Article

Determinants of Antenatal Care Access and Utilization in Haiti

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Abstract: Several pregnancy-related complications resulting in maternal mortality in low-income countries may be due to inaccessible or under-utilized antenatal healthcare services. This study aims to assess the sociodemographic characteristics of Haitian women and how these may affect their access to and use of antenatal care services (ANC) during pregnancy. Multi-logistic regression was used to analyze sociodemographic factors associated with ANC access and use among a cross-section of Haitian women (N = 4890) from the Demographic and Health Survey Haiti (2016–2017). Approximately 18.2% of the women had no education, 40.2% had secondary education, and 4.0% had higher education. About 45.6% of women with no education, 95% with higher education, and 76% of urban dwellers made four or more ANC visits. Only 3% of those who used public sector ANC had a higher education, and over 64.2% of those who used private sector ANC lived in urban areas. Rich women (OR = 2.49, 95% CI = 2.02–3.08) vs. poor women and mature mothers (OR = 1.97, 95% CI = 1.42–2.73) vs. teenage mothers both had higher odds of using ANC services four or more times. Women with higher education (OR = 0.19, 95% CI = 0.12–0.30) and those who were rich (OR = 0.67, 95% CI = 0.5–0.89) had lower odds of using public sector ANC vs. private sector ANC. Wealth and education are protective of ANC access and use by Haitian women. As over half the population has home births, public health education interventions targeting traditional birth attendants are recommended. Interventions training traditional birth attendants to provide better ANC during pregnancy and at the time of birth and to access skilled help during emergency deliveries is recommended.

Keywords: antenatal care utilization; antenatal care access; pregnant women; Haiti; Demographic Health Survey (DHS); sociodemographic factors

1. Introduction

Maternal mortality rates and safe infant deliveries are affected by the type of health services received during pregnancy [1]. Antenatal care (ANC) services which are healthcare services provided to pregnant women throughout the period of their pregnancy by skilled healthcare professionals, aim to identify risks and manage pregnancy-related illnesses. Health services like ANC make it possible for healthcare professionals to closely monitor pregnant women. Thereby increasing the odds of identifying pregnancy-related complications like gestational diabetes and pre-eclampsia at an early stage in pregnancy. Early detections may result in behavioral changes and direct medical interventions that circumvent potential emergency situations during pregnancy, and that manage and minimize negative impacts on pregnant women and on their fetuses [2]. However, there are social determinants of health that affect obstetric outcomes among Haitian women. Maternal health

during pregnancy may be influenced by exposure to social or environmental stressors, residence, the built environment, transportation, education, or by interactions—if any—with primary healthcare providers before and during pregnancy. These may influence a woman's perceptions and her experience of maternal health care.

Access to health services is especially important in low-income countries like Haiti [1,3], where available advanced health services during pregnancy-related emergencies can be limited [2,4]. Haiti has one of the highest annual maternal mortality rates [5]. In 2017, Haiti's maternal mortality ratio was 480 deaths per 100,000 live births [6–8], with only 42% of births attended by skilled health providers [7]. This is quite high when compared to the maternal mortality rate in other low-income countries like El Salvador (37 deaths per 100,000 live births) and Honduras (65 deaths per 100,000 live births). In the same year, the WHO reported much lower maternal mortality rates for other Caribbean countries like Trinidad and Tobago, Jamaica, and the Dominican Republic (67 deaths, 80 deaths and 95 deaths per 100,000 live births, respectively) [9]. Some of the major barriers to good quality healthcare in Haiti are financial resources and governance. Studies by Dev et al. (2019), Aziato and Omenyo (2018) and UNFPA (2020) show that a large percentage of Haitian women give birth with the help of unskilled traditional birth attendants (TBA), locally known as matwons [7,8,10,11]. Remote villages in Haiti are majorly inaccessible and may be accessible only by foot, increasing the appeal of matwons for pregnancy and delivery-related healthcare [12]. The literature further shows that some rural and isolated parts of Haiti only have access to matwons, who have limited childbirth knowledge available to them [13]. Though Haitian women agree that hospital births may be safer and help save lives in emergencies, a lot of them have also reported bad birthing experiences in hospitals. Public hospitals in Haiti are operated by the government with limited resources or managed by NGOs that rely on irregular donor funds to provide resources and finances for the hospitals. This lack of resources makes them less equipped than private hospitals (which have more resources available) to serve the health needs of the population. According to the World Health Organization, public spending on healthcare is lower than the average spending in other low-income countries [14], and the natural disasters that have devastated Haiti over the years have resulted in a weakening of the public sector healthcare services available to the people of Haiti Private hospitals are therefore better maintained, provide better services and may have more available resources compared to public hospitals. The costs attributed to the use of private hospitals may impact the use of these private hospitals by Haitian women.

