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Original Research Article

Missed opportunities for antenatal syphilis testing and its associated factors among mothers delivered at fort portal regional referral hospital, Uganda: a cross-sectional study

Theoneste Hakizimana[1]*, Marie Pascaline Sabine Ishimwe[2], Yarine Fajardo[1], Christine Olwedo Adoch[3], Ugwu Okechukwu Paul-Chima[4], Rogers Kajabwangu[1]

[1]Department of Obstetrics and Gynecology, Kampala International University, Kampala, Uganda
[2]Department of General Medicine, University of Rwanda, Butare, Rwanda
[3]Department of Ear, Nose and Throat, Busitema University, Tororo, Uganda
[4]Department of Publications and Extension, Kampala International University, Kampala, Uganda

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***Correspondence:**
Dr. Theoneste Hakizimana,
E-mail: theonestehakizimana5@gmail.com

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ABSTRACT

Background: The global effort to eradicate mother to child transmission (MTCT) of syphilis concentrated on attaining antenatal syphilis screening and treatment; nevertheless, there is lack of data about the accessibility of prenatal screening and treatment in Sub-Saharan Africa (SSA). This study aimed at determining the proportion of missed opportunities for antenatal syphilis testing and associated factors among mothers in rural western Uganda delivered at Fort Portal Regional Referral Hospital (FRRH).
Methods: A cross-sectional study was conducted from postnatal ward of FRRH from April to July 2022. Consecutive sampling of 381 participants was done. A structured pretested questionnaire was used to obtain Sociodemographic details and other factors required for analysis. Using SPSS version 22.0, descriptive statistical analysis was done and binary logistic regression was computed to determine factors associated with missed opportunities for antenatal syphilis testing with a significance level of 5% and 95% confidence interval.
Results: The proportion of missed opportunities for syphilis testing was 124 (32.5%). lack of syphilis test counseling (aOR= 4.3 [2.009-9.438], lack of knowledge of syphilis MTCT (aOR= 3.1 [1.120-8.903], lack of transport (aOR= 10.7 [3.116-36.810] and fear of testing (aOR= 4.3 [1.075-17.484] were found to be independently associated factors after multivariate analysis.
Conclusions: Our study findings demonstrated the need of sensitization of healthcare providers including antenatal care (ANC) staff about the role of identifying mothers who missed antenatal syphilis testing while in postnatal ward for education, counselling and testing.

Keywords: Antenatal care, Antenatal syphilis testing, Missed opportunities, Syphilis testing

INTRODUCTION

Treponema pallidum infects approximately 2 million pregnant women worldwide each year, with a 45-70 percent risk of vertical transmission to neonates.[1] Each year, over one million pregnancies in Sub-Saharan Africa are at risk of having a poor outcome due to the high prevalence of syphilis among pregnant women, which is estimated to be 2.7 percent.[2] The composite prevalence of syphilis among pregnant women in Sub-Saharan Africa is lower than the prevalence in East and Southern African regions (3.2% and 3.6% respectively).[2] The study done in

Tanzania in 133 antenatal clinics showed the overall prevalence of 2.5%.[3] In Uganda, the prevalence of syphilis is estimated to be 4% among pregnant women and 4.1% among mothers in the postpartum period.[4,5] In 2017, WHO published syphilis testing and treatment recommendations for pregnant mothers, suggesting routine syphilis testing for all pregnant women during their first ANC visit.[6] Despite routine syphilis screening of all pregnant mothers as recommended in most countries, coverage has remained insufficient in many places, for example, the WHO estimates that nearly half of the antenatal clinic attendees in Africa are not currently screened for syphilis.[7]

In a study done in the USA, in Indianapolis 17,367 pregnancies underwent antenatal syphilis testing and the proportion of unscreened women was 28.3% in 2014.[8] In Brazil a similar study reported that among 408 women who provided their antenatal records, 17.90% had not performed syphilis test during the prenatal period.[9]

In SSA, women suspected to have infection of syphilis who are not screened or treated for syphilis are predicted to have 387,636 pregnancies per year, and 68percent of these cases occur in those who receive antenatal care not less than once but during pregnancy are not tested for syphilis.[10] In a study done in Ghana, About 48% of 18,292 enrolled pregnant women were not tested for syphilis.[11] In East Africa a study done in Tanzania reported that only 43.2% of women tested for syphilis within 16 weeks of pregnancy, and 50.1% failed to screen for syphilis from 663 women enrolled during the antenatal visit.[1] In Moshi city, Tanzania a similar study found that syphilis screening is not prioritized, as indicated by the findings that 89.4 percent of pregnant women were not tested for syphilis, compared to only 1% that were not tested for HIV.[12] The Prevalence of missed opportunities for syphilis testing is not known in Uganda particularly at Fort Portal Regional Referral Hospital, the only study done in Uganda was at Mbarara Regional Referral Hospital and focused on congenital syphilis revealing that 45.6% of women were not tested for syphilis during their current pregnancy.[5]

