

Enhancing Utilization of PMTCT Services: Investigating Knowledge Factors Among Pregnant and Breastfeeding Mothers at Kiryandongo General Hospital, Western Uganda

Kakungulu Yusuf

Faculty of Clinical Medicine and Dentistry Kampala International University Western Campus Uganda.

ABSTRACT

This study aimed to determine the factors affecting the utilization of PMTCT services among mothers attending the ART clinic at Kiryandongo General Hospital. This was a facility-based cross-sectional which recruited a total of 185 pregnant and lactating mothers attending Kiryandongo Hospital. STATA software version 14.0 was used for data analysis. To identify factors affecting utilization of PMTCT services, univariate analysis and modified Poisson regression run and crude prevalence ratios with 95% confidence interval were used to determine the level of significance at bivariate meanwhile adjusted prevalence ratios were calculated at multivariate analysis to establish independent significant factors. The mean age of the study participants was 25.6 with a standard deviation of 6. Results showed that the mean score on knowledge was 5.21 with a standard deviation of 1.36. The median score was 5 with an interquartile range of 4 to 6. The majority of 59.46% (110/185) of the study participants had inadequate knowledge of PMTCT meanwhile less than of the study participants 40.54% (75/185) had adequate knowledge. The factors independently affecting utilization of PMTCT services were; Unemployment (aPR 4.05, 95%CI 2.19-7.50, P<0.001), Rude and harsh attitude of health workers (aPR 2.17, 95%CI 1.38-3.44, P=0.001). Unsatisfactory services (Apr 2.40, 95%CI 1.22-4.74, P=0.011). The study has shown that there are more than half of the pregnant women and lactating mothers attending Kiryandongo Hospital have inadequate knowledge of PMTCT services. The proportion of mothers found with adequate knowledge of PMTCT in the present study is low compared to most studies done in Africa. At Kiryandongo Hospital, the utilization of PMTCT services among pregnant and lactating mothers was found to be slightly high. Employment status was the only socio-demographic factor affecting the utilization of PMTCT services meanwhile Rude and harsh attitudes of health workers and unsatisfactory services were the health facility-related factors affecting the utilization of PMTCT services.

Keywords: HIV, PMTCT services, Children, Pregnant mothers, Lactating mothers.

INTRODUCTION

Human Immunodeficiency Virus (HIV) can be transmitted from an HIV-positive woman to her child during pregnancy, childbirth and breastfeeding. Mother-to-child transmission (MTCT), which is also known as 'vertical transmission', accounts for the vast majority of infections in children (0-14 years) [1-5]. HIV infection is more prevalent in low-and middle-income countries globally and women are mostly affected [6, 7]. The risk of mother-to-child transmission (MTCT) of HIV in newly infected women, not yet on treatment is much higher and it may occur at any period of pregnancy and lactation [8, 9]. By 2015, more than 1 million pregnant women living with HIV received antiretroviral therapy (ART) for the Prevention of Mother to Child Transmission (PMTCT), with nearly 79% in sub-Saharan Africa [10]. Sub-Saharan Africa contributes more than two-thirds (69%) of the global

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

infected population. Children under the age of 15 account for 3.4 million of the global number of infected, while sub-Saharan Africa alone contributes to 90% of this burden. The most significant source of HIV infection in children and infants is transmission of HIV from mother to child during pregnancy, childbirth, or breastfeeding. Without intervention, the risk of transmission varies ranging from 5% to 10% during pregnancy, 10% to 15% during labor/delivery, and 5% to 20% through breastfeeding [11]. Uganda faces an HIV prevalence of 7.4%, with a fertility rate of 5.9 births per woman and an estimated number of 120,000 HIV-positive pregnant women in 2013; hence, the country requires continuous engagement in the effective implementation of a PMTCT approach. Uganda adopted WHO's Option B+ strategy as one of the first sub-Saharan African countries [12]. To prevent the transmission of HIV from mother to baby WHO promotes a comprehensive strategic approach that includes the following four components; Primary prevention of HIV infection among women of child bearing age, preventing unintended pregnancies among women living with HIV, Preventing HIV transmission from a woman living with HIV to her infants, and providing appropriate treatment, care and support to mothers living with HIV and their children and families [13]. Mother-to-child transmission (MTCT) of HIV remains a major public health problem and continues to account for a substantial proportion of new HIV infections among young children [14]. Without treatment, if a pregnant woman is living with HIV the likelihood of the virus passing from mother to child is 15% to 45% [15, 16]. However, antiretroviral treatment (ART) and other interventions can reduce this risk to below 5% [17]. The positive strides Uganda has made towards PMTCT are evident in the 86% reduction in new infections among children between 2010 and 2016 [18]. However, the proportion of HIV-exposed infants tested for HIV remains low at 38% due to low retention of mother-and-baby pairs in PMTCT programs [18]. If nothing is done, then Uganda will lag in achieving the 90-90-90. In Uganda, about 5.5% of pregnant mothers are HIV positive, of which 85% access ART as part of Antenatal Care (ANC) services. Although 97% of pregnant mothers attend the first ANC visit, only 48% complete the recommended 4 visits and the trend of ANC attendance mirrors the trend of retention of HIV-positive mothers on option B plus. The rollout of option-B plus in Uganda in 2012 increased the number of mothers initiated on ART, however retention of mothers in HIV care progressively declined; with only 79, 70 and 56% returning for ART drug refill at 1 month, 3 months and 6 months. Health service providers' attitudes, stigma, discrimination, low ART stock levels and lack of means of transportation for clients to nearby health facilities are some of the factors that affect the utilization of PMTCT services [19]. Little is yet known about PMTCT services and its utilization and so, it is upon this background that the study was conducted to establish the factors affecting the utilization of PMTCT services among pregnant women and breastfeeding women attending Kiryandongo hospital.

METHODOLOGY

Study Design

The study employed a cross-sectional descriptive design i.e. quantitative data collection techniques. This study design was chosen because it had the advantage of collecting large volumes of data within a short period hence saving the researchers time.

Area of Study

The study was conducted at Kiryandongo General Hospital located 225 km along the Kampala-Gulu highway in Kikube County, Kiryandongo district western Uganda. It is a 109-bed hospital serving a population of over 400,000 people from areas of Kiryandongo, Masindi, Nakasongola, Oyam, Apac, Amuru and Nwoya districts. The hospital offers several services including; OPD, inpatient, ophthalmology, HIV, immunization, environmental health, and special clinics among others (ministry of Health, 2019).

Study Population

Population under this study involved pregnant women and breastfeeding mothers irrespective of their HIV status attending Kiryandongo Hospital.

Inclusion criteria

All pregnant mothers who attended the different maternal child health clinics in Kiryandongo General Hospital during days of data collection and mothers who consented to be part of the study were recruited to participate in the study.

Exclusion criteria

HIV-negative mothers and all HIV-positive mothers who were not willing to participate and were not around during the days of data collection or HIV-positive mothers with children above one year of age.