Although most pregnant Haitians (90%) use ANC services at least once, only 54% reach the WHO-required minimum of four visits [15]. This is important since ANC use may reduce the maternal mortality rate [16,17]. It is important to understand the sociodemographic characteristics of pregnant women who use the available ANC services during pregnancy to properly identify and to better understand existing barriers and to apply appropriate strategies to improve ANC utilization during pregnancy. Studies have shown that the availability of skilled health services in Haiti may reduce the risk of unwanted maternal or neonatal obstetric outcomes and reduce the prevalence of stillbirths, eclampsia and postpartum infections in a rural part of Haiti where a new health facility was built [18] but accessibility may be a barrier to receiving good quality antenatal healthcare services in Haiti.

Aims

This study aims to assess the sociodemographic characteristics of Haitian women and the sociodemographic factors that affect their ANC access and use during pregnancy. This should help highlight potential areas for targeted public health education intervention as well as some preliminary areas of infrastructural and human resource shortfalls in Haiti's approach to maternal and child health. It is important to understand the sociodemographic characteristics of the Haitian population in order to understand and address

the relevant barriers to healthcare during pregnancy and after childbirth and to reduce maternal mortality through the use of antenatal care services.

2. Materials and Methods

Data were obtained from 2016–2017 Demographic and Health Survey (DHS) Haiti dataset collected using standardized questionnaire modules. DHS used a stratified two-stage cluster design that was generalizable at the regional, residential and national levels (details are available in Haiti's DHS final report) [19]. About 13,546 households were selected for the DHS interview, and the initial sample consisted of 13,405 women successfully interviewed, with a 99.7% response rate. The inclusion criteria for this study were women between 15 and 49 years old who had given birth at least once and who responded to the ANC use question (8518 women). In order to minimize the loss of valuable data points, observations with missing data for ANC use (3628 women) were excluded. The final sample size used for this study was 4890 women.

2.1. Study Variables

Education was measured using the question "What is the participant's highest education level?" (No education, primary, secondary, higher); residence by the question "Where did the participant live at time of survey?" (Urban, Rural); and wealth by the Wealth index (a categorical measure of the participant's wealth classification on a five-response scale as provided by the DHS) [19]. Women who identified as rich or very rich were classified as "Rich", those who reported being poor or very poor as "Poor", and those who identified as middle class remained as "Middle class" [20,21].

ANC accessed during pregnancy was originally measured with the question, "Where did you receive antenatal care for this pregnancy?" Responses of "Government hospital", "Government Health center", "Government Health post", or "Other Public Sector" were classified as Public Sector; responses of "Private hospital", "Private clinic", or "Other private Medical sector" as Private Sector, and responses of "Her home", "Other home" or "Other" were classified as Home/Other. These were recoded into "Public Sector ANC" and "Private Sector ANC" for analyses—similar to other studies where only public and private sector skilled health services were analyzed [22]. The frequency of ANC use was measured by the question, "How many times did you receive antenatal care during this pregnancy?" The frequency of ANC visits was originally recoded into "0 visits", "1–3 visits", and "≥4 visits" to identify background characteristics. These were recoded into "<4 visits" and "≥4 visits", a decision guided by the WHO's Focused ANC (FANC) model containing recommendations for minimal ANC visit requirements during pregnancy in countries like Haiti [10,13]. Potential confounders like age, marital status, occupation, maternal age at birth, and parity were also considered.

2.2. Data Analysis

De-identified data on Haiti women were analyzed with permission from the DHS. The sample was weighted and sorted by a negative response to 'never had a child'. Multi-logistic regression was used to assess the association between the main sociodemographic variables (educational level, wealth, and residence) and dependent variables of ANC visits ((<4 visits, ≥4 visits) and ANC access (Public Sector ANC access, Private Sector ANC access) after adjusting for main confounders. Analyses were performed using IBM SPSS v.26 [23].