Efforts to screen and treat mothers for syphilis, as well as potential solutions to reduce missed opportunities are limited by several barriers around the world, despite the widespread use of prenatal syphilis screening programs.[13] Lack of information or provision of syphilis testing during prenatal care, distance from the clinic, and late booking have been reported to be the key limitations to prenatal syphilis testing from the client's viewpoints.[14] Unpublished survey done from March 2021 to May 2021 showed that; among 1052 mothers who delivered at FRRH, 50.3% did not have documented results of Syphilis screening in their antenatal record booklet and hence managed as syphilis negative. It is also unknown why the mothers admitted to the maternity ward at FRRH do not have up-to-dated syphilis testing status. Therefore, this study aimed to determine the proportion of missed opportunities for syphilis testing and associated risk factors among mothers in rural western Uganda.

METHODS

This was a cross-sectional study that involved mothers in the postpartum period delivered at FRRH from April to July 2022. FRRH is a public hospital in western Uganda. It is a Tertiary and teaching hospital of both undergraduates and postgraduates medical students of Kampala International University. It is located in Fort portal town of Kabarole district which is approximately 300km west of Capital Kampala city. The in-patient capacity of FRRH is 350 beds distributed in all departments with 105 beds within the obstetrics and gynecological department. The hospital has a modern accredited laboratory able to carry out syphilis tests. The study participants were coming from catchment areas such as Kabarole, Bundibugyo Kamwenge, Kasese, Ntoroko, and Kyenjojo districts. This study involved mothers in immediate postpartum period (at least 12 hours post-delivery). They were consecutively enrolled as long as they were hemodynamically stable with antenatal cards with them. All eligible mothers were asked to consent and a structured pretested questionnaire written in both English and Rutooro (the local language) was used to collect data on factors associated with missed opportunity for antenatal syphilis testing until we reached our desired sample size. Mothers without antenatal cards at time of recruitment were excluded from the study. The sample size was determined using the Kish Leslie formula (1965):

$$n = \frac{z^2 p(1-p)}{e^2}$$

Where; n: Estimated minimum sample size required, p: Proportion of a characteristic in a sample (mothers not tested for syphilis during antenatal period), e: margin of error set at 5%, z: 1.96 (for 95% confidence interval).

Using the proportion of mothers who did not test for syphilis in a study done in Mbarara Regional Referral Hospital (MRRH), Uganda[6] of 45.4% as " p"

$$n = \frac{(1.96)^2 \times 0.454 \times (1-0.454)}{(0.05)^2} = 381 \text{ Participants}$$

The data from questionnaires was compiled in Microsoft Excel version 16, cleaned, coded and then imported into SPSS version 22.0 for analysis. The prevalence of mothers with missed opportunities of antenatal syphilis testing was calculated as number of mothers with missed opportunity for syphilis testing out of all mothers recruited in this study, expressed as frequency and percentages and presented using a pie chat. The factors associated with missed opportunity for syphilis testing among mothers delivered at FRRH were determined using binary logistic regression. A bivariate analysis was performed using cross-tabulation at 95% confidence interval (CI) to assess the likely effect. Factors that were found with a $p \leq 0.05$ and others with biological plausibility were subjected to a multivariate analysis at 95% CI to remove the confounding factors. Factors that turned up with $p \leq 0.05$ in the final

multivariate model were considered significant in this analysis. Results from both bivariate and multivariate analysis were interpreted and presented using odds ratio, confidence interval, and p value to assess likelihood ratio.

RESULTS

Baseline characteristics of the study participants

During the study period, a total of 381 mothers were recruited from postnatal ward of FRRH with response rate of 100%. Majority of participants were between 20-29 years of age 224 (58.8%), married 317 (83.2%), from rural areas 253 (66.4%), staying in <5km from the nearest health facility 216 (56.7%). The majority of mothers 195 (51.2%) had primary education level and 143 (37.5%) were housewives (Table 1).

Table 1: Baseline characteristics of participants.