Sample Size Determination

Sample size was determined using the Kish Lisle [20] formula as stated below;

$$n = \frac{Z^2 P (1-P)}{E^2}$$

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Where n: is the estimated minimum sample size required

P: is the proportion of a character in a sample

Z: 1.96(for 95% confidence level)

E: margin of error set at 5%

$$n = \frac{(1.96)^2(0.86)(1-0.86)}{(0.005)^2}$$

n=185

Sampling Procedures

A systematic sampling technique was used to select respondents from the study population to ensure that every HIV-positive mother had an equal chance of being selected. Numbers were written on pieces of paper from 1 to the last number then placed in a box and shaken. Pieces of paper were picked at random. Those who picked even numbers for example 1, **2**, 3, **4**, 5, **6**, 7 (bold numbers will be included) without replacement until the required number of participants was attained.

Data Collection Methods and Management

The researcher obtained an introductory letter from Kampala International University Western Campus administration and presented it to the administrator of Kiryandongo General Hospital to seek permission to access the study area and respondents. The researcher then explained the purpose of the study to the accessible population. The researcher then administered pretested questionnaires to respondents who had consented, the questionnaires were converted into the local language which is the most spoken language in the study area, the respondents filled in the questionnaires and then handed them back to the researcher and this was done for two consecutive months.

Data Analysis

Collected data was therefore edited at the end of each interview to ensure accuracy, completeness and relevant data was collected. Data was then analyzed using STATA software Version 14.0 and information was presented in the form of pie charts, tables or bar graphs.

Quality Control

Raw data was edited, coded and recorded. This was done by the researcher to ensure quality of data. The filled questionnaires were kept in a safe place to ensure confidentiality of the participants. The Research Assistants underwent training where they were introduced to the research protocol and the questionnaire and were made to undergo interview simulations to polish up their skills. This was important in order to familiarize them with the questionnaire administration and thus reduce inconsistencies and biases during the explanation. Each question was explained in English to ensure that participants understood clearly what the question meant. Furthermore, participants were encouraged to ask the researcher questions for further clarifications.

Ethical Considerations

Proposal was approved by research committee Kampala international university western campus and an introductory letter was obtained seeking permission to carry out the study in Kiryandongo general hospital. The researcher reported to medical superintendent Kiryandongo general hospital to whom he introduced himself and purpose of the study. After permission was granted, written consent from respondents was obtained after adequate explanation of the objectives of the study and participants were assured that information would be kept confidential because serial numbers were used instead of names. The filled questionnaires were kept securely and handled by the researcher alone.

RESULTS

Socio-demographic Characteristics

Table 1 below shows that the majority of the study participants 45.41% (84/185) were in the age group of 16 to 23 years, had 5 to 8 family members 54.05% (100/185), were Catholics 40.54% (75/185) and were residing in rural areas 71.89% (133/185). The results have also shown that the majority of the mothers of the participants 63.78% (118/185) were married, unemployed 52.43% (97/185) meanwhile 84.32% (156/185) had gravidity of less or equal to 4.

Table 1; Shows Frequency distribution for socio-demographic Characteristics of the Study Participants.

Variable	Frequency (n)	Percentage (%)
Age in years		
16 – 23	84	45.41
24 – 30	62	33.51
31 – 37	32	17.30
≥38	07	03.78
Number of family members		
1 – 4	80	43.24
5 – 8	100	54.05
>8	05	02.70
Religion		
Catholic	75	40.54
Anglican	60	32.43
Muslim	18	09.73
Others	32	17.30
Area of Residence		
Urban	52	28.11
Rural	133	71.89
Marital status		
Unmarried	67	36.22
Married	118	63.78
Education Level		
None	20	10.81
Primary	69	37.30
Secondary	85	45.95
Tertiary	11	05.95
Employment Status		
Employed	88	47.57
Unemployed	97	52.43
Gravidity		
≤4	156	84.32
>4	29	15.68

Shown in table 2 below is the summary descriptive statistics for the continuous variable of age of the study participants. The mean age of the study participants was 25.6 with a standard deviation of 6. The median age was 25 years with an inter-quartile range of 20 years to 30 years. The minimum age was 16 years whereas the maximum age was 40 years. The data on age of the participants had a variance of 36.10 with a positive skewness of 0.52 and a kurtosis of 2.6.

Table 2; Continuous Variable of age of study participants

Observations	Mea n	Std Dev	Media n	IQR	Mi n	Max	Variance	Skewness	Kurtosi s
185	25.46	6.00	25	20,30	16	40	36.10	0.52	2.26

Std Dev = Standard Deviation, Min = Minimum, Max = Maximum, IQR = Inter quartile Range

Health Facility-related Characteristics

Table 3 below shows the frequency distribution of the health facility-related characteristics of the study participants. It can be observed from the table that the majority of the study participants 72.43% (134/185) had never been told about PMTCT during ANC meanwhile more than half of the study participants 58.92% (109/185) said the waiting time at the clinic was less than 30 minutes. Furthermore, the majority of the participants 37.84% (70/185) said that the health workers are segregative meanwhile 53.51% (99/85) said that there is inadequate communication from health workers about PMTCT services. When asked if services at Kiryandongo Hospital are satisfactory, 47.03% (87/185) of the participants disagreed meanwhile 81.62% (151/185) said that the health workers were managing time and 64.32% (119/185) said that the health workers rendering services at Kiryandongo hospital are few.

Table 3; Frequency Distribution table for health facility related Characteristics

Variable	Frequency (n)	Percentage (%)
Ever been told about PMTCT during ANC		
Yes	134	72.43
No	51	27.57
Waiting Time at the clinic		
<30 minutes	109	58.92
30 - 60 minutes	52	28.11
>2 hours	24	12.97
Attitude of health workers		
Segregative	70	37.84
Friendly and caring	26	14.05
Pay little attention to clients	24	12.97
Harsh and rude	65	35.14
Communication about PMTCT services		
Inadequate	99	53.51
Easy to understand	26	14.05
No communication at all	35	18.92
Too technical	25	13.51
Satisfactory Services		
Strongly Agree	24	12.97
Agree	39	21.08
Disagree	87	47.03
Strongly Disagree	35	18.92
Time Management by health workers		
Yes	151	81.62
No	34	18.38
Few Health Workers		
Yes	66	35.68
No	119	64.32

The Knowledge on PMTCT Among Pregnant and Breast-Feeding Mothers at Kiryandongo Hospital

Shown in table 4 are the questions that were used to assess the knowledge of study participants on PMTCT services and their responses. Majority of the study participants 74.05% (137/185) said that HIV can be transmitted from mother to her child whereas 58.92% (109/185) of the study participants correctly answered that PMTCT is the prevention of HIV transmission from mother to child. When asked if HIV can be transmitted from Mother to Baby during pregnancy, majority of study participants 70.27% (130/185) correctly said yes. A high proportion of participants 73.51% (136/185) said that failing to adhere to ARV increases the risk of transmission from pregnant mother to child. More than half of the study participants 53.51% (99/185) said that HIV can be transmitted from Mother to Baby during childbirth. Regarding the question of whether HIV can be transmitted from Mother to Baby during breastfeeding, the majority 54.05% (100/185). Results of the study have shown that 51.35% (95/185) responded that HIV transmission from Mother to Baby is prevented by ARV drug meanwhile 65.41% (121/185) answered that HIV transmission from Mother to Baby is prevented by avoiding breastfeeding and 60.00% (121/185) said that HIV transmission from Mother to Baby is prevented by avoiding breastfeeding.