3. Results

The final sample comprised of 4890 women who had given birth at least once in their lifetime and who had responded to the question about the frequency of ANC use during pregnancy. The weighted sample represented a population where 18.2% were uneducated, 37.7% had a primary school education, 40.2% had a secondary school education, and only 4.0% had a higher education. About five in every eight women lived in rural areas (62.3%),

42.0% were poor, 36.6% were rich, and 21.4% were middle class. Most of the women (84.4%) were married, and half of them worked in sales (50%). More than a third were unemployed (33.1%), and only 5.7% of the women were professionals, managers, or technicians. During pregnancy, 8.6% made no ANC visits, while 66.7% completed four or more visits. More women used ANC provided by the public sector (78.3%) than the private sector (13.8%).

3.1. Antenatal Care (ANC) Use by Haitian Women during Pregnancy

Less than half (45.6%) of the women with no education, three in four (78.6%) women with secondary education and over four in five (94.8%) with a higher education made at least four ANC visits while pregnant. Over three in four (76.1%) women who lived in urban areas made four or more ANC visits while pregnant. The number of ANC visits during pregnancy increased with an increase in wealth. Where 47.2% of those who were poor made less than four ANC visits, only 18.9% of those who were rich made less than four ANC visits. We found that only 52.8% of the poor women but over 81% of rich women made at least four ANC visits.

We found that 54.7% of teenage mothers made four or more ANC visits compared to 67.8% of young adult mothers and 66.3% of mature mothers in our study. Among those who were married or were living with their partners, over three in five (67.3%) made more than four ANC visits, and only 32.8% made less than four ANC visits. Almost three in four (73.9%) women who had given birth once made four or more ANC visits. Table 1 summarizes the sociodemographic and background characteristics of the sample population as well as the frequency of ANC visits among Haitian women.

Table 1. Sociodemographic and reproductive characteristics by ANC [1] visits among Haitian women in 2017.

	Antenatal Care Visits during Pregnancy				
	Total	**No Visits**	**1–3 Visits**	**≥4 Visits**	**p Value [3]**
	n (%) [2]	*n* (%)	*n* (%)	*n* (%)	
Total sample	4890 (100%)	419 (8.6%)	1209 (24.7%)	3262 (66.7%)	
Education level					<0.0001
No education	890 (18.2%)	187 (21.0%)	297 (33.4%)	405 (45.6%)	
Primary education	1843 (37.7%)	162 (8.8%)	551 (29.9%)	1129 (61.3%)	
Secondary education	1963 (40.2%)	70 (3.6%)	350 (17.8%)	1544 (78.6%)	
Higher education	194 (4.0%)	0 (0.0%)	10 (5.2%)	184 (94.8%)	
Residence					<0.0001
Urban	1842 (37.7%)	119 (6.5%)	321 (17.4%)	1402 (76.1%)	
Rural	3048 (62.3%)	300 (9.8%)	888 (29.1%)	1860 (61.0%)	
Wealth Index					<0.0001
Poor	2053 (42.0%)	279 (13.6%)	690 (33.6%)	1084 (52.8%)	
Middle	1046 (21.4%)	73 (7.0%)	247 (23.6%)	726 (69.4%)	
Rich	1791 (36.6%)	67 (3.7%)	272 (15.2%)	1452 (81.1%)	
Marital Status					0.197
Never married	388 (7.9%)	31 (8.0%)	113 (29.1%)	244 (62.9%)	
Married/Living with partner	4129 (84.4%)	350 (8.5%)	1002 (24.3%)	2777 (67.3%)	
Divorced/Separated/Widowed	373 (7.6%)	38 (10.2%)	94 (25.2%)	241 (64.6%)	
Mother's age					<0.0001
Teenager (15–19 years)	254 (5.2%)	24 (9.4%)	91 (35.8%)	139 (54.7%)	
Young adult (20–34 years)	3327 (68.0%)	243 (7.3%)	829 (24.9%)	2255 (67.8%)	
Mature adult (35–49 years)	1310 (26.8%)	152 (11.6%)	289 (22.1%)	868 (66.3%)	
Parity					<0.000
One child	1491 (30.5%)	47 (3.2%)	342 (23.0%)	1101 (73.9%)	
More than one child	3399 (69.5%)	372 (10.9%)	866 (25.5%)	2161 (63.6%)	
Occupation					<0.000
Not employed	1617 (33.1%)	143 (8.8%)	462 (28.6%)	1013 (62.6%)	
Professional/technical/managerial	277 (5.7%)	7 (2.5%)	25 (9.0%)	245 (88.4%)	
Sales	2447 (50.0%)	190 (7.8%)	563 (23.0%)	1694 (69.2%)	
Agricultural work	298 (6.1%)	59 (19.9%)	96 (32.3%)	142 (47.8%)	
Others	252 (5.1%)	21 (8.3%)	62 (24.6%)	169 (67.1%)	

[1] ANC: Antenatal care. [2] Unweighted counts and weighted percentages. [3] *p*-value for chi-square.

