

ORIGINAL RESEARCH ARTICLE

Factors associated with the utilization of antenatal care services among pregnant women in Eswatini - A cross-sectional study

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Zama Mkhonta¹, Yu-Ying Lu^{2*}, Shu-Chen Kuo³ and Chieh-Yu Liu⁴

Community Health Nurse, Releigh Fitkin Memorial Hospital, Eswatini, Africa¹; Department of Nursing, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan²; Department of Nurse-Midwifery and Women Health, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan³; Department of Health Care Management, National Taipei University of Nursing and Health Sciences, Taipei, Taiwan⁴

*For Correspondence: Email: yuyin@ntunhs.edu.tw; Phone: 886-2-28227101 ext. 3193

Abstract

The study aimed to assess the utilization of antenatal care services and its associated factors among pregnant women in Eswatini. A cross-sectional study was adopted. Convenience sampling was conducted in a public referral hospital in central Eswatini from 1st of August to the 30 of September 2021. A total of 400 newly delivered women who met the inclusion criteria were recruited. SPSS version 22.0 was used to analyze data including descriptive and bivariate analysis. Results indicated that only 13% of pregnant women booked their first ANC in the first trimester and 24.8% of them attended less than four ANC visits. Maternal education, gestational age, gravity, pregnant-related complications, medical history, and maternal health literacy were significantly associated with the utilization of ANC services ($p < .05$). To increase the utilization of ANC service, healthcare professionals should pay special attention to pregnant women with tertiary education, gave birth below 38 weeks, multi-gravities, medical history, and poor maternal health literacy. (*Afr J Reprod Health* 2022; 26[12]: 67-77).

Keywords: Eswatini, maternal health literacy (MHL), pregnant women, utilization of antenatal care services (ANC)

Résumé

L'étude visait à évaluer l'utilisation des services de soins prénatals et ses facteurs associés chez les femmes enceintes en Eswatini. Une étude transversale a été retenue. Un échantillonnage de commodité a été effectué dans un hôpital public de référence du centre d'Eswatini du 1^{er} août au 30 septembre 2021. Un total de 400 femmes nouvellement accouchées qui répondaient aux critères d'inclusion ont été recrutées. La version SPSS 22.0 a été utilisée pour analyser les données, y compris l'analyse descriptive et bivariable. Les résultats ont indiqué que seulement 13 % des femmes enceintes ont réservé leur première CPN au cours du premier trimestre et 24,8 % d'entre elles ont assisté à moins de quatre visites CPN. L'éducation de la mère, l'âge gestationnel, la gravité, les complications liées à la grossesse, les antécédents médicaux et les connaissances en matière de santé maternelle étaient significativement associés à l'utilisation des services de soins prénatals ($p < 0,05$). Pour accroître l'utilisation des services de soins prénatals, les professionnels de la santé doivent accorder une attention particulière aux femmes enceintes ayant fait des études supérieures, ayant accouché à moins de 38 semaines, multigravités, ayant des antécédents médicaux et une faible littératie en matière de santé maternelle. (*Afr J Reprod Health* 2022; 26[12]: 67-77).

Mots-clés: Eswatini, littératie en santé maternelle (MHL), femmes enceintes, utilisation des services de soins prénatals (ANC)

Introduction

Pregnant-related complications such as obstetric hemorrhage, anemia, sepsis, eclampsia, unsafe abortion, eclampsia, and obstructed labor are the leading causes of maternal mortality and morbidity. Most complications are preventable¹. Majority of studies conducted globally as well as in Eswatini have recognized that antenatal care (ANC) is a key to sustaining better maternal health and reducing maternal mortality and morbidity². However, maternal mortality ratio (MMR) in Eswatini was

unacceptably high at 437 per 100,000 births in 2017³. To reduce maternal mortality, the Eswatini Ministry of Health implemented 8 ANC visits in 2018 followed the WHO guidelines^{4,5}. Eswatini is among the low- and middle-income countries and has adopted the Basic Antenatal Care (BANC) model as an intervention for reducing maternal and child mortality. The BANC model recommends all pregnant women receive a minimum of eight ANC visits. ANC services in Eswatini is almost free and is provided in public health facilities, NGOs, and private hospitals. Utilization of ANC services is