Table 4: Questions used to assess knowledge of PMTCT services and the responses

Variable	Frequency (n)	Percentage (%)
HIV can be transmitted from mother to her child?		
Yes	137	74.05
No	28	15.14
Don't Know	20	10.81
What does PMTCT mean?		
Prevention of HIV transmission from Father	63	34.05
Prevention of HIV transmission from Mother	109	58.92
Don't Know	13	07.03
Can HIV be transmitted from Mother to Baby during pregnancy?		
Yes	130	70.27
No	55	29.73
Failing to adhere increases the risk of transmission from pregnant mother to child		
Yes	136	73.51
No	49	26.49
Can HIV be transmitted from Mother to Baby during child birth?		
Yes	99	53.51
No	86	46.49
Can HIV be transmitted from Mother to Baby during breastfeeding?		
Yes	100	54.05
No	85	45.95
Can HIV transmission from Mother to Baby be prevented by ARV drugs?		
Yes	95	51.35
No	90	48.65
Can HIV transmission from Mother to Baby be prevented by avoiding breastfeeding?		
Yes	121	65.41
No	64	34.59
Can HIV transmission from Mother to Baby be prevented by caesarean section delivery?		
Yes	111	60.00
No	74	40.00

Summary statistics of Knowledge Score of study participants.

Table 5 below shows the summary statistics for the knowledge scores of the study participants. For every question, a participant scored one point if she answered the question correction and a zero point if she answered a question wrongly. Results showed that the mean score on knowledge was 5.21 with a standard deviation of 1.36. The median score was 5 with an inter-quartile range of 4 to 6. The minimum score was 2 whereas the maximum score 8. The data on knowledge score of the participants had a variance of 1.85 with a skewness of 0.08 and a kurtosis of 2.50.

Table 5: Summary statistics of Knowledge Score of study participants

Observations	Mean	Std Dev	Median	IQR	Min	Max	Variance	Skewness	Kurtosis
185	5.21	1.36	5	4, 6	2	8	1.85	0.08	2.50

Std Dev = Standard Deviation, Min = Minimum, Max = Maximum, IQR = Inter quartile Range

Grading of Knowledge Score of study participants.

Study participants who had a total knowledge score of 6 and above out of 9 were considered to be having adequate knowledge of PMTCT meanwhile those who had a knowledge score of 5 and below out of 9 were considered to be having inadequate knowledge of PMTCT. Results showed that the majority 59.46% (110/185) of the study participants had inadequate knowledge on PMTCT meanwhile less than of the study participants 40.54% (75/185) had adequate knowledge.

Table 6: Grading of Knowledge Score of study participants.

Knowledge	Frequency (n)	Percentage (%)	95% Confidence Interval
Inadequate	110	59.46	52.32 – 66.60
Adequate	75	40.54	33.40 – 47.68

The Utilization of PMTCT Services Among Pregnant and Breastfeeding Mothers at Kiryandongo Hospital
Table 7 shows the level of utilization of PMTCT services by the study participants. As observed from the table, the majority of the participants 62.16% (115/185) at a 95% CI of 55.11 – 69.22 had utilized PMTCT services meanwhile 37.84% (70/185) had not utilized PMTCT services with a 95% CI of 30.78 – 44.89.

Table 7; The Level of Utilization of PMTCT Services.

Utilization	Frequency (n)	Percentage (%)	95% Confidence Interval
Yes	115	62.16	55.11 – 69.22
No	70	37.84	30.78 – 44.89

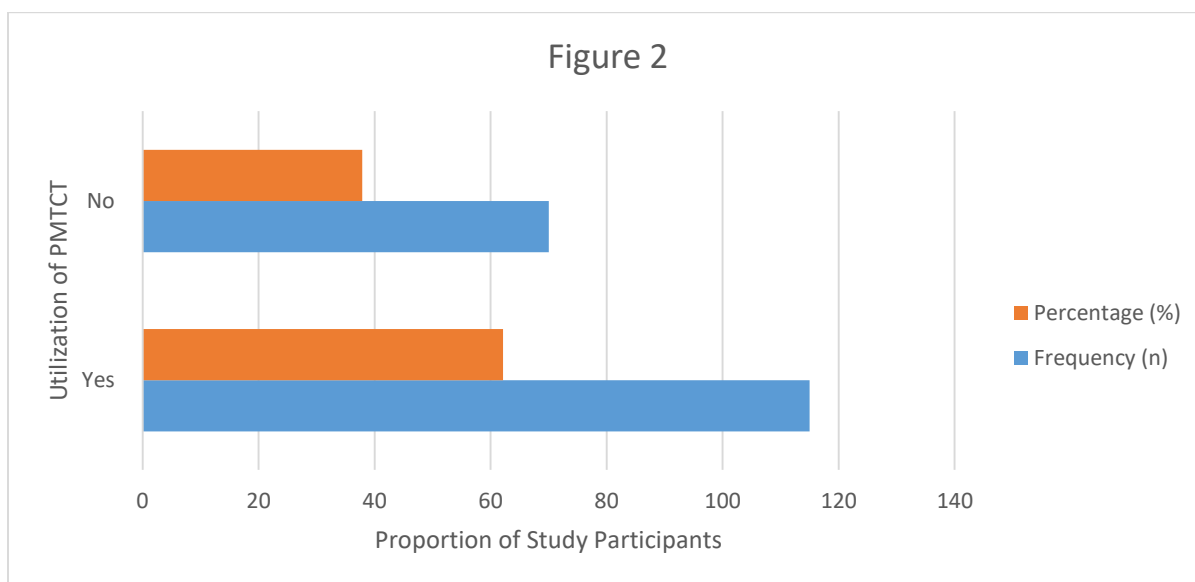


Figure 1; Bar Graph showing Utilization of PMTCT Services

The Utilization of Specific PMTCT Services.

Table 8 below shows the utilization of specific PMTCT services by the study participants. Results have shown that the majority of the study participants 78.38% (145/185) tested for HIV during the current pregnancy meanwhile 21.62% (40/185) never tested for HIV. Out of the 145 who tested for HIV, 64.14% were negative whereas 35.86% (52/145) were positive. For the 40 who never tested for HIV, majority 28.21% (11/40) gave the main reason for not testing to as absence of counsellor/provider. For the 52 participants who were positive, 51.92% (27/52) had collected ARV drugs meanwhile 48.08% (25/52) had not collected ARV drug. Out of the 25 who had not collected the ARV drugs, more than half of them 52.00% (13/25) said they never collected the ARV drugs because of fear of partners/husbands. The majority of the study participants 76.22% (141/185) had discussed voluntary counselling and testing of HIV with their husbands/partners and 24.11% (34/141) said their husbands refused to take the test whereas the same number 24.11% (34/141) said that their partners were not willing to pick their results.