3.2. Sources or Providers of Antenatal Care (ANC) Services

We found that less than half (43%) of women who used public sector ANC services had a secondary school education or more, 64% lived in rural areas compared to 35% who lived in urban areas, 43.5% were poor, less than 35% were rich, about 7.9% were never married, 25.3% were mature mothers, 68.4% already had more than one birth, and 32.8% were unemployed compared to the 4.7% who had a professional, technical, or managerial job. Among women who used ANC services provided by the private sector, 65.7% had at least a secondary school education, 64.2% lived in urban areas, 56.9% were rich, 86.6% were married or living with their partner, 68.7% were young adults, 63.1% had given birth to more than one child, and 44% worked in sales. Approximately three in five (59.2%) women who gave birth at home had a primary school education or less, more than half (54.4%) lived in rural areas, and 37.3% were poor. Over four in five (80.6%) were married or lived with their partner, about 70.9% had given birth to more than one child, 32.7% were unemployed, and only 6.9% had professional, technical or management jobs. Table 2 summarises the background characteristics of Haitian women based on the source of ANC services used during pregnancy.

Table 2. Demographic composition of Haitian women's access and use of ANC [1] services in 2017.

	Access to Antenatal Care Services during Pregnancy			
	Public Sector ANC (*n*/%) [2]	Private Sector ANC (*n*/%)	Home/Other ANC (*n*/%)	*p*-Value
Total Sample	3384 (82.6%)	610 (14.9%)	103 (2.5%)	
Education level				<0.0001
No education	575 (17.0%)	55 (9.0%)	21 (20.4%)	
Primary education	1355 (40.0%)	154 (25.2%)	40 (38.8%)	
Secondary education	1352 (40.0%)	316 (51.8%)	37 (35.9%)	
Higher education	102 (3.0%)	85 (13.9%)	5 (4.9%)	
Residence				<0.0001
Urban	1210 (35.8%)	2174 (64.2%)	47 (45.6%)	
Rural	2174 (64.2%)	285 (46.7%)	56 (54.4%)	
Wealth Index				<0.0001
Poor	1472 (43.5%)	153 (25.1%)	38 (37.3%)	
Middle	736 (21.7%)	110 (18.0%)	21 (20.6%)	
Rich	1176 (34.8%)	347 (56.9%)	43 (42.2%)	
Marital Status				0.059
Never married	267 (7.9%)	53 (8.7%)	10 (9.7%)	
Married/Living with partner	2847 (84.1%)	528 (86.6%)	83 (80.6%)	
Divorced/Separated/Widowed	270 (8.0%)	29 (4.8%)	10 (9.7%)	
Mother's age				0.100
Teenager (15–19 years)	189 (5.6%)	22 (3.6%)	6 (5.8%)	
Young adult (20–34 years)	2339 (69.1%)	419 (68.7%)	78 (75.7%)	
Mature adult (35–49 years)	855 (25.3%)	169 (27.7%)	19 (18.4%)	
Parity				0.030
One child	1070 (31.6%)	225 (36.9%)	30 (29.1%)	
More than one child	2313 (68.4%)	385 (63.1%)	73 (70.9%)	
Occupation				0.000
Not employed	1111 (32.8%)	210 (34.4%)	33 (32.7%)	
Professional/technical/managerial	159 (4.7%)	75 (12.3%)	7 (6.9%)	
Sales	1747 (51.6%)	269 (44.0%)	50 (49.5%)	
Agricultural work	196 (5.8%)	15 (2.5%)	4 (4.0%)	
Others	171 (5.1%)	42 (6.9%)	7 (6.9%)	

[1] Unweighted counts and weighted percentages. [2] *p*-value for chi-square.