Variables	Categories	Frequency (N)	%
Age (years)	<20	57	15
	20-29	224	58.8
	30-39	90	23.6
	≥40	10	2.6
Marital status	single	45	11.8
	Divorced	16	4.2
	Widowed	3	0.8
	Married	317	83.2
Residence	Rural	253	66.4
	Urban	128	33.6
Distance to the nearest health facility	≥5km	165	43.3
	<5km	216	56.7
Level of education	None	23	6
	Primary	195	51.2
	Secondary	138	36.2
	Tertiary	25	6.6
Occupation	Housewife	143	37.5
	Farmer	75	19.7
	Business	105	27.6
	Professional	58	15.2

Prevalence of missed opportunities for antenatal syphilis testing among mothers delivered at FRRH

Of 381 mothers enrolled in the study, the overall prevalence of missed opportunities for antenatal syphilis testing was 124 (32.5%) and 257 (67.5%) of participants were tested for syphilis during prenatal period (Figure 1).

Factors associated with missed opportunities for syphilis testing among mothers delivered at FRRH

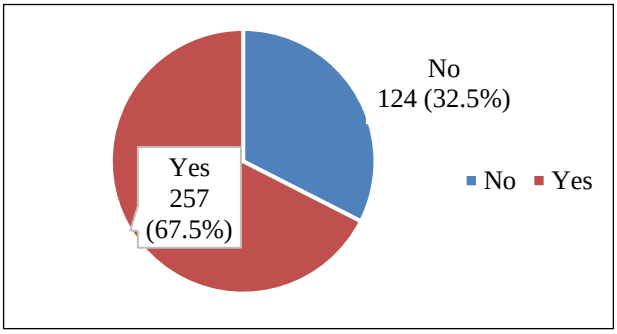

Figure 1: Proportion of missed opportunities for syphilis testing among mothers delivered at FRRH.

This study found that lack of syphilis test counseling, lack of knowledge of syphilis MTCT, Lack of transport and fear of testing were independently associated with missed opportunity for antenatal syphilis testing. Specifically, mothers who were not given syphilis test counseling were 4 times more likely to have missed opportunities for antenatal syphilis testing (aOR=4.3, 95% CI: 2.009-9.438, p<0.001). Mothers with no knowledge of syphilis MTCT were 3 times more likely to have missed opportunities for antenatal syphilis testing (aOR=3.1, 95% CI: 1.12-8.903, p=0.03). Mothers who reported lack of transport as main reason of not testing were 11 times more likely to have missed opportunities for antenatal syphilis testing (aOR=10.7, CI: 3.116-36.81, p<0.001) and those who reported fear of testing as reason of not testing were 4 times more likely to have missed opportunities for antenatal syphilis testing (aOR=4.3, 95% CI: 1.075-17.484, p=0.039 (Table 2).

Table 2: Factors associated with missed opportunity for antenatal syphilis testing (n=381).

Variables	Categories	Opportunity		cOR (95% - CI)	P value	AOR (95%-CI)	P value
		Not missed (n=257) %	Missed (n=124) %				
Age	<20	33 (12.8)	24 (19.4)	6.545 (0.776-55.181)	0.084		
	20-29	156 (60.7)	68 (54.8)	3.923 (0.487-31.576)	0.199		
	30-39	59 (23.0)	31 (25.0)	4.729 (0.573-39.053)	0.149		
	>=40	9 (3.5)	1 (0.8)	Ref			
Marital status	Single	25 (9.7)	20 (16.1)	1.814 (0.962-3.423)	0.066		
	Divorced	10 (3.9)	6 (4.8)	1.361 (0.481-3.850)	0.561		
	Widowed	2 (0.8)	1 (0.8)	1.134 (0.102-12.655)	0.919		

Continued.