Table 8: The Utilization of Specific PMTCT services

PMTCT Service	Frequency (n)	Percentage (%)
Respondents tested for HIV in the current pregnancy		
Yes	145	78.38
No	40	21.62
Result of HIV test		
Positive	52	25.86
Negative	93	64.14
Respondents' main reason for not being tested		
Absence of counsellor/provider/KIT	11	28.21
Fear of rejection by partner/husband	05	12.82
Fear of stigma and discrimination	08	20.51
Tested before the current pregnancy	05	12.82
Fear of being tested positive for HIV	10	25.64
Collected ARV drug (For positive participants)		
Yes	27	51.92
No	25	48.08
Respondents' main reason for not collecting ARV drug		
Fear of her partner/husband	13	52.00
Refusing my test result	12	48.00
Discussed about voluntary counselling and testing of HIV with her husband/partner		
Yes	141	76.22
No	44	23.78
Response of the partner		
Will not take the test	15	10.64
Not willing to collect results	34	24.11
Encouraged me to take a test	33	23.40
He refused to take a test	34	24.11
Took the test	25	17.73

Socio-demographic Factors

A modified Poisson regression was run to determine the factors affecting the utilization of PMTCT services since more than 30% of the study participants were found not to be utilizing PMTCT services. Table 9 shows the socio-demographic factors which affect the utilization of PMTCT services among the study participants. Results of the analysis revealed that employment status and Gravidity were the only socio-demographic factors affecting utilization of PMTCT services. Study participants who were unemployed were 6.15 times more likely not to utilize PMTCT services compared to those who were employed (cPR 6.15, 95%CI 3.24-11.65, $P < 0.001$). Women who had gravidity of >4 were 76% protective from not utilizing PMTCT services (cPR 0.24, 95%CI 0.08-0.72, $P = 0.010$).

Table 9: Socio-demographic Factors That Affect the Utilization of PMTCT Services among Pregnant and Breast-Feeding Mothers

Variables	Utilization of PMTCT		cPR (95% CI)	P Value
	Yes Count, (%)	No Count, (%)		
Age in years				
16 – 23	51 (60.71)	33 (39.29)	1.00	
24 – 30	35 (56.45)	27 (43.55)	1.11 (0.75-1.64)	0.604
31 – 37	24 (75.00)	08 (25.00)	0.64 (0.33-1.23)	0.178
≥38	05 (71.43)	02 (28.57)	0.73 (0.22-2.43)	0.604
Number of family members				
1 – 4	46 (57.50)	34 (42.50)	1.00	
5 – 8	65 (65.00)	35 (35.00)	0.83 (0.57-1.19)	0.304
>8	04 (80.00)	01 (20.00)	0.47 (0.08-2.78)	0.406
Religion				
Catholic	45 (60.00)	30 (40.00)	1.00	
Anglican	33 (55.00)	27 (45.00)	1.13 (0.76-1.67)	0.559
Muslim	13 (72.22)	05 (27.78)	0.69 (0.31-1.54)	0.370
Others	24 (75.00)	08 (25.00)	0.63 (0.32-1.21)	0.165
Area of Residence				
Urban	32 (61.54)	20 (38.46)	1.00	
Rural	83 (62.41)	50 (37.59)	0.98 (0.65-1.47)	0.913
Marital status				
Unmarried	46 (68.66)	21 (31.34)	1.00	
Married	69 (58.47)	49 (41.53)	1.32 (0.88-2.01)	0.184
Education Level				
None	14 (70.00)	06 (30.00)	1.00	
Primary	41 (59.42)	28 (40.58)	1.35 (0.65-2.81)	0.417
Secondary	52 (61.18)	33 (38.82)	1.29 (0.63-2.67)	0.484
Tertiary	08 (72.73)	03 (27.27)	0.91 (0.28-2.95)	0.874
Employment Status				
Employed	79 (89.77)	09 (10.23)	1.00	
Unemployed	36 (37.11)	61 (62.89)	6.15 (3.24-11.65)	<0.001
Gravidity				
≤4	89 (57.05)	67 (42.95)	1.00	
>4	26 (89.66)	03 (10.34)	0.24 (0.08-0.72)	0.010

CI = Confidence Interval, cPR = Crude Prevalence Ratio, P Value is Significant at 0.05 level Health Facility Related Factors.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

The results of a modified Poisson regression revealed that 4 health facility-related factors affected the utilization of PMTCT services as shown in Table 10 below. The factors include; Waiting time of >2 hours versus <30 minutes (cPR 0.37, 95%CI 0.15-0.93, P=0.035), Harsh and rude attitude of health workers versus the segregative attitude (cPR 3.77, 95%CI 2.31-6.15, P<0.001), Disagreeing on satisfactory services versus strongly agreeing on satisfactory services (cPR 3.66, 95%CI 1.47-9.11, P<0.001) and Those who said health workers are not few versus those who said the health workers are few (cPR 0.99, 95%CI 0.68-1.47, P<0.001).

Table 10: Health Facility-Related Factors That Affect the Utilization of PMTCT Services among Pregnant and Breast-Feeding Mothers

Variables	Utilization of PMTCT		cPR (95% CI)	P Value
	Yes Count, (%)	No Count, (%)		
Ever been told about PMTCT during ANC				
Yes	85 (63.43)	49 (36.57)	1.00	
No	30 (58.82)	21 (41.18)	1.13 (0.76-1.68)	0.559
Waiting Time at the clinic				
<30 minutes	60 (55.05)	49 (44.95)	1.00	
30 - 60 minutes	35 (67.31)	17 (32.69)	0.73 (0.47-1.13)	0.159
>2 hours	20 (83.33)	04 (16.67)	0.37 (0.15-0.93)	0.035
Attitude of health workers				
Segregative	56 (80.00)	14 (20.00)	1.00	
Friendly and caring	24 (92.31)	02 (07.69)	0.38 (0.09-1.58)	0.186
Pay little attention to clients	19 (79.17)	05 (20.83)	1.04 (0.42-2.59)	0.930
Harsh and rude	16 (24.62)	49 (75.38)	3.77 (2.31-6.15)	<0.001
Communication about PMTCT services				
Inadequate	61 (61.54)	38 (38.38)	1.00	
Easy to understand	16 (61.54)	10 (38.46)	1.00 (0.58-1.73)	0.994
No communication at all	21 (60.00)	14 (40.00)	1.04 (0.64-1.68)	0.866
Too technical	17 (68.00)	08 (32.00)	0.83 (0.45-1.56)	0.569
Satisfactory Services				
Strongly Agree	20 (83.33)	04 (16.67)	1.00	
Agree	33 (84.62)	06 (15.38)	0.92 (0.29-2.95)	0.893
Disagree	34 (39.08)	53 (60.92)	3.66 (1.47-9.11)	0.005
Strongly Disagree	28 (80.00)	07 (20.00)	1.2 (0.39-3.66)	0.749
Time Management by health workers				
Yes	93 (61.59)	58 (38.41)	1.00	
No	22 (64.71)	12 (35.29)	0.92 (0.56-1.51)	0.740
Few Health Workers				
Yes	41 (62.12)	25 (37.88)	1.00	
No	74 (62.18)	45 (37.84)	0.99 (0.68-1.47)	<0.001