3.3. Association between Sociodemographic Characteristics and ANC Use

Table 3 presents estimates of adjusted odds ratios (OR) for ANC visits and the type of ANC services accessed by pregnant Haitian women, respectively. Compared to those with

no education, women with primary (OR = 1.78, 95% CI = 1.49–2.12), secondary (OR = 3.00, 95% CI = 2.44–3.68) and higher education (OR = 9.59, 95% CI = 4.89–18.81) had higher odds of completing at least four ANC visits while pregnant. There was no significant association between where a Haitian woman lived, and the number of ANC visits she made during her pregnancy. There was also no association between the type of ANC services the women accessed while pregnant. Middle-class (OR = 1.60; 95% CI = 1.34–1.92) and rich (OR = 2.49; 95% CI = 2.02–3.08) women had more odds of making four ANC visits or more when compared to poor women. Being married or living with a partner (OR = 1.63; 95% CI = 1.27–2.10) as well as being divorced, separated, or widowed (OR = 1.43; 95% CI = 1.03–1.99) both increased the odds of making four or more ANC visits while pregnant, compared to never being married. Young adults between 20 and 34 years old (OR = 1.47; 95% CI = 1.10–1.97) and mature adults between 35 and 49 years old (OR = 1.97; 95% CI = 1.42–2.73) had 47% and 97% more odds respectively, of using ANC services at least four times, compared to teenagers between 15 and 19 years old. Having more than one child (OR = 0.69; 95% CI = 0.58–0.82) reduced the odds of making four or more ANC visits compared to having only one child by 31%. On the other hand, having a professional job (OR = 2.01; 95% CI = 1.40–3.14) and working in sales (OR = 1.41; 95% CI = 1.22–1.64) both increased the odds of making four or more ANC visits while pregnant, compared to being unemployed.

Table 3. Association between ANC [1] use and sociodemographic factors of Haitian women.

	Antenatal Care Visits	Antenatal Care Access
	(>4 ANC Visits) OR [2] (95% CI [3])	(Public Sector ANC) OR (95% CI)
Education level		
No education	Ref	Ref
Primary education	**1.78 (1.49–2.12)**	0.86 (0.61–1.21)
Secondary education	**3.00 (2.44–3.68)**	0.50 (0.35–0.71)
Higher education	**9.59 (4.89–18.81)**	0.19 (0.12–0.30)
Residence		
Urban	Ref	Ref
Rural	1.14 (0.95–1.36)	1.20 (0.96–1.51)
Wealth Index		
Poor	Ref	Ref
Middle	**1.60 (1.34–1.92)**	0.93 (0.70–1.23)
Rich	**2.49 (2.02–3.08)**	**0.67 (0.50–0.89)**
Marital Status		
Never married	Ref	Ref
Married/Living with partner	**1.63 (1.27–2.10)**	0.95 (0.68–1.34)
Divorced/Separated/Widowed	**1.43 (1.03–1.99)**	**1.71 (1.03–2.84)**
Mother's age		
Teenager (15–19 years)	Ref	Ref
Young adult (20–34 years)	**1.47 (1.10–1.97)**	0.85 (0.53–1.38)
Mature adult (35–49 years)	**1.97 (1.42–2.73)**	0.63 (0.38–1.07)
Parity		
Only 1 child	Ref	Ref
More than 1 child	**0.69 (0.58–0.82)**	0.93 (0.75–1.16)
Occupation		
Not employed	Ref	Ref
Professional/technical/managerial	**2.10 (1.40–3.14)**	0.84 (0.59–1.18)
Sales	**1.41 (1.22–1.64)**	1.18 (0.96–1.45)
Agricultural work	1.02 (0.78–1.34)	1.59 (0.90–2.82)
Other	1.05 (0.78–1.42)	0.80 (0.55–1.18)

[1] ANC: Antenatal care. [2] OR: Adjusted Odds Ratio. [3] CI: Confidence interval.

3.4. Association between Sociodemographic Characteristics and ANC Access

Compared to women with no education, those with higher education (OR = 0.19, 95% CI = 0.12–0.30) had 81% lower odds of using public sector ANC services versus private sector ANC services, holding identified confounders constant. Compared to the poor, the rich (OR = 0.67; 95% CI = 0.5–0.89) had 33% lower odds of using public sector ANC versus private sector ANC services. However, the odds of using public ANC services were higher among divorced, separated, or widowed women when compared to those who were single or who had never been married women (OR = 1.71; 95% CI = 1.03–2.84). We also found that residence location, a woman's age, having more than one child, and occupation were not associated with the type of ANC accessed by pregnant Haitian women, as shown in Table 3.