Variables	Categories	Opportunity		cOR (95% - CI)	P value	AOR (95%-CI)	P value
		Not missed (n=257) %	Missed (n=124) %				
	Married	220 (85.6)	97 (78.2)	Ref			
Residence	Rural	166 (64.6)	87 (70.2)	1.289 (0.812-2.046)	0.281		
	Urban	91 (35.4)	37 (29.8)	Ref			
Distance to the health facility	>=5km	107 (41.6)	58 (46.8)	1.232 (0.800-1.896)	0.343		
	<5km	150 (58.4)	66 (53.2)	Ref			
Level of education	None	19 (7.4)	4 (3.2)	1.105 (0.242-5.046)	0.897	0.599 (0.094-3.818)	0.588
	Primary	125 (48.6)	70 (56.5)	2.94 (0.970-8.908)	0.057	0.599 (0.671-11.317)	0.159
	Secondary	92 (35.8)	46 (37.1)	2.625 (0.851-8.096)	0.093	0.599 (0.436-6.464)	0.451
	Tertiary	21 (8.2)	4 (3.2)	Ref		Ref	
Occupation	Housewife	99 (38.5)	44 (35.5)	0.912 (0.475-1.753)	0.783		
	Farmer	43 (16.7)	32 (25.8)	1.528 (0.748-3.120)	0.245		
	Business	76 (29.6)	29 (23.4)	0.783 (0.391-1.570)	0.491		
	Professional	39 (15.2)	19 (15.3)	Ref			
Got syphilis test counseling	No	186 (72.4)	110 (88.7)	2.999 (1.614-5.574)	0.001	4.355 (2.009-9.438)	<0.001*
	Yes	71 (27.6)	14 (11.3)	Ref		Ref	
Time of transmission to fetus	Don't know	143 (55.6)	96 (77.4)	4.124 (1.781-9.549)	0.001	3.158 (1.12-8.903)	0.030*
	During labor	51 (19.8)	11 (8.9)	1.325 (0.473-3.714)	0.593	1.135 (0.342-3.774)	0.836
	During breastfeeding	20 (7.8)	10 (8.1)	3.071 (1.020-9.245)	0.046	2.587 (0.727-9.206)	0.142
	During pregnancy	43 (16.7)	7 (5.6)	Ref		Ref	
Reason of not testing in ANC	Lack of transport	6 (2.3)	28 (22.6)	14 (4.743-41.322)	<0.001	10.71 (3.116-36.81)	<0.001*
	Lack of test kits	169 (65.8)	42 (33.9)	0.746 (0.365-1.521)	0.42	0.644 (0.283-1.467)	0.295
	Fear of testing	8 (3.1)	11 (8.9)	4.125 (1.365-12.468)	0.012	4.334 (1.075-17.484)	0.039*
	Shortage of staff	35 (13.6)	30 (24.2)	2.571 (1.161-5.693)	0.02	2.46 (0.969-6.247)	0.058
	Don't know	39 (15.2)	13 (10.5)	Ref		Ref	
Knowledge of syphilis status of partner	No	129 (50.2)	97 (78.2)	3.565 (2.180-5.828)	<0.001	1.776 (0.966-3.264)	0.065
	Yes	128 (49.8)	27 (21.8)	Ref		Ref	
Staying with partner	No	54 (21.0)	39 (31.5)	1.725 (1.064-2.797)	0.027	1.168 (0.636-2.147)	0.616
	Yes	203 (79.0)	85 (68.5)	Ref		Ref	

ANC: antenatal care; *P≤0.05; cOR: crude odds ratio; aOR; adjusted odds ratio, p value= significance level

DISCUSSION

Early prenatal syphilis testing and treatment is an essential preventative measure for maternal syphilis and associated adverse pregnancy outcomes, especially if done before the third trimester of pregnancy.[14] The prevalence of missed opportunities for syphilis testing among mothers delivered at FRRH was 32.5%. This proportion found in this study is consistent with 28.3% obtained in Marion County, Indiana in 2014, and 34% obtained in East Africa at Dodoma Regional Hospital, Tanzania.[8,16] The proportion of 32.5% from our findings is higher than 16.8% obtained from the Mwanza Region of Tanzania and 16.9% obtained from 4 hospitals in Miami-Dade County, USA.[17,18] This difference could be explained by our findings in the study of lack of test kits and shortage of staff as the main barriers to syphilis testing according patients' perceptions since the ANC attendance rate was 99.5%. In Uganda, regular stock-outs of test kits and a shortage of staff in health

facilities are the main gaps in the prevention of congenital syphilis.[5]

The proportion of 32.5% obtained in this study differs from 45.4% obtained in Mbarara regional referral hospital and this could be explained by the fact that information in their study was not confirmed from antenatal cards for all mothers which were done for every mother in this study since some mothers get tested but not sure of that as revealed in the other study done in Tanzania.[5,16] Another explanation could be that the current study included only mothers within the immediate postpartum period (at least 12h hours post-delivery) in comparison with the other study from Mbarara Regional Referral Hospital which included both mothers in labor and postpartum period.

The proportion of unscreened mothers obtained in this study of 32.5% is much lower than 41.2% obtained in Brazil and 43.1% obtained in Guangdong province in south-eastern China.[19,20] This discrepancy could be explained by the different methodology used. The study done in Brazil was multicenter based involving interviews to mothers to know whether tested for syphilis or not without necessarily confirmation from ANC cards while the study done in china was multicenter based involving the use of hospital records conducted over period of one and 4 years respectively.

In this study, lack of syphilis test counseling, lack of knowledge on syphilis MTCT, lack of transport and fear of testing were independently associated with a missed opportunity for syphilis testing after logistic regression analysis adjusted for confounding variables.

