset on ANC utilization was obtained from demographic and health surveys conducted in South Africa from 1998 to 2016. The targeted study population was women of reproductive age (15–49 years).

The survey involved a two-stage cluster stratified sampling method. In the first stage, the country was divided into clusters, using the enumeration areas (EA); clusters for the study were selected using simple random sampling and the households within each cluster were line listed. Women between 15 and 49 years of age who were citizens or permanent residents were randomly selected from the listed households and enrolled in the study in the second stage [44].

4.4. Instruments

Data for the DHS were collected through interviewer-administered semi-structured validated questionnaires. Information obtained with this questionnaire includes socioeconomic characteristics, reproductive history, antenatal, delivery, post-natal care, and breastfeeding.

4.5. Validity and Reliability of the Data Collection Instrument

DHS questionnaire is a validated tool that has been used for many decades. The DHS survey data collection tool's reliability has been tested and established through repeated use by DHS and other experienced research investigators [44].

4.6. Variables of Interest

The independent variables: These include, sociodemographic characteristics such as age, marital status, education, and race; household factors such as parity (zero, one and two, three or more), the timing of ANC, place of residence, and region; economic status factors such as wealth index, employment, own a car/truck, own a motorcycle/scooter, own a bicycle, own a refrigerator, and electricity; media exposure factors such as own a television, own a radio, watch television regularly, listen to the radio regularly and read newspapers regularly; institutional factors such as access to a health facility and distance to a health facility.

The dependent (outcome) variable: ANC utilization during the women's pregnancy period was the outcome variable. This was categorized as 'not utilized—women who did not attend ANC', and 'utilized'—women who utilized. ANC not utilized was defined by <4 clinic visits and ANC utilized by ≥ 4 clinic visits across the study years.

4.7. Data Analysis

The data were analyzed using the SPSS package for data analysis. Descriptive analyses such as count, frequencies, and percentages are presented using a frequency table and bar/pie charts where appropriate. Pearson chi-square test was used to establish relationships between the independent and outcome variables, using a statistical significance of p -value less than or equal to 0.05 ($p \leq 0.05$).

Bivariate and multivariate logistic regression analyses were used to measure the associations between the independent and outcome variables.

The study further used a regression model expression to simulate a nested approach in which a non-adjusted aggregate model comprising all explanatory variable categories and utilization of Antenatal care services would be iterated to generate Model 1. Model 2 was simulated using obstetric and household factors; economic factors; and media exposure factors while controlling for their socio-demographic/individual factors. Simulation using economic factors and media exposure factors while controlling for household factors was for Model 3 and lastly, Model 4 was simulated using only media exposure factors and controlling for economic status factors. The primary benefit of the model selected is avoiding confounding effects by analyzing the association between all variables simultaneously. Confounding effects were tested in the four models among different factors. After defining the technique, the fundamental interpretation of the results was emphasized. A p -value set at 0.05 was considered statistically significant.

5. Conclusions

The study uncovered factors that influence women's use of antenatal care in South Africa. Age, marital status, having a tertiary education, living in an urban area, and socioeconomic factors, such as being in the richest wealth index and employed, having electricity, and media exposure, all influenced antenatal care utilization. Antenatal care enables the early detection and treatment of diseases that may affect both the mother and the child. It also allows a pregnant woman to be cared for during prenatal, antenatal, childbirth, and post-natal periods, reducing the chances of complications leading to maternal and neonatal death. Introducing targeted health promotion and education programs in communities would empower young and illiterate rural women to use available ANC services more often during pregnancy. Strengthening antenatal care visits becomes critical to the government in promoting and improving the health of the mother and child. This will lead to improved maternal and neonatal outcomes and minimize rural–urban reproductive health indices in South Africa. Maternal health services need to be accessible, used more frequently,

and of higher quality. In addition, strengthening girl child education is paramount, not only to improve women's empowerment, but also to improve ANC utilization among those who are pregnant. Further, health promotion in the primary and secondary levels of education needs to be intensified to change the narrative of poor ANC utilization among these categories of people.

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Data Availability Statement: The datasets analyzed for this study are available at <https://dhsprogram.com> (accessed on 15 June 2021).

Conflicts of Interest: The authors declare no conflict of interest.

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