4. Discussion

We assessed the association between social determinants like education, wealth index or place of residence (residence-location) and making at least the recommended number of ANC visits while pregnant. We also assessed the relationship between the social determinants and the utilization of ANC services based on accessible providers (ANC services provided by public sector hospitals or private sector hospitals). Our findings suggest that the higher a woman's education level, the higher her odds of meeting the WHO-recommended number of ANC visits during pregnancy and the lower her odds of using public ANC compared to private ANC services. We also found that the wealthier a woman is, the higher her odds of meeting the WHO recommendations for ANC visits and the lower her odds of using public sector ANC services. Residence location was not associated with ANC visits or ANC access. The odds of making four or more ANC visits during pregnancy were higher in women who were married, cohabiting with their partner, were separated or were divorced when compared to those that were never married. The odds of making the required number of ANC visits increased with age and with working in sales or as a professional (technical or managerial roles). Divorced, separated, or widowed women had higher odds of using public sector ANC compared to private ANC, while women who had at least one child at the time of their pregnancy had reduced odds of making four or more ANC visits while pregnant.

4.1. Interpretation of Results

Education increases access to health information, resulting in a higher level of health literacy [24]. Studies show that low education results in low-quality interactions between health providers and pregnant women, lower health literacy [25] and reduced ANC use in pregnancy [25–27]. This may explain why women with higher education were more likely to meet the WHO recommendation of at least four ANC visits when compared to those with no education [28]. Increased use of ANC with wealth in our study was similar to other findings [29,30], where financial constraint was a barrier to accessible ANC healthcare [31]. According to the Bulletin of the WHO (2007), rich women are educated and open-minded to ANC use [32,33] and have a modern and holistic understanding of maternal health [32]. They also found that poor women are less likely to see the need for skilled healthcare and ANC use during pregnancy because they classify pregnancy as a 'non-illness'. More recent studies have also found that education and wealth are associated with increased access and quality of ANC accessed by women in low-income countries [34]. It is important to mention the existence of barriers that may make it more difficult for women with less education or wealth to access antenatal care. Various barriers, such as economic, transportation, financial and social barriers, that disadvantage women from poorer communities and increase these inequalities in ANC use need to be acknowledged. According to Jacobs, Judd and Bhutta (2016), the scope and size of public healthcare services provided to Haitian women are limited due to constraints in state governance and regulation enforcement in the public sector [29], making public healthcare services less appealing to educated women. The restrictions in regulation of healthcare quality by

the government related to the continued contracting/outsourcing of healthcare services to non-governmental organizations (NGOs) who bypass 'government mechanisms' in their day-to-day provision of health services [35]. This may explain the reduced odds of using public ANC instead of private ANC by women with higher education vs those with no education. Education increases health awareness and may provide a better understanding of the pitfalls that plague public sector hospitals. This may then reduce the appeal of the public sector hospitals with increased education. Although public sector healthcare services are severely underfunded and sparsely distributed—especially in rural areas, the cost of healthcare in public hospitals is significantly lower when compared to the cost of healthcare in private hospitals. This may deter poor women from seeking better quality healthcare from the private sector hospitals [25,30] even when these hospitals may be close by and are available (in terms of proximity). Severe underfunding, overcrowding and the inadequate training of health providers commonly associated with public hospitals in Haiti may deter the rich from using public sector ANC services [32] as shown in our findings where an increase in wealth status was associated with reduced odds of using ANC services from the public sector. An insufficient number of available skilled health providers working in public sector health services [36] limits ANC accessibility. Recent studies show that about 45% of Haitians live in rural areas with mountainous terrains difficult to access by road and limiting their access to skilled health providers and services [29,37]. This is especially important because almost half of all the healthcare service facilities in Haiti are located in Port-au-Prince which is a metropolitan area—even though only about 35% of the total population lives there [38]. Despite these factors, our study found no statistically significant association between residence-location (urban/rural) and ANC visits/access respectively.