Multivariate Analysis to Show Factors That Independently Affect the Utilization of PMTCT Services Among Pregnant and Breast-Feeding Mothers at Kiryandongo

For the multivariate model, factors which had p-values less than 0.20 at bivariate analysis were added to the model and a multivariate analysis was executed to determine factors independently affecting utilization of PMTCT services among the study participants. Through a stepwise regression with removal of least significant variables in each step, Employment status, attitude of health workers and level of satisfaction with services remained independently affecting the utilization of PMTCT services. Mothers who were unemployed were 4.05 times likely not to utilize PMTCT services (aPR 4.05, 95%CI 2.19-7.50, P<0.001). Mothers who said that health workers are rude and harsh were 2.17 times more likely not to utilize PMTCT services than mothers who said that the health workers are segregative (aPR 2.17, 95%CI 1.38-3.44, P=0.001). Women who disagreed that services are satisfactory were 2.40 times more likely not to utilize PMTCT services than those who strongly agreed that services are satisfactory (aPR 2.40, 95%CI 1.22-4.74, P=0.011).

Table 11: Multivariate Analysis to Show Factors That Independently Affect the Utilization of PMTCT Services Among Pregnant and Breast-Feeding Mothers at Kiryandongo

Variables	Utilization of PMTCT		Apr (95% CI)	P Value
	Yes Count, (%)	No Count, (%)		
Age in years				
16 – 23	51 (60.71)	33 (39.29)	1.00	
24 – 30	35 (56.45)	27 (43.55)	1.09 (0.82-1.45)	0.562
31 – 37	24 (75.00)	08 (25.00)	0.89 (0.60-1.33)	0.571
≥38	05 (71.43)	02 (28.57)	1.94 (0.63-6.00)	0.251
Religion				
Catholic	45 (60.00)	30 (40.00)	1.00	
Anglican	33 (55.00)	27 (45.00)	1.15 (0.85-1.55)	0.352
Muslim	13 (72.22)	05 (27.78)	1.38 (0.76-2.48)	0.287
Others	24 (75.00)	08 (25.00)	0.79 (0.45-1.38)	0.400
Marital status				
Unmarried	46 (68.66)	21 (31.34)	1.00	
Married	69 (58.47)	49 (41.53)	1.20 (0.87-1.65)	0.274
Employment Status				
Employed	79 (89.77)	09 (10.23)	1.00	
Unemployed	36 (37.11)	61 (62.89)	4.05 (2.19-7.50)	<0.001
Gravidity				
≤4	89 (57.05)	67 (42.95)	1.00	
>4	26 (89.66)	03 (10.34)	0.50 (0.15-1.62)	0.257
Waiting Time at the clinic				
<30 minutes	60 (55.05)	49 (44.95)	1.00	
30 - 60 minutes	35 (67.31)	17 (32.69)	0.99 (0.70-1.41)	0.967
>2 hours	20 (83.33)	04 (16.67)	0.81 (0.39-1.70)	0.574
Attitude of health workers				
Segregative	56 (80.00)	14 (20.00)	1.00	
Friendly and caring	24 (92.31)	02 (07.69)	0.60 (0.16-2.24)	0.451
Pay little attention to clients	19 (79.17)	05 (20.83)	0.77 (0.34-1.71)	0.518
Harsh and rude	16 (24.62)	49 (75.38)	2.17 (1.38-3.44)	0.001
Satisfactory Services				
Strongly Agree	20 (83.33)	04 (16.67)	1.00	
Agree	33 (84.62)	06 (15.38)	1.65 (0.68-4.03)	0.269
Disagree	34 (39.08)	53 (60.92)	2.40 (1.22-4.74)	0.011
Strongly Disagree	28 (80.00)	07 (20.00)	1.37 (0.57-3.27)	0.479

CI = Confidence Interval, aPR = Adjusted Prevalence Ratio, P-Value is Significant at 0.05 level

DISCUSSION

The Knowledge on PMTCT among Pregnant and Breast-Feeding Mothers at Kiryandongo Hospital

This study showed that the mean score on knowledge was 5.21 with a standard deviation of 1.36. The majority 59.46% (110/185) of the study participants had inadequate knowledge on PMTCT meanwhile less than of the study participants 40.54% (75/185) had adequate knowledge. The figures found in the present study are low when compared to the results of a study among pregnant women attending antenatal clinics in Addis Ababa which revealed that about 90% knew that a mother with HIV can pass the virus to her child, and MTCT through breast milk was commonly cited by most women (72.4%) [21]. The possible reason for the discrepancy in the study findings could be because the previous study was multi-cantered whereas the present study was conducted in only one hospital. The findings of the present study are low compared with the results of a study done within a similar setting which revealed that 90% of postnatal mothers who delivered in Tikur Anbessa and Zewditu Memorial hospitals knew that HIV can be transmitted from an infected mother to her child [22]. The discrepancy in the study results could be because in the area where the previous study was conducted various health education programmes were being conducted both at health-facility and community levels as well as a broadcast through mass media. The women's knowledge about MTCT in the present study was lower than the knowledge reported in other African settings. In a health-facility study in Uganda, 80% of the women knew that a mother with HIV could transmit the virus to her child [23]. Furthermore, the knowledge of mothers on PMTCT in the present study was low compared to the knowledge (79%) of the pregnant women studied at ANC clinic in Khartoum, Sudan [24] and 70% in rural districts of Zimbabwe [25]. The high level of knowledge of mothers about MTCT is critical for preventing the transmission of the virus from HIV-positive women to their children, and programmes should utilize various means of increasing the awareness and knowledge of the community through proper IEC/BCC interventions. This study showed 53.51% of mothers knew that mother with HIV can pass the virus to her baby and 51.35% of them knew it can be prevented by ARV drug. This finding is lower than the study conducted in a similar setting in Addis Ababa, Ethiopia (90.3%) [26], Hawassa Referral Hospital, Ethiopia (90.1%) [27], and Uganda (93%) [28] but consistent with the study conducted in East Gojjam, Ethiopia (77.5%) [29] and Sudan (79%) [24]. The overall 40.54% of mothers who had good knowledge in this study is consistent with a report from Northwestern Ethiopia (42%) [30] but lower than another report (79.5%) from Dire Dawa [31]. This might be due to the fact that health education program implementation and community awareness about MTCT vary from region to region. This level of knowledge may be due to various health education programmes being conducted at health facility and awareness created at community levels in collaboration with health extension workers. Having found that majority of women in the present study had inadequate knowledge on PMTCT, this could become a barrier in utilization of PMTCT services just like a study in Vietnam found that lack of knowledge and information due to poor counseling, and fear of stigma and discrimination were the main barriers in accessing PMTCT services for HIV positive women [32]. Efforts are needed to address the low level of knowledge regarding PMTCT among pregnant women. Also a study by Nguyen et al. [32] in Hanoi, Vietnam underscores the importance of proper counselling that will affect the attitude of pregnant positive mothers, it revealed that "Among the 52 women, there were 15 who either lacked knowledge about the infection and testing or had never thought about their own risk of infection. Most of the women were not aware that medication could prevent MTCT".