In our study, mothers who were not given syphilis test counseling ($p<0.001$**)** were 4 times more likely to have missed the opportunity for prenatal syphilis testing. The results are consistent with the study done in northeastern Brazil where participants with a lack of information about syphilis tests were 4 times more likely to miss syphilis tests, and the study done in Tanzania where approximately half of the respondents failed to test for syphilis and among reasons for not testing for syphilis at ANC included being not informed about syphilis test and lack of trained personnel to perform a test.[9,1]

Knowledge is an important aspect of preventing syphilis infection, but the extent to which people are aware of the illness is unknown.[21] In our study, mothers who didn't know when transmission of syphilis infection to the fetus occur were 3 times more likely to have missed the opportunity for prenatal syphilis testing ($p=0.03$). These findings are consistent with the study done in Tanzania where low knowledge of syphilis transmission and complications among pregnant women was significantly associated with a lack of screening for syphilis, the study done in Burkina Faso where it was reported poor knowledge about syphilis as a potential barrier to testing and study done in Mongolia where screened women had significantly higher knowledge of syphilis as compared to unscreened women.[21-23] Our study findings were inconsistent with 2 studies done in Ghana where knowledge about syphilis did not affect screening in the studies.[11,14] This could be explained by the fact that in their studies, it was shown that health education talks were regularly delivered to all women attending ANC in both public and private clinics, and maternal syphilis is one of the key topics discussed therefore there might not make difference between syphilis screened and unscreened women.

According to maternal perceptions, women who reported lack of transport as the main reason for not screening in ANC ($p<0.001$) were 5 more likely to miss the opportunity for syphilis testing. The findings of this study were in line with the study done in DRC and Zambia which identified barriers to syphilis testing such as late enrollment in ANC due to transportation or costx and the study done in Brazil, where 60.65% reported some difficulty in performing the tests requested, in which 33.72% complained that collection centers were too far from their homes, same as the study conducted in Mongolia where the unscreened group was significantly more likely to stay far from ANC services ($p<0.001$).[9,23,24] In Uganda like in other developing countries, women may live far from a health facility or be unable to afford transport costs and therefore be unable to attend regularly for syphilis testing.[26] According to Bocoum et al women particularly those living in rural areas, have to travel long distances to access health facilities and laboratories, and this lead to a delay or failure to screen.[22] The results from our study are inconsistent with results obtained from the study done in Ghana where the transport to the ANC clinic was not associated with screening.[14] The difference could be explained by the fact that the majority of our respondents were from rural areas 253 (66.4%) and nearly half (43.3%) were staying ≥5km from the nearest health facility while in that study done in Ghana the travel time to the clinic was <30min for most of their respondents (63.8% of unscreened vs 59.0% of screened) and this possibly couldn't make difference.

In our study, women who reported fear of testing as the reason of not testing in ANC were 4 times more likely to have missed the opportunity for syphilis testing ($p=0.039$). This can be explained by a lack of self-decision making as indicated in our study that the majority of our respondents didn't decide for themselves (62.4%) as in regards to syphilis testing in ANC. The other explanation can be fear of testing positive due to a lack of knowledge of the syphilis status of the partner as indicated in this study majority of respondents (59.3%) didn't know the syphilis status of the partner together with low ANC partner attendance underlined in Uganda.[26] Lastly, fear of testing may be explained by a lack of knowledge on MTCT and Prevention of MTCT causing them not to understand the importance of syphilis testing during pregnancy or the importance is in PMTCT and this goes beyond fear of the test. Our findings in this study are in line with WHO survey in 2017 where most studies showed that women

were satisfied with being tested for syphilis even though some were concerned about the stigma of testing, some feared a syphilis-positive result and some had concerns about the treatment implications if results were positive.[27]

This study has few limitations and strengths. According to available information we have, this is the first study done in Uganda to report the proportion of missed opportunities and associated risk factors among mothers in postpartum period. Mothers who didn't have prenatal cards but had had antenatal care were excluded in this study yet it is possible that mothers who did not have ANC cards had different risk factors associated with missed opportunities for antenatal syphilis testing than those who did.

CONCLUSION

The proportion of mothers with missed opportunities for syphilis testing at FRRH is similar to the global estimate. Lack of syphilis test counseling, knowledge of syphilis MTCT, lack of transport and fear of testing were independently associated factors. Our study recommends Sensitization of all healthcare providers about the importance of identifying mothers with missed opportunities for syphilis testing during labor and postpartum period to be tested for syphilis as long as the maternal ANC booklet does not indicate that screening for syphilis was done and finally to sensitize ANC staff about adequate and effective syphilis test counseling to all women attending ANC to increase their perception of being at risk of syphilis infection, to educate these women about syphilis transmission, complications, and prevention.

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