crucial to reduce risk of adverse pregnancy outcomes. Unfortunately, the actual number of visits does not reach the recommended number of at least 4 ANC visits during pregnancy⁶. Therefore, it is an urgent need to explore the factors influencing the utilization of ANC services among pregnant women in Eswatini. Knowing the associated factors can aid in the development of appropriate interventions to improve the uptake of ANC services.

Maternal health literacy (MHL) is one of the most important factors that would influence the utilization of ANC services. MHL is defined as a woman's cognitive and social abilities and motivation to access, assess, understand and use maternal health information and services to make informed decisions that protect and promote their own and their children's health⁷. MHL helps pregnant women to understand when to start ANC visits, danger signs of pregnancy, and take action on the advice given to them by the healthcare professionals⁸. Many studies have found that MHL has an impact on the utilization of ANC services^{9,10}. Mothers with high MHL are more likely to use ANC services and have positive pregnant-related outcomes compared to those with low MHL¹¹. In addition, utilization of ANC services is associated with several socio-demographic factors such as maternal age, marital status, maternal and husband education, area of residence, religion, employment status, gestational ages, parity, and previous experiences of pregnant-related complications. Although many studies have been conducted to examine the level of MHL and the utilization of ANC services, relatively few studies have been done particularly in low and middle-income countries, particularly among pregnant women in Eswatini. Therefore, the present study aimed to understand the utilization of ANC services, levels of MHL, and to explore the influencing factors of utilization of ANC services among pregnant women in Eswatini.

Methods

Study area and period

The study was conducted at one public referral hospital (Raleigh Fitkin Memorial

Hospital/RFMH) in the Manzini region in central Eswatini. The hospital is located in a densely populated area, serving an aggregate population of 350,000. It has the highest number of hospital deliveries in the country, with an average of 500 deliveries per month¹². The research study was conducted from the 1st of August to the 30 of September 2021.

Study design

A quantitative approach was used. A cross-sectional correlational study was used to assess the utilization of ANC services and to determine the association among socio-demographics, MHL, and the utilization of ANC services among pregnant women in Eswatini.

Sample size determination

The sampling size estimation was calculated using G-Power software with a power of 0.90, alpha of 0.05, and odds ratio of 1.5 based on a logistic regression model. At least 275 participants for this study were needed. During the data collection period, 400 participants who met the inclusion criteria were invited to participate.

Inclusion/Exclusion criteria

Women aged between 15 and 45 years old who delivered within 24 hours, multiple or single pregnancies, and Swazi citizens were recruited. Women who were mentally ill, had stillbirths, with severe maternal and neonatal health problems during pregnancy and childbirth were excluded from the study.

Study variables

Dependent variables

Utilization of ANC services: Utilization of ANC services included two major variables: timing of booking initial ANC visit and the number of ANC visits attended during pregnancy. Timing of booking initial ANC visit was coded into three groups: 1st trimester, 2nd trimester, and 3rd trimester. The number of ANC visits were coded into two groups: less than 4 visits, and 4 visits and above.

Independent variables

Socio-demographics: maternal age, marital status, maternal and husband education, area of residence, religion, employment status, gestational ages, parity, pregnant-related complications and medical history were included in this study.

Maternal health literacy inventory in pregnancy (MHELIP): a 48-item structured questionnaire was used to assess participants' MHL. MHELIP included four dimensions: maternal health knowledge (21 items), search for maternal health information (6 items), assessment of health information (6 items), maternal health decision making, and behavior (15 items). Each item used a five-point Likert scale, ranging from "I don't know at all" to "I know a lot," and from "never" to "always" (with scores ranging from 1 to 5)². The original scores were translating to a score from 0 to 100 using the following formula:

$$\text{Score} = \frac{\text{Raw score} - \text{Minimum possible raw score}}{\text{Maximum possible raw score} - \text{Minimum possible raw score}} \times 100$$

MHELIP were categorized into four levels of inadequate (zero to 50), insufficient (50.1 to 66), desirable (66.1 to 84), and excellent (84.1 to 100). The inadequate and insufficient health literacy levels were defined as limited health literacy¹³. The validities of MHELIP were acceptable by face and expert validity, and construct validity. The reliability of MHELIP was proven by a Cronbach's alpha of 0.94². The Cronbach's alpha of MHELIP in the present study was 0.82.

Data collection

A structured questionnaire was used to collect data by a registered nurse-midwife using face to face interview. The data collector was trained in the general aspects of administering a questionnaire and how to ask and record responses on the research questionnaires to assure the quality of data collection. Participants were contacted in the postpartum ward within 24 hours of delivery. Informed consent was obtained from participants before the commencement of data collection. Completed questionnaires were submitted by the

data collector to the primary researcher's email. All collected data were properly coded and stored (access was limited to the researchers only) and were used exclusively for academic research purposes.

Data processing and analysis

Data were analyzed using the Statistical Product and Service Solution (SPSS) version 22.0. Socio-demographic characteristics and utilization of ANC services were analyzed using frequency and percentage. MHL was analyzed using mean and standard deviation. Associations were tested using Chi-square, ANOVA, independent t-test, and Pearson's correlation coefficient. Logistic regression was used to predict factors affecting the utilization of ANC services.

Results

Participants' characteristics

Table 1 shows the distribution of participant socio-demographic characteristics. The mean age of participants was 25.96 years (± 6.14), ranging from 15 to 45 years. The majority were either single or separated (87.0%). There were 48.3% of participants from the urban areas and 51.7% from rural areas. Most participants had secondary education (69.7%) and were Christians (95%); 49.3% of the participants were employed or self-employed. The majority of gestational ages were ≥ 38 weeks (77.5%), 62.5% of the participants were multipara, 33.5% of the participants reported complications during their recent pregnancy, and 23.0% of the participants had medical history.

The level of MHL among pregnant women in Eswatini

Table 2 shows the distribution of MHL mean scores among participants. The total mean score of MHL was 43.4 (± 9.9 ; range: 9-71) which indicated inadequate MHL. The majority (99.0%) were either inadequate or problematic maternal health literacy. Maternal health knowledge subscale had the lowest mean score (34.3 ± 13.1), followed by assessment of maternal health information (48.1 ± 13.7), search for

Table 1: Demographic and descriptive characteristics of participants (N= 400)

Characteristics	n(%)
Age	
≤ 20 years	90 (22.5)
21-34 years	270 (67.5)
>34 years	40 (10.0)
Marital status	
Single / Separated	348 (87.0)
Married	52 (13.0)
Area of residence	
Urban	193 (48.3)
Rural	207 (51.7)
Employment status	
Employed/ Self Employed	197 (49.3)
Unemployed	203 (50.7)
Partner's employment status	
Employed/ Self-Employed	323 (80.7)
Unemployed	77 (19.3)
Religion	
Christian	380 (95.0)
Muslim/ Other	20 (5.0)
Educational level	
None/Primary	36 (9.0)
Secondary	279 (69.7)
Diploma and higher	85 (21.3)
Partner's educational level	
None/Primary	33 (8.3)
Secondary	151 (37.7)
Diploma and higher	216 (54.0)
Gestational ages	
< 38 weeks	90 (22.5)
≥ 38 weeks	310 (77.5)
Gravidity	
≤ 3 pregnancies	334 (83.5)
>3 pregnancies	66 (16.5)
Parity	
1	150 (37.5)
>1	250 (62.5)
Pregnant-related complications	
No	266 (66.5)
Yes	134 (33.5)
Medical history	
No	308 (77.0)
Yes	92 (23.0)

maternal health information (51.0±14.8), and maternal health decision making and behavior (51.3±12.4).

The utilization of ANC services among pregnant women in Eswatini

This study indicated that 79.8% of the women had their first ANC visit in the second trimester (13-28 weeks), only 13% of them booked their first ANC visit in the first trimester (0-12 weeks). The mean

gestational age of starting the first ANC visit was 19.24 weeks (±5.37, range: 4-34 weeks). The mean number of ANC visits was 4.40 (±1.43, range: 1-10), 24.8% of the participants attended less than four ANC visits (Table 2).

The influencing factors of utilization of ANC services among pregnant women in Eswatini

Tables 3 and 4 show the association of socio-demographics, MHL, and the utilization of ANC visits among participants. Table 3 showed that the timing of initial ANC visit was significantly associated with educational level ($\chi^2= 14.64^{**}$), gravidity ($\chi^2= 14.01^{***}$), and MHL ($F= 11.50^{***}$) by univariate analysis. Table 4 showed that the number of ANC visits was significantly associated with educational level ($\chi^2= 8.13^*$), gestational age at childbirth ($\chi^2= 33.07^{***}$), pregnant-related complications ($\chi^2= 8.44^{**}$), medical history ($\chi^2= 4.00^*$), and MHL ($t= -3.05^{**}$) by univariate analysis.

The results of logistic regression model by the timing of initial ANC visit and the number of ANC were presented in Table 5. Results showed that women who had primary or no formal education were more likely to attend first ANC at 1st trimester compared to those with tertiary education (OR= 0.04; 95% CI: 0.003-0.45). Women who had three or fewer pregnancies were 3.3 times more likely to attend first ANC at 1st trimester (OR= 3.30; 95% CI: 1.17-9.31) compared to those with more than three pregnancies. For every increase in total MHL score, the odds of attending first ANC visit at 1st trimester increase (OR= 1.08; 95% CI: 1.03-1.14). Women who had primary or no formal education were 3.4 times more likely (OR= 3.44; 95% CI: 1.38-8.58) to attend 4 or more ANC visits compared to those with tertiary education. Moreover, women with had secondary education were 2.2 times more likely to attend 4 or more ANC visits compared to those with tertiary education (OR= 2.20; 95% CI: 1.20-4.27). Pregnant women who gave birth below 38 weeks have less odds of attending more than 4 ANC visits compared to those at 38 weeks and above (OR= 0.24; 95% CI: 0.24-0.40). Women who had 3 or fewer pregnancies had higher odds (OR: 1.28; 95% CI: 0.71-2.31) of attending 4 or more ANC visits

Table 2: Distribution of maternal health literacy and utilization of ANC services (N= 400)

Variables	n (%)	M±SD / Range
MHL: total scores		43.4±9.9 / 9-71
Inadequate	305 (76.2)	
Problematic	91 (22.8)	
Sufficient	4 (1.0)	
Excellent	0 (0)	
Maternal health knowledge		34.3±13.1 / 2-74
Inadequate	357 (89.2)	
Problematic	40 (10.0)	
Sufficient	3 (0.8)	
Excellent	0 (0)	
Search for maternal health information		51.0±14.8 / 8-88
Inadequate	208 (52.0)	
Problematic	122 (30.4)	
Sufficient	67 (16.8)	
Excellent	3 (0.8)	
Assessment of mantel health information		48.1±13.7 / 0-88
Inadequate	227 (56.6)	
Problematic	133 (33.3)	
Sufficient	39 (9.8)	
Excellent	1 (0.3)	
Mantel health decision-making and behavior		51.3±12.4 / 17-82
Inadequate	196 (49.0)	
Problematic	157 (40.0)	
Sufficient	47 (11.0)	
Excellent	0 (0)	
Utilization of ANC services		
Number of ANC visits (times)		4.40±1.43 / 1-10
< 4	99 (24.8)	
≥ 4	301 (75.2)	
Timing of initial ANC visit (weeks)		19.24±5.37 / 4-34
1 st trimester (0-12 weeks)	55 (13.8)	
2 nd trimester (13-28 weeks)	319 (79.8)	
3 rd trimester (>28 weeks)	26 (6.4)	

Inadequate= 0 to 50; Problematic= 50.1 to 66; Sufficient= 66.1 to 84; Excellent= 84.1 to 100

Table 3: Univariate analysis for the timing of initial ANC visit (N= 400)

variables	1 st trimester	2 nd trimester	3 rd trimester	Test statistics
Age				X ² = 1.11
≤ 20 years	13 (23.6)	72 (22.6)	5 (19.2)	
21-34 years	35 (63.6)	217 (68.0)	18 (69.2)	
>34 years	7 (12.7)	30 (9.4)	3 (11.5)	
Marital Status				X ² = 1.52
Single / Separated	45 (81.8)	280 (87.8)	23 (88.5)	
Married	10 (18.2)	39 (12.2)	3 (11.5)	
Area of residence				X ² = 3.23
Rural	21 (38.2)	161 (50.5)	11 (42.3)	
Urban	34 (61.8)	158 (49.5)	15 (57.7)	
Employment status				X ² = 3.02
Employed / Self-Employed	32 (58.2)	155 (48.6)	10 (38.5)	
Not Employed	23 (41.8)	164 (51.4)	16 (61.5)	
Partner's employment status				X ² = 0.27
Employed/ Self-Employed	43 (78.2)	259 (81.2)	21 (80.8)	
Not Employed	12 (21.8)	60 (18.8)	5 (19.2)	
Religion				
Christian	51 (92.7)	305 (95.6)	24 (92.3)	X ² = 1.25

Muslim /Other	4 (7.3)	14 (4.4)	2 (7.7)	$X^2 = 14.64^{**}$
Educational level				
None/Primary	1 (1.8)	28 (8.8)	7 (26.9)	
Secondary	43 (78.2)	220 (69.0)	16 (61.5)	
Tertiary	11 (20.0)	71 (22.3)	3 (11.5)	$X^2 = 4.00$
Partner's educational level				
None/Primary	5 (9.1)	27 (8.5)	1 (3.8)	
Secondary	17 (30.9)	121 (37.9)	13 (50.0)	
Tertiary	33 (60.0)	171 (53.6)	12 (46.2)	$X^2 = 3.61$
Gestational ages				
< 38 weeks	12 (21.8)	76 (23.8)	2 (7.7)	
≥ 38 weeks	43 (78.2)	243 (76.2)	24 (92.3)	
Gravidity				$X^2 = 14.01^{***}$
≤ 3 Pregnancies	45 (81.8)	274 (85.9)	15 (57.7)	
>3 Pregnancies	10 (18.2)	45 (14.1)	11 (42.3)	
Parity				
1	20 (36.4)	123 (38.6)	7 (26.9)	$X^2 = 1.10$
>1	35 (63.6)	196 (61.4)	19 (73.1)	
Pregnant-related complications				
No	32 (58.2)	215 (67.4)	19 (73.1)	
Yes	23 (41.8)	104 (32.6)	7 (26.9)	$X^2 = 4.39$
Medical history				
No	42 (76.4)	250 (78.4)	16 (61.5)	
Yes	13 (23.6)	69 (21.6)	10 (38.5)	
MHL scores (M+SD)	56.52 (11.78)	51.11 (11.94)	42.82 (14.79)	$F = 11.50^{***}$

* $p < .05$, ** $p < .01$, *** $p < .001$; Based on chi-square test and ANOVA

Table 4: Univariate analysis for the number of ANC visits (N= 400)

variables	< 4 times	≥ 4 times	Test statistics
Age			$X^2 = -0.84$
≤ 20 years	27 (27.3)	63 (20.9)	$X^2 = 0.42$
21-34 years	61 (61.6)	209 (69.4)	
>34 years	11 (11.1)	29 (9.6)	
Marital Status			
Single / Separated	88 (88.9)	260 (86.4)	$X^2 = 0.17$
Married	11 (11.1)	41 (13.6)	
Area of residence			
Rural	46 (46.5)	147 (48.8)	
Urban	53 (53.5)	154 (51.2)	$X^2 = 3.23$
Employment status			
Employed / Self-Employed	41 (41.4)	156 (51.8)	
Not Employed	58 (58.6)	145 (48.2)	
Partner's employment status			$X^2 = 0.75$
Employed/ Self-Employed	77 (77.8)	246 (81.7)	
Not Employed	22 (22.2)	55 (18.3)	
Religion			
Christian	95 (96.0)	285 (94.7)	$X^2 = 0.26$
Muslim /Other	4 (4.0)	16 (5.3)	
Educational level			
None/Primary	13 (13.1)	23 (7.6)	
Secondary	74 (74.7)	205 (68.1)	$X^2 = 8.13^*$
Tertiary	12 (12.1)	73 (24.3)	
Partner's educational level			
None/Primary	6 (6.1)	27 (9.0)	
Secondary	41 (41.4)	110 (36.5)	$X^2 = 1.27$
Tertiary	52 (52.5)	164 (54.5)	
Gestational ages			
< 38 weeks	43 (43.4)	47 (15.6)	
≥ 38 weeks	56 (56.6)	254 (84.4)	$X^2 = 33.07^{***}$

Gravidity			$X^2 = 0.69$
≤ 3 Pregnancies	80 (80.8)	254 (84.4)	
>3 Pregnancies	19 (19.2)	47 (15.6)	
Parity			$X^2 = 0.27$
1	36 (36.4)	114 (37.9)	
>1	63 (63.6)	187 (62.1)	
Pregnant-related complications			$X^2 = 8.44^{**}$
No	54 (54.5)	212 (70.4)	
Yes	45 (45.5)	89 (29.6)	
Medical history			$X^2 = 4.00^*$
No	69 (69.7)	239 (79.4)	
Yes	30 (30.3)	62 (20.6)	
MHL scores (M±SD)	40±9.46	44.27±9.88	$t = -3.05^{**}$

* $p < .05$, ** $p < .01$, *** $p < .001$; Based on chi-square test and independent-test

Table 5: Predictors of the timing of initial ANC visit and the number of ANC visits

Timing of initial ANC visit	1 st vs. 3 rd trimester (reference) OR (95% CI)	2 nd vs. 3 rd trimester (reference)
Education level: Tertiary (Reference)		
None/Primary	0.04 (0.003-0.45) *	0.17 (0.04-0.70) **
Secondary	0.73 (0.18-2.97)	0.58 (0.17-2.05)
Gravidity: > 3 pregnancies (Reference)		
≤ 3 pregnancies	3.30 (1.17-9.31)*	4.47 (1.93-10.34)***
MHL total score	1.08 (1.03-1.14)**	1.07 (1.03-1.12)***
Number of ANC visits	≥ 4 times (reference) vs. < 4 times OR (95% CI)	
Education level: Tertiary (Reference)		
None/Primary	3.44 (1.38-8.58) **	
Secondary	2.20 (1.20-4.27)*	
Gestational ages: ≥38 weeks (Reference)		
<38 weeks	0.24 (0.24-0.40)***	
Gravidity: > 3 pregnancies (Reference)		
≤ 3 pregnancies	1.28 (0.71-2.31)***	
Complications: Yes (Reference)		
No	0.50 (0.32-0.80)**	
Medical History: Yes (Reference)		
No	0.60 (0.36-1.00)*	
MHL total score	0.58 (0.33-1.02)**	

* $p < .05$, ** $p < .01$, *** $p < .001$; Based on logistic regression analysis

compared to those who had 3 or more pregnancies. Women without complications during pregnancy were 0.5 times less likely to attend 4 or more ANC visits compared to those who had complications (OR= 0.50; 95% CI: 0.32-0.80). Women without medical history were 0.6 times less likely attending 4 or more ANC visits compared to those with medical history (OR= 0.60; 95% CI: 0.36-1.00). For every decrease in total maternal health literacy score, the odds of having more than four ANC visits decreased by 42% (OR= 0.58; 95% CI: 0.33 - 1.02).

Discussion

The study aimed at increasing our understanding of the utilization of ANC services, levels of MHL, and

to explore the influencing factors of utilization of ANC services among pregnant women in Eswatini. Overall, the results showed that only 13% of pregnant women booked their first ANC in the first trimester, 24.8% of the participants attended less than four ANC visits. In addition, majority of pregnant women in Eswatini had inadequate MHL. In the logistic regression model, the results indicated that higher education, greater gravidity, and lower MHL scores significantly decreased the odds of booking first ANC visit at 1st trimester; higher education, gestational age below 38 weeks combined with those without pregnancy-related complications and medical history, and lower MHL scores significantly decreased the odds of attending 4 and more ANC visits.

In this study, 79.8% of the women had their first ANC visit in the second trimester (13-28 weeks), only 13% of them book their first ANC visit in the first trimester (0-12 weeks). The mean number of ANC visits was 4.40, one-quarter of the women attended less than 4 ANC visits. The results were consistent with studies conducted in other developing countries¹⁴. A study done in Eswatini in the Shiselweni region found 64% of pregnant women book their first ANC visit during the 2nd trimester and 22% during the 3rd trimester¹⁵. A study conducted in Addis Ababa, 65.6% of women started their first ANC visit within 16 gestational weeks¹⁶. In Bangladesh, only 6% of the mothers received the WHO-recommended 8 or more ANC visits, and 31% received at least 4 ANC visits¹⁶.

Although the ANC services is almost free of charge at the health facilities in Esiwantini, the utilization of ANC services amongst pregnant women is below WHO's recommendation. It might be because of cultural beliefs, for example waiting for the pregnancy to be visible to start ANC visits, showing pregnancy at an early stage is taboo and drawing attention to miscarriage due to witchcraft, which results in low usage of ANC services¹⁸. In addition, low compliance toward the utilization of ANC services amongst Eswatini pregnant women might be partly related to the patriarchal nature country, women need permission and financial support from their husbands or partners to attend ANC visits¹⁹. Finding from a qualitative research indicated that issues related to access to health facilities and lack of resources, the influence of the socio-cultural context and conflict, misperceptions about pregnancy, and perceptions about the quality of ANC were the barriers for a pregnant woman to attend ANC services²⁰. Research indicated that knowledge and experience of ANC services, access to sources of information, and access to counseling services might help women to utilize ANC services²¹. These findings are important for researchers to explore the facilitating factors and barriers to use ANC services in the future for formulating intervention programs to improve the utilization.

Maternal education, gestational age at delivery, gravity, pregnant-related complications, medical history, and MHL have been identified as important predictors of the utilization of ANC

services in this present study. Women with lower education levels reported a higher chance of booking the first ANC visit at 1st trimester and attending more than 4 ANC visits. Similarly, a study done in Nigeria found that educated women missed follow-up ANC visits compared to low educated women because of their busy work schedules²². Moreover, some evidence from India does not support that education leads to an increased number of ANC visits and better maternal health decision-making²³. However, this study results are inconsistent with most of studies. Previous studies indicated that educated women tend to have a greater awareness of ANC services and more likely to attend ANC²⁴. One possible reason is that highly educated women in Eswatini might tend to use ANC services in private facilities than in public ones, which led to this finding.

This study showed that women who give birth below 38 gestational weeks have less chances of meeting or fulfilling at least 4 ANC visits as compared to those who give birth more than 38 weeks especially if their first visit was late. In Eswatini, most woman cannot accurately recall their last day of menstruation and rely on traditional method of estimating date of delivery. Similar results were found in a study done in low-income and middle-income country most pregnant women have less ANC visit because of wrong estimation date of delivery²⁵. In the present study, majority of participants were single. Study by Exavery *et al.* Revealed that single marital status was one of significant predictors of both mistimed and unwanted pregnancies and women whose pregnancies are mistimed or unwanted may be reluctant to initiate ANC because of hoping the pregnancy will disappear²⁶.

Women who had higher gravidity reported lower chance of booking their first ANC visit in the first trimester in this study. Researcher has found that as parity increases, the timely initiation of ANC decreases. Women with high gravidity may tend to feel more confident during pregnancy and consider ANC to be less important. This finding was consistent with a study done in Nigeria, compared to first-time mothers, women with more than one child tended to start ANC late because they considered themselves expert mothers²⁷. Similar findings were found in a study done in Eswatini,

high parity women tend to rely on their past pregnancy experiences and not feel the need for ANC²⁸.

Women without pregnant-related complications and no medical history reported a less chance of attending 4 or more ANC visits in this study. Women with complications and medical history during pregnancy that need more ANC visits for close monitoring than women without complications and medical history. The observation is that since women with high-risk pregnancy know the consequences, in turn, tend to use ANC more to avoid future abortion and stillbirth. The findings are similar to a study done in Rwanda where women with no pregnant complications were less likely to attend more ANC visits and deliver at health facilities by skilled midwives compared to their counterparts²⁹.

The current study found a significant association between MHL and the utilization of ANC visits. Participants with higher MHL engaged in ANC at an early stage of their pregnancy and attended more ANC visits. Pregnant women in Eswatini had inadequate levels of MHL, especially in the domains of maternal health knowledge, and assessment of maternal health information. The low MHL among pregnant women in Eswatini could probably be because most of them were less educated, had low socioeconomic status, and were from rural areas. Studies have reported that obtaining adequate ANC was influenced by the level of health literacy. Women with adequate MHL understand the purposes of ANC services more than those with low MHL^{30,31}. A Kenyan study found that those with high MHL attended more than 4 ANC visits compared to those with low MHL³².

Recommendations for clinical practices

This study found that majority of pregnant women in Eswatini do not complete the recommended number of 8 visits and start their initial ANC visit at 1st trimester during pregnancy. In the communities, general awareness on the importance of timing and number of ANC visits among pregnant women and their partners should be initiative by local radios, newspapers or brochures. Emphasis should further be on supporting

multigravida, small gestational ages, low-risk, low MHL of pregnant women and to follow the recommendations of ANC services. Healthcare professionals have an important task to improve women and their partner's awareness of ANC and commitment to utilize the ANC services to ensure maternal care and improve better pregnancy outcomes.

Limitations/Future research

This study was a cross-sectional study and the results cannot be used to infer causation. Future studies should adopt qualitative or longitudinal studies to explore the reasons behind associated factors for the poor utilization of ANC services. Subjects for the study were limited to a convenience sample of newly delivered women from one public referral hospital in central Eswatini. The sample may not be generalizable to all populations. The sample size and range of subjects should be expanded to confirm these results in future studies.

Conclusion

This study has provided data on MHL and the utilization of ANC services among pregnant women in Eswatini. Several important predictors of the utilization of ANC services including maternal education, gestational age at delivery, gravity, pregnant-related complications, medical history, and MHL have been identified in this study. Healthcare professionals should pay special attention to pregnant women who present with the factors associated with the utilization of ANC services identified in this study. The maternal health programs should consider the sociodemographic and obs-gyn factors associated with the utilization of ANC services. Health education programs to increase women's MHL should also be developed and strengthened. Qualitative studies are needed to investigate the reasons for the poor utilization of ANC services.

Authors contribution

Zama Mkhonta and Yu-Ying Lu took part in research design, data collection, data analysis, interpretation, and manuscript development. Shu-

Chen Kuo and Chieh-Yu Liu gave critical revision of this research.

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Ethical approval

Ethical approval to conduct the study was granted by the Research Ethics Committee at the Ministry of Health in Eswatini (reference no. 00011253). All study subjects consented to it before data collection.

Conflict of interest

All authors declare that they have no conflict of interest.

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