4.2. Strengths and Limitations

We used a large representative dataset that provided national coverage of Haitian women, allowing for the generalizability of the study by weighting. Despite DHS's rigorous data collection process, our study was not without limitations. First, we were unable to establish causality since cross-sectional data was used. Second, the data used was based on retrospective self-reporting, and so it is possible that the responses provided for the number of ANC visits made during pregnancy may have been subject to recall bias, especially if there were no perceived or identified complications during the pregnancy. Third, the survey was face-to-face, increasing the chance that some women may have reported ANC visit numbers that they assumed should be the desired health practice or that would make them appear in a more favorable light to the interviewer, subjecting the study to desirability bias. They may also have either overreported or underreported their wealth status. Fourth, in collecting data about the number of ANC visits made, the participants did not specify what type of visits were made. It is, therefore, possible that the participants may have classified informal visits from their matwons as ANC visits. Fifth, since the number of women who reported using ANC services at home or other locations was minimal (about only 2.5% of Haitian women), there is a chance that they might have had access to qualified and skilled public or private ANC providers in the comfort of their homes—which we may not know about. This is especially important since other studies have shown that skilled workers from the private or public sector have been known to make home visits and provide health services in patients' homes [22]. We have therefore left home/other sources of ANC out of our multi-logistic regression analysis. Although our study identifies associations between ANC access and use during pregnancy and wealth, education or residence, there is a need for further qualitative studies that will reflect on Haitian women's perceptions, targeted needs, and the barriers they face in trying to access an optimal quality of care during pregnancy and childbirth.

4.3. Future Perspectives on Clinical and Research Issues

Similar studies in other low-income countries suggest transport-based programs that will transport pregnant women to health facilities for ANC (Uganda) or incentivize

ANC visits and skilled deliveries (India) [31]. However, the economic state of Haiti as a country [38] makes interventions like this difficult in the short term. However, in the long term, interventions that prioritize transport-based programs are recommended. At present, available and functioning hospitals are dwindling in Haiti. The priority may be reinvesting in existing hospitals and finding the resources to get the existing hospitals up to speed before transportation-based programs are prioritized. Further qualitative studies and participatory action research with the matwons will help understand the underlying barriers to the provision and maintenance of good quality healthcare across the nation. We recommend, instead, that targeted health education interventions to help raise awareness about the importance of ANC during pregnancy and delivery should be promoted among pregnant women and their families, especially in rural communities where women usually have little or no education and are poor [39]. It is important to underscore to these women that pregnancy complications can arise and may go undetected without ANC visits. We believe this approach may work better since pregnant women are more likely to use ANC if they feel like their pregnancy has complications [15,32].

While infrastructure and wealth have been identified as problems in other studies [30,32,40], the obvious recommendations of improving availability and accessibility to quality healthcare by building accessible roads and building good hospitals in rural areas [41], while necessary in the long run, might not be easily achievable in the short-term but should still be recommended. Strategies that increase access to adequate maternal health services using community-based interventions are encouraged. Involving matwons in the conceptualization and implementation of health promotion strategies that target the most impoverished [22] and least educated areas and populations in the country is also recommended. Although our study assessed the availability and accessibility of ANC services, we did not directly investigate the quality of the antenatal healthcare received by these Haitian women. Since the quality of care received during these ANC visits may be associated with the pregnant woman's use of ANC services—with increased parity, we suggest further studies to better understand the actual services provided to the women in pregnancy, the quality of care as well as the Haitian woman's perception of the necessity and usefulness of the antenatal healthcare services provided during pregnancy. We recommend further qualitative studies to better understand the perceptions, targeted needs and potential barriers faced by Haitian women as they try to access good ANC services during pregnancy and childbirth.

5. Conclusions

This study highlights the problems of accessible and available antenatal care in Haiti. Although education has been found to be associated with the use of ANC services but not with access, wealth significantly affects ANC access and use by Haitian women. Both education and wealth should therefore be considered during proposed interventions or programs that promote ANC use. Considering the limited resources available in the country, policies and interventions that encourage collaboration between matwons and skilled birth attendants will help reduce pregnancy complications and maternal or child mortality in Haiti more efficiently. It is important to assess the social and structural determinants of health in Haiti when planning for any solutions to the problems of limited ANC accessibility and use.

Demographic Health Survey. The participants in this cross-sectional study were also de-identified by the DHS prior to providing the data to the authors.

Informed Consent Statement: Not applicable.

Data Availability Statement: Restrictions apply to the availability of these data. Data were obtained from the U.S. Agency for International Development and are available from the Demographic and Health Surveys (DHS) Program/at https://dhsprogram.com/data/available-datasets.cfm (accessed on 24 October 2020) with the permission of the Demographic and Health Surveys (DHS) Program.

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