The Utilization of PMTCT Services Among Pregnant and Breastfeeding Mothers at Kiryandongo Hospital

Results of the present study have revealed that 62.16% had utilized PMTCT services meanwhile 37.84% had not utilized PMTCT services. Among those who utilized PMTCT services, 78.38% tested for HIV during the current pregnancy meanwhile 21.62% never tested for HIV. For those who were positive, 51.92% had collected ARV drugs meanwhile 48.08% had not collected ARVs. The results of the present study are higher than the results of a study done in Ethiopia which revealed that only 18% and 9% of respondents attended the facility for HIV counselling and testing (HCT) and receiving antiretroviral prophylaxis, respectively [21]. The probable reason for the discrepancy in the study findings could be because there are many organizations implementing HIV programs in the facility where the present study was conducted. The result of the present study is lower than the figures found in a study based in Central Ethiopia which revealed that the prevalence of PMTCT service utilization was 86.9% though when it came to HIV counselling and testing, only 8.6% of respondents attended the facility for HCT which is a lower figure compared to the 78.38% found in the present study [33]. The disagreement in the study findings could be because of the HIV testing and counselling being initiated by the health workers at the facility where the present study was conducted. The results of the present study are higher the results of a study conducted in rural Tanzania which revealed that overall, 24% of women accessed HIV care and 12% accessed ARVs during pregnancy [34]. The discrepancy in the study findings could be because of the difference in study settings in that the present study was hospital based whereas the previous study was community based. In the present study, 24.11% of the women said

their husbands refused them to take HIV test which is almost consistent with another study conducted in Uganda by Bajunirwe & Muzoora [23]) who reported that about 20% of the pregnant women said that their husbands disapproved mother's decision to test for HIV. Similar to the present findings, several studies indicate that women's major concern about HCT is the reaction of their male partners towards HIV-positive test results and the subsequent low rates of HIV serostatus disclosure [35, 36]. The decision to involve male partners in the maternity services plays an important role in the uptake of ANC/ PMTCT services. The strategy to inform the male partners about PMTCT services and invite them to ANC clinics with their female partners to increase the uptake of HCT is currently implemented in many countries [37]. In the present study, 17.73% of the women said their husbands took an HIV test which is lower than what was found in a study conducted in Ethiopia which revealed that most of the pregnant women interviewed reported that 60% of their partners were tested for HIV during the current pregnancy [21]. The findings of the present study are not consistent with the findings of a study done in urban Rwanda and Zambia which revealed that although 91% and 47% of the couples, respectively, were willing to test jointly, stigma and fear of partner reaction were the main barriers preventing couples from getting tested for HIV together [35]. As such, multi-pronged approaches need to be employed by the stake holders so as to break the barriers. The result of the present study is low compared with the study conducted in Gondar, north-west Ethiopia, that showed 82.5% of pregnant women accepted HIV counseling and testing [38]. The finding of this result is higher than the 2014 national coverage in Ethiopia (57%) [26] but is lower than reports from Addis Ababa (94%) [21]. The possible reasons for this could be due to the fact that the program being implemented in opt-out approach is with high level of acceptability and high level of awareness towards PMTCT. The result of the present study is lower than the result of an institutional based cross-sectional study which showed that the prevalence of PMTCT service utilization was 86.9% though the 8.6% of respondents attended the facility for HCT is lower than what was found in the present study [33]. The finding of the present study is higher than the result of a study in Kassala which revealed that although 152 (17.7%) patients initially agreed to have an HIV test, only 109 (12.7%) were tested. Of the 109 patients who were tested, 20 (18.3%) were found to be HIV-positive [39].

The Socio Demographic and Health Facility Related Factors That Affect the Utilization of PMTCT Services Among Pregnant and Breast-Feeding Mothers at Kiryandongo

This study showed that Employment status, attitude of health workers and level of satisfaction with services were independently affecting the utilization of PMTCT services. Employment status: This study showed that unemployed participants were more likely not to utilize PMTCT services. This could be because of the possibility that some health workers in government facilities extort money from clients even when services are supposed to be completely free of charge. Then for those who might want to receive the PMTCT services from private, facilities, the cost of services may be too expensive to be afforded by unemployed clients who then resort to not utilizing the PMTCT services. The finding of the present study is in line with the result of a study done in Central Ethiopia which revealed that the occupational status of the women was associated with utilization of PMTCT services [33]. Contrary to the findings of the present study, Fikadu & Dejene [40] did not establish any association between the employment status of the participants and utilization of PMTCT. Similar to what was found in the present study, Dalal et al. [41] found a significant association between employment status and utilization of PMTCT services. The attitude of health workers: Women who regarded health workers as rude and harsh were more likely not to utilize PMTCT services. The way health workers treat the mothers (mistreatment), is a barrier that contributes to the low utilization of ANC/PMTCT services because mothers with prior experience of harsh treatment by health workers may choose not to go for PMTCT services hence low level of utilization [21]. Similar to the findings of the present study, Abebe et al. [42] found that not getting friendly service from health facilities was one of the factors that might hinder PMTCT service utilization. Poor quality of care is always a prominent reason not to use available PMTCT services [25]. Regarding the above, among factors affecting "user friendliness" are explained on organizational quality and consumer responsiveness of health care judged by utilizes and the approach of service providers and Clients interaction. It includes staff attitude that could be result of poor training and rude behaviors, hours of operation that could inconvenient, privacy, sufficient space and conducive waiting area, well organized service delivery point and providers' response are mandatory for satisfaction of service consumers, absence of skilled professional and improper utilization of time for post-test counseling was identified as a reason why the women did not receive test result [43]. With specific regard to the use of antiretroviral prophylaxis for PMTCT, little evidence suggested that this was linked to women's experiences in PMTCT services. However, irregular antenatal care attendance and low levels of trust in health workers, which may stem from experiences within PMTCT, were associated with non-use of antiretroviral prophylaxis for PMTCT [44]. Level of satisfaction with services: This study revealed that women who disagreed of satisfactory services were more likely not to utilize PMTCT services. Overall, the evidence regarding how women's experiences in PMTCT services affect their subsequent care-seeking behaviour remains sparse, since few studies have specifically sought to assess this link. This appears to be particularly true regarding

the uptake of both long-term HIV care and treatment for the woman's own HIV infection and infant HIV testing and related services [42]. Client satisfaction with PMTCT services is an indicator of the quality of outcomes in health care as it influences service utilization and therefore, one of the pillars of improving the quality of health services is measuring and addressing client satisfaction [24]. Still regarding satisfaction with services offered at the health facility, the results of a study done by Asefa & Mitike [45] revealed that clients who liked the discussion they had with their counsellor were less likely to be satisfied with the PMTCT service they received. This surprising finding may be because the situations faced by clients at health institutions may not be relevant to them if compared to the quality of attention received which can largely affect their satisfaction [46].

CONCLUSION

The study has shown that there is more than half of the pregnant women and lactating mothers attending Kiryandongo hospital have inadequate knowledge on PMTCT services. The proportion of mothers found with adequate knowledge on PMTCT in the present study is low compared to most studies done in Africa. At Kiryandongo hospital, the utilization of PMTCT services among pregnant and lactating mothers was found to be slightly high. HIV counselling and testing was found to be high among the pregnant and lactating mothers. Male partners' HIV counseling and testing during the current pregnancy were reported to be low. After adjusting for confounders, Employment status, attitude of health workers and level of satisfaction with services were found to be independently affecting the utilization of PMTCT services among the pregnant and lactating mothers attending Kiryandongo hospital.

RECOMMENDATIONS

Health workers should continuously and regularly provide health education about PMTCT to pregnant and lactating women so as to increase their level of knowledge. This can be done in collaboration with peers, linkage facilitators and health sciences students who have gone to the facility for placement. For the mothers have been missed since they don't attend hospitals, the government should budget for and formulate programs of community sensitization to enlighten mothers within the community about PMTCT and the importance of utilizing PMTCT services. Health workers should motivate mothers to utilize PMTCT services by signifying the importance of PMTCT to mothers and how their unborn children will benefit. Implementing partners and other collaborators can liaise with the government to scale the utilization of PMTCT among the target groups. Improving the quality of counselling services for pregnant mothers might also help to improve their utilization of PMTCT services.

REFERENCES

1. Alum, E. U., Ugwu, O. P.C., Obeagu, E. I., & Okon, M. B. Curtailing HIV/AIDS Spread: Impact of Religious Leaders. *Newport International Journal of Research in Medical Sciences (NIJRMS)*, 2023; 3(2): 28-31. <https://nijournals.org/wp-content/uploads/2023/06/NIJRMS-32-28-31-2023-rm.pdf>
2. Alum, E. U., Obeagu, E. I., Ugwu, O. P.C., Aja, P. M., & Okon, M. B. HIV Infection and Cardiovascular diseases: The obnoxious Duos. *Newport International Journal of Research in Medical Sciences (NIJRMS)*, 2023; 3(2): 95-99. <https://nijournals.org/wp-content/uploads/2023/07/NIJRMS-3-295-99-2023.pdf>.
3. Obeagu, E.I., Alum, E.U., & Obeagu, G.U. Factors Associated with Prevalence of HIV Among Youths: A Review of Africa Perspective. *Madonna University Journal of Medicine and Health Sciences*, 2023; 3(1): 13-18. <https://madonnauniversity.edu.ng/journals/index.php/medicine>
4. Obeagu, E. I., Nwosu, D. C., Ugwu, O. P. C., & Alum, E. U. Adverse Drug Reactions in HIV/AIDS Patients on Highly Active Antiretro Viral Therapy: A Review of Prevalence. *Newport International Journal of Scientific and Experimental Sciences (NIJSES)*. 2023; 4(1):43-47. <https://doi.org/10.59298/NIJSES/2023/10.6.1000>
5. Alum, E. U., Obeagu, E. I., Ugwu, O. P. C., Samson, A. O., Adepoju, A. O., & Amusa, M. O. Inclusion of nutritional counseling and mental health services in HIV/AIDS management: A paradigm shift. *Medicine* 2023; 102:41(e35673). Received: 2 August 2023 / Received in final form: 16 September 2023 / Accepted: 25 September 2023 <http://dx.doi.org/10.1097/MD.00000000000035673>.
6. Alum, E. U., Ugwu, O. P. C., Obeagu, E. I., Aja, P. M., Okon, M. B., & Uti, D. E. Reducing HIV Infection Rate in Women: A Catalyst to reducing HIV Infection pervasiveness in Africa. *International Journal of Innovative and Applied Research*. 2023; 11(10):01-06. DOI: 10.58538/IJAR/2048. <http://dx.doi.org/10.58538/IJAR/2048>
7. Obeagu, E. I., Obeagu, G. U., Alum, E. U., & Ugwu, O. P. C. Anemia as a Prognostic Marker for Disease Progression in HIV Infection. *IAA Journal of Biological Sciences*. 2023; 11(1):33-44. <https://doi.org/10.59298/IAAJB/2023/3.2.23310>
8. Obeagu, E. I., Obeagu, G. U., Alum, E. U., & Ugwu, O. P. C. Persistent Immune Activation and Chronic Inflammation: Unravelling Their Impact on Anemia in HIV Infection. *INOSR Experimental Sciences*. 2023; 12(3):73-84. <https://doi.org/10.59298/INOSRES/2023/7.3.21322>

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

9. Dlamini, P., Mokoboto-zwane, T. S., Africa, S., & Africa, S. International Journal of Africa Nursing Sciences Knowledge, attitudes and practices associated with post-natal PMTCT in breastfeeding mothers living with HIV. *International Journal of Africa Nursing Sciences*. 2019; 11: 100150. <https://doi.org/10.1016/j.ijans.2019.100150>.
10. Abteu, S. Knowledge of pregnant women on mother-to-child transmission of HIV , its prevention , and associated factors in Assosa town , Northwest Ethiopia. 2016; 101–107.
11. Decker, S., Rempis, E., Schnack, A., Braun, V., Rubaihayo, J., Busingye, P., Tumwesigye, N. M., Harms, G., & Theuring, S. Prevention of mother-to-child transmission of HIV: Postpartum adherence to Option B+ until 18 months in Western Uganda. *PLoS ONE*. 2017; 12(6), 1–13. <https://doi.org/10.1371/journal.pone.0179448>,
12. WHO. Mother-baby package: implementing safe motherhood in countries: practical guide (WHO/FHE/MSM/94.11; 1) 2016.
13. WHO. PMTCT strategic vision 2010-2015: preventing mother-to-child transmission of HIV to reach the UNGASS and Millennium Development Goals: moving towards the elimination of paediatric HIV, December 2009, 2019.
14. Obeagu, E. I., Obeagu, G. U., Alum, E. U., & Ugwu, O. P. C. Comprehensive Review of Antiretroviral Therapy Effects on Red Blood Cells in HIV Patients. *INOSR Experimental Sciences*. 2023; 12(3):63-72. <https://doi.org/10.59298/INOSRES/2023/6.3.21322>
15. Obeagu, E. I., Obeagu, G. U., Alum, E. U., & Ugwu, O. P. C. Understanding the Impact of HIV-Associated Bone Marrow Alterations on Erythropoiesis. *INOSR Scientific Research*. 2023; 10(1):1-11. <https://doi.org/10.59298/INOSRSR/2023/1.2.12222>
16. UNAIDS. Global HIV & AIDS statistics — 2020 fact sheet. Joint United Nations Programme on HIV/AIDS. <https://www.unaids.org/en/resources/fact-sheet>, 2020.
17. UNAIDS. UGANDA. Joint United Nations Programme on HIV/AIDS. <https://www.unaids.org/en/regionscountries/countries/uganda>, 2018.
18. Masereka, E. M., Ngabirano, T. D., Osingada, C. P., Wiltshire, C. S., Castelnuevo, B., & Kiragga, A. N. Increasing retention of HIV positive pregnant and breastfeeding mothers on option-b plus by upgrading and providing full time HIV services at a lower health facility in rural Uganda. 2019; 1–6.
19. Wiegand, H., & Kish, L. Survey Sampling. John Wiley & Sons, Inc., New York, London 1965, IX + 643 S., 31 Abb., 56 Tab., Preis 83 s. *Biometrische Zeitschrift*. 10, 88–89 (1968). <https://doi.org/10.1002/bimj.19680100122>
20. Deressa, W., Seme, A., Asefa, A., Teshome, G., & Enqueslassie, F. Utilization of PMTCT services and associated factors among pregnant women attending antenatal clinics in Addis Ababa, Ethiopia. *BMC Pregnancy and Childbirth*. 2014; 14(1), 1–13. <https://doi.org/10.1186/1471-2393-14-328>.
21. Jebessa, S., & Teka, T. Knowledge and attitude towards mother-to-child transmission of HIV and its prevention among post-natal mothers in Tikur Anbessa and Zewditu Memorial Hospitals, Addis Ababa. *Ethiop J Health Dev*, 2015; 19(3), 211–218.
22. Bajunirwe, F., & Muzoora, M. Barriers to the implementation of programmes for the prevention of mother-to-child transmission of HIV: a cross-sectional survey in rural and urban Uganda. *AIDS Res Ther*, 2015; 2, 10.
23. Mahmoud, M., Nasr, A., Gasmelseed, DEA Abdalehahafiz, M., Elsheikh, M., & Adam, I. Knowledge and attitude toward HIV voluntary counselling and testing services among pregnant women attending an antenatal clinic in Sudan. *J Med Virol*, 2017; 79, 469–473.
24. Perez, F., Aung, K., Ndor, T., Engelsmann, B., & Dabi, F. Participation of traditional birth attendants in the prevention of mother-to-child transmission of HIV services in two rural districts of Zimbabwe: a feasibility study. *BMC Public Health*, 2018; 8(401).
25. MOHFDRE. (2014). "Health sector development programme Iv," Annual Performance Report, Ministry of Health of Federal Democratic Republic of Ethiopia. Ministry of Health of Federal Democratic Republic of Ethiopia, Addis Abab(Ethiopia).
26. Abajobir, A. A., & Zeleke, A. B. AIDS & clinical knowledge, attitude, practice and factors associated with prevention of mother-to-child transmission of HIV/AIDS among pregnant mothers. *Journal OfAIDS&Clinical Research*, 2013; 4(6).
27. Harms, G., Schulze, K., Moneta, I., Baryomunsi, C., Mbezi, P., & Poggensee, G. Mother-to-child transmission of HIV and its prevention: awareness and knowledge in Uganda and Tanzania. *SAHARA-J: Journal of Social Aspects of HIV/AIDS*, 2018; 2(2), 258–266.
28. Belachewand, A., & Abebe, G. Factors affecting acceptance ofHIV Counseling & Testing among antenatal care attendants: with Emphasis on Role of Male Partners. *International Journal of Scientific and Engineering Research*, 2012; 3(4).
29. Moges, Z., & Amberbir, A. Factors associated with readiness to VCT service utilization among pregnant women

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

- attend- ing Clinics in Northwestern Ethiopia: a Health belief model approach. *Ethiopian Journal Of Health Sciences*, 2017; 21(5), 115–122.
30. Demissie, A., Deribew, A., & Abera, M. Determinants of acceptance of voluntary HIV testing among antenatal clinic attendees at Dil Chora Hospital, Dire Dawa, East Ethiopia. *Ethiopian Journal of Health Development*, 2019; 23(2), 142– 147.
31. Nguyen, A., Oosterhoff, P., Ngoc, Y., Wright, P., & Hardon, W. Barriers to access prevention of mother-to-child transmission for HIV positive women in a well-resourced setting in Vietnam. *AIDS Research and Therapy*, 2018; 5(7), 1742–6405.
32. Merga, H., Woldemichael, K., & Dube, L. Utilization of Prevention of Mother-to-Child Transmission of HIV Services and Associated Factors among Antenatal Care Attending Mothers in Sebeta Town, Central Ethiopia. *Advances in Public Health*, 2016, 1–10. <https://doi.org/10.1155/2016/6250898>.
33. Gourlay, A., Wringe, A., Todd, J., Cawley, C., Michael, D., Machelamba, R., Reniers, G., Urassa, M., & Zaba, B. Factors associated with uptake of services to prevent mother-to-child transmission of HIV in a community cohort in rural Tanzania. *Sexually Transmitted Infections*, 2015; 91(7), 520–527. <https://doi.org/10.1136/sextrans-2014-051907>.
34. Kelley, A., Karita, E., Sullivan, P., Katangulia, F., Chomba, E., Carael, M., Telfair, J., Dunham, S., Vwalika, C., Kautzman, M., Wall, K., & Allen, S. Knowledge and perceptions of couples' voluntary counseling and testing in urban Rwanda and Zambia: a cross-sectional household survey. *PLoS One*, 2019; 6(5), e19573.
35. Lerebo, W., Callens, S., Jackson, D., Zarowsky, C., & Tommerman, M. Identifying factors associated with the uptake of prevention of mother to child HIV transmission programme in Tigray region. Ethiopia: a multilevel modelling approach. *BMC Health Services Research*, 2014; 14(181).
36. WHO. PMTCT Strategic Vision 2010–2015: Preventing Mother-to-Child Transmission of HIV to Reach the UNGASS and Millennium Development Goals. World Health Organization, Geneva 2010.
37. Malaju, M. T., & Alene, G. D. Assessment of utilization of provider-initiated HIV testing and counselling as an intervention for prevention of mother-to-child transmission of HIV and associated factors among pregnant women in Gondar town, North West Ethiopia. *BMC Public Health*, 2012; 12(1), 1–8.
38. Abdallah, T. M., Ali, A. A., & Adam, I. Provider-initiated HIV testing and counselling among tuberculosis patients in Kassala, Eastