Prevalence and Correlates of Pregnancy Self-Testing Among Pregnant Women Attending Antenatal Care in Western Kenya

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Abstract

In sub-Saharan Africa little is known about how often women use pregnancy self-tests or characteristics of these women despite evidence that pregnancy self-testing is associated with early antenatal care (ANC) attendance. Understanding the characteristics of women who use pregnancy self-tests may facilitate early access to ANC and preventive interventions in pregnancy. We conducted a cross-sectional survey on an ongoing pre-exposure prophylaxis (PrEP) implementation study which enrolled pregnant women to determine the prevalence and factors associated with pregnancy self-testing among women in western Kenya. Overall in our study population, the prevalence of pregnancy self-testing was 22% and higher among women who were employed, currently in school, had previous pregnancy complications, received services from urban health facilities, and had partners who had at least attended secondary school. The most reported reasons for non-use of pregnancy self-tests included not thinking it was necessary, lack of knowledge, and lack of money to pay for the test. Future research should focus on understanding the knowledge and attitudes of women toward pregnancy self-testing.

Introduction

The World Health Organization (WHO) recommends that pregnant women should initiate the first antenatal care (ANC) visit in the first trimester of pregnancy because early ANC access is central to identifying pregnancy complications and managing pre-existing conditions.(1) However, in western Kenya, less than 20% of pregnant women are estimated to present for ANC in the first trimester.(2) Barriers to early initiation of ANC due to uncertainty of pregnancy status during the first trimester can potentially be addressed by improving access to pregnancy testing.(3, 4) However, little is known about how often women use pregnancy self-tests or the characteristics of these women. Understanding the characteristics of women who use pregnancy self-tests is important to facilitate early access to ANC and to preventive interventions in pregnancy. In this study, our primary objective was to determine the prevalence of pregnancy self-testing and associated factors among pregnant women attending maternal and child health (MCH) clinics in western Kenya. In a secondary objective, we evaluated the factors associated with early ANC initiation among pregnant women.

Methods

Study design

From November 2018 to July 2019, we conducted a cross-sectional survey among pregnant women enrolling in the PrEP Implementation for Mothers in Antenatal Care (PrIMA) study. PrIMA is a cluster randomized trial (NCT03070600) that aims to compare approaches for delivering oral pre-exposure prophylaxis (PrEP) in pregnancy. The study protocol is described elsewhere.(5) Briefly, study participants were recruited from women presenting for ANC in 20 public health facilities in Homabay and Siaya counties in western Kenya. Participants answered questions on socio-demographics, medical and pregnancy history, and partner characteristics.

Study variables

We analyzed two dependent variables: pregnancy self-test use and early ANC. Pregnancy self-test users were defined as those who reported using a pregnancy self-test when asked "*Once you suspected that you were pregnant, how did you confirm that you were pregnant?*" Early ANC was defined as initiation of the first ANC visit during the first trimester of pregnancy. We analyzed variables that we hypothesized would be associated with pregnancy self-test use and early ANC including maternal age, education level, employment status, marital status, partners' education level, gravidity, prior pregnancy complications, travel time to health facility, and location of health facility. We analyzed pregnancy self-test use as an independent variable when evaluating factors associated with early ANC.

Statistical analysis

We examined the prevalence and correlates of pregnancy self-test use and early ANC among pregnant women. We estimated the odds of pregnancy self-test use and early ANC using univariate and multivariable logistic regression models. In the multivariable analyses, we adjusted for all the above-mentioned independent variables. Statistical analyses were performed using R software (R-Studio Version 1.1.456) and STATA 15.1 (College Station, TX).

Ethics

The study was approved by the Kenyatta National Hospital and the University of Washington institutional review boards. All participants provided informed consent to participate in the study.

Results

Socio-demographic and pregnancy-related characteristics

Overall, this analysis included 1085 pregnant women between the ages of 15-43 years, median age 24 (IQR 21-28). At the time of the survey, the majority of the respondents were married (87%), not employed (89%), 25 years or older (49%), not in school (91%) and had previously been pregnant (78%) (Table 1). Approximately 65% of women confirmed their pregnancy in the first trimester. However, only 35% of the women presented for ANC early - in the first 12 weeks of pregnancy. Fifty-eight percent of the women presented for ANC during the second trimester, and 8% during the third trimester.

Twenty-two percent of women reported using a pregnancy self-test to confirm their pregnancy (Table 1). Of the 830 respondents who did not use a self-test: 85% confirmed their pregnancies at a public health facility, 9% at a private health facility, and 6% did not confirm their pregnancy. Users of pregnancy self-tests obtained their kits from a community pharmacy (77%), a public health facility (14%), a private health facility (7%), and stores (2%). The most frequent reasons for non-use of pregnancy self-tests included: not thinking it was necessary (57%), lack of knowledge on self-tests (26%), and lack of money to pay for a self-test (11%).

Prevalence and correlates of pregnancy self-testing

Table 2 shows the univariate and multivariable logistic regression results for variables associated with pregnancy self-testing. In the univariate analysis, self-test use was associated with employment status (OR=3.25, 95% CI 2.24, 4.72), education status (OR= 2.42, 95% CI 1.55, 3.80), gravidity (OR= 0.54, 95% CI 0.39, 0.74), travel time to health facility (OR= 1.72, 95% C 1.26, 2.35), partner's education level (some high school [OR= 2.41, 95% CI 1.55, 3.75] and some college [OR= 8.00, 95% CI 5.07, 12.58]), and location of health facility (OR= 2.44, 95% CI 1.82, 3.26). In multivariate analyses, self-test use was more likely among women who were employed (aOR=2.43, 95% CI 1.53, 3.85), currently in school (aOR= 2.14, 95% CI 1.19, 3.85), had previous pregnancy complications (aOR=1.34, 95% CI 1.24, 2.53), and received services from urban health facilities (aOR=1.77, 95% CI 1.24, 2.53). Compared to women whose partners had a primary school education or less, self-test use was 2 times more likely among women whose partners had some high school education (aOR= 2.10, 95% CI 1.32, 3.34) and 6 times more likely among women whose partners had attended college (aOR=5.93, 95% CI 3.60, 9.76). Pregnancy self-testing was not associated with age, marital status, having had a prior pregnancy, and travel time to health facility.

Prevalence and correlates of early antenatal care attendance

Table 3 shows univariate and multivariable logistic regression results for variables associated with early ANC attendance. In the univariate analysis, early ANC was associated with pregnancy self-testing (OR= 1.50, 95% CI 1.12, 2.00), gravidity (OR= 0.65, 95% CI 0.49, 0.87), maternal age (being between 20-24 [OR=1.55, 95% CI 1.01, 2.39]), receiving services from an urban health facility (OR= 1.66, 95% CI 1.28, 2.15), having had previous pregnancy complications (OR= 1.97, 95% CI 1.17, 3.32), and having a partner who had attended college (OR=2.04, 95% CI 1.43, 2.92). In multivariate analyses, women who initiated ANC early were more likely to have had prior pregnancy complications (aOR=2.18, 95% CI 1.22, 3.90), be pregnant for the first time (aOR=0.58 95 % CI 0.38, 0.87), have a partner who attended college (aOR=1.58, 95% CI 1.03, 2.40), and received services from an urban health facility (aOR=1.51, 95% CI 1.11, 2.05). Early ANC initiation was not associated with pregnancy self-test use, age, marital status, employment status, education status, and travel time to health facility.

Discussion

In this study, we investigated the prevalence and correlates of pregnancy self-testing among pregnant women attending maternal and child health clinics in western Kenya. To our knowledge, this is the first study that has examined the factors associated with pregnancy self-testing among pregnant women. Overall, the prevalence of pregnancy self-testing in the study population was low with 22% of women reporting having used a pregnancy self-test to confirm their pregnancy. These findings are similar to a South African study in 2006 that reported use of pregnancy self-tests among 27% of ANC clients.(6) It is interesting to note that the majority of women who did not use a pregnancy self-test either did not think it was necessary or did not know that they could use one suggesting the need for further studies to understand women's knowledge and attitudes toward pregnancy self-testing. In the study population,

maternal employment and education status, prior pregnancy complications, location of health facility, and partner's education level were the strongest correlates of pregnancy self-testing. These findings might reflect awareness or perception of the need for pregnancy self-testing, or availability of financial resources toward pregnancy self-tests. Employed women may have greater autonomy in their finances compared to women who are not employed.(7) Education may be directly related to awareness of pregnancy self-tests which can be attributed to formal education.(8) Partner's education is an important determinant of women's health seeking behavior. One study found that a partner's schooling has strong effects on their spouses' health care utilization especially when partners have at least a secondary school education.(7) Women residing in rural areas are less likely to use pregnancy self-tests due to the sparse distribution of health services.(9) Poor education levels in rural areas may impact awareness of pregnancy tests. For women with previous pregnancy complications, confirming a pregnancy early becomes increasingly important due to the stigma surrounding infertility.(10)

In this study population, we found that 35% of women reported attending their first ANC visit in the first trimester of pregnancy. This proportion is similar to findings reported for sub-Saharan Africa (24.9%) in a recent systematic review (12) and a 20% national average in the Kenya Demographic and Health Survey (KDHS).(2) We found that women who initiated ANC in the first trimester were more likely to have been previously pregnant, have had previous pregnancy complications, have a partner who attended college, and received services from an urban health facility. Our findings are consistent with other studies which have shown that multigravida women are less likely to present early for ANC than primigravida women.(10) One study from Zimbabwe found that women who had at least one previous pregnancy were more likely to delay ANC.(13) As the number of children increases, the utility of ANC decreases.(11) Women with prior pregnancy complications are more likely to present early for ANC. This finding is consistent with findings from other studies and can be attributed to the fact that women who have not experienced adverse pregnancy complications do not perceive the necessity of ANC services.(4, 10, 14–16) There are several mechanisms through which partner's education may affect ANC utilization. Having more education may encourage adoption of positive health seeking behaviors, including the appropriate and timely use of ANC services.(17) Education also influences one's occupational trajectories and earning potential.(18) Women residing in rural locations are more likely to delay initiation of ANC compared with urban dwellers. This finding is consistent with other studies in sub-Saharan Africa.(8, 13, 19–21) This may be due to better access and availability of health care services in urban areas. However, we did not find any association between maternal education and early ANC attendance. This could be explained by the fact that maternal education was categorized as a binary variable and women were assigned to either being currently in school or not currently in school. We did not have access to the women's education levels, which is a limitation of this study.

To our knowledge this is one of the few studies to evaluate whether pregnancy testing is associated with early ANC attendance. Several studies have found that women who recognized their pregnancy using a urine test were less likely to delay ANC compared to women who used other means such as missed periods.(22, 23) A prior study in South Africa reported an association between pregnancy self-testing and timing of ANC initiation. The study treated timing of ANC initiation as a continuous variable and found

that obtaining a urine pregnancy test from a private pharmacy was associated with a 3.6 week decrease in the gestational age at presentation for ANC.(6) In this study, we treated early ANC initiation – ANC attendance during the first 12 weeks of pregnancy – as a categorical variable. In the univariate analysis, we found that women who reported having used a pregnancy self-test were more likely to attend antenatal care in the first 12 weeks of pregnancy. However, after adjusting for partner's education level, location of the health facility, gravidity, and previous pregnancy complications, this association was no longer significant. The study sample size may not have been sufficient to observe a statistically significant association. Additionally, the characteristics of the pregnant women in our study population could have been different from the women in the South Africa study. As such the women in our study population could have different antenatal care seeking behaviors. Also, while previous studies focused on whether access to pregnancy testing reduced gestational age at presentation for ANC, our study evaluated whether pregnancy self-testing was associated with an increased likelihood of presenting for ANC during the first trimester. Future research should investigate whether access to pregnancy self-tests by women who are less likely to use pregnancy self-tests would increase the likelihood of presenting early for ANC.

Our study has some limitations. Although we were able to recruit over 1000 study participants from 20 clinics in western Kenya, the majority of the participants came from rural areas therefore some aspects of our findings may not generalize to other settings. Secondly, participants self-reported when they confirmed their pregnancy and when they first presented for antenatal care, this could lead to differential misclassification due to recall bias. Finally, given that we conducted secondary analysis from an existing cluster randomized trial, we were unable to assess additional variables such as knowledge and attitudes toward pregnancy self-testing and ANC that may be associated with pregnancy testing and early ANC.

In conclusion, our study found a modest overall use of pregnancy self-tests. The majority of women either did not see the utility of pregnancy self-testing or did not know about pregnancy self-tests. Promoting awareness of pregnancy self-tests may be a useful driver of earlier ANC attendance and warrants further research. Qualitative research is needed to understand women's attitudes, knowledge and motivations toward pregnancy self-testing and how it informs decision-making around ANC attendance.

Abbreviations

ANC	Antenatal care
KDHS	Kenya demographic and health survey
MCH	Maternal child health
PrEP	Pre-exposure prophylaxis
PRIMA	PrEP implementation for mothers in antenatal care
WHO	World Health Organization

Declarations

Ethics approval and consent to participate

The study was approved by the Kenyatta National Hospital and the University of Washington institutional review boards. All participants provided informed consent to participate in the study.

Consent for publication

Not applicable.

Availability of data and materials

The datasets during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

NN designed the study, worked on the analysis and drafted the manuscript. MM designed the study, supervised and worked on the analysis and drafted the manuscript. KM supervised the data analysis, contributed to interpretation of the analysis and revised the manuscript. JD, JK, JB, GJS, LG, MM and BO revised the manuscript. All authors read and approved the final manuscript.

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Tables

Table 1: Characteristics of pregnant women who confirmed their pregnancy with or without conducting a pregnancy self-test (n=1074)

Characteristics	Conducted a pregnancy self-test (n=244) [a]		Did not conduct a pregnancy self-test(n=830) [a]		
	N	(%)	N	(%)	p-value
Age					0.982
15-19	29	(12)	98	(12)	
20-24	93	(40)	309	(39)	
25	113	(48)	387	(49)	
Currently in school					<0.001
Yes	36	(15)	55	(7)	
No	206	(85)	763	(93)	
Previously pregnant					<0.001
Yes	168	(69)	667	(80)	
No	76	(31)	162	(20)	
Marital status					0.572
Currently married[b]	208	(86)	719	(88)	
Not married[c]	33	(14)	101	(12)	
Currently employed					<0.001
Yes	61	(25)	77	(9)	
No	181	(75)	742	(91)	
Travel time to the health facility (minutes)					0.001
30	172	(71)	482	(59)	
30	70	(29)	338	(41)	
Partner's education attainment					<0.001
Primary school and below[d]	31	(14)	291	(40)	
Some high school[e]	83	(38)	323	(44)	
Some college[f]	103	(47)	121	(16)	

Health facility location					<0.001
Urban	120	(49)	236	(28)	
Rural	124	(51)	594	(72)	
Previous pregnancy complications[f]					0.610
Yes	15	(6)	44	(5)	
No	229	(94)	786	(95)	
Timing of pregnancy confirmation					<0.001
1st trimester	201	(82)	496	(60)	
2nd trimester	40	(16)	302	(36)	
3rd trimester	3	(1)	32	(4)	

[a]The number of respondents for each variable may vary due to missing responses

[b]Includes respondents who are married and come we stay

[c]Includes respondents who are single, divorced, widowed, have a steady boyfriend

[d]Includes respondents with no formal education and those who either completed or did not complete primary school

[e]Includes respondents who at least attended high school

[f]Includes respondents who at least attended college

[g]Includes late pregnancy bleeding, miscarriage, fetal miscarriage, and high blood pressure

Table 2: Logistic regression model for variables associated with pregnancy self-testing (N=909)

	OR(95% CI)	
Predictor Variables	**Crude**	**Adjusted**
Marital status (reference group: unmarried)		
Married	0.89(0.58, 1.35)	1.54(0.77, 3.08)
Previous pregnancy (reference group: no)		
Yes	0.54(0.39, 0.74)	0.79 (0.49, 1.27)
Age (reference group: 15-19)		
20-24	1.02(0.63, 1.64)	0.77(0.41, 1.43)
25	0.99(0.62, 1.57)	0.80(0.41, 1.53)
Employment status (reference group: no)		
Yes	3.25(2.24, 4.72)	2.43(1.53, 3.85)
Education status (reference group: no)		
Yes	2.42(1.55, 3.80)	2.14(1.19, 3.85)
Travel time to health facility(minutes) (reference group: 30)		
30	1.72(1.26, 2.35)	1.15(0.79, 1.67)
Partners education attainment (reference group: some primary school)		
Some high school	2.41(1.55, 3.75)	2.10(1.32, 3.34)
Some college	8.00(5.07, 12.58)	5.93(3.60, 9.76)
Previous pregnancy complications (reference group: no)		
Yes	1.17(0.64, 2.14)	1.34(1.24, 2.53)
Location of health facility (reference group: rural health facilities)		
Urban health facilities	2.44(1.82, 3.26)	1.77(1.24, 2.53)

Table 3: Logistic regression model for variables associated with early antenatal care attendance (N=909)

	OR (95% CI)	
Predictor Variables	**Crude**	**Adjusted**
Pregnancy self-testing		
Non-pregnancy self-test use	1.50(1.12, 2.00)	1.09(0.76, 1.55)
Marital status (reference group: unmarried)		
Married	1.29(0.87, 1.90)	1.23(0.68, 2.24)
Previous pregnancy (reference group: no)		
Yes	0.65(0.49, 0.88)	0.58(0.38, 0.87)
Age (reference group: 15-19)		
20-24	1.55(1.01, 2.39)	1.30(0.76, 2.21)
25	1.17(0.76, 1.79)	1.20(0.69, 2.09)
Employment status (reference group: no)		
Yes	1.33(0.93, 1.92)	1.19(0.77, 1.83)
Education status (reference group: no)		
Yes	0.98(0.62, 1.54)	0.96(0.55, 1.67)
Travel time to health facility(minutes) (reference group: 30)		
30	1.24(0.95, 1.61)	1.00(0.74, 1.35)
Partners education attainment (reference group: some primary school)		
Some high school	1.32(0.97, 1.81)	1.19(0.84, 1.67)
Some college	2.04(1.43, 2.92)	1.58(1.03, 2.40)
Previous pregnancy complications (reference group: no)		
Yes	1.97(1.17, 3.32)	2.18(1.22, 3.90)
Location of health facility (reference group: Rural health facilities)		

Urban health facilities	1.66(1.28, 2.15)	1.51(1.11, 2.05)

Supplementary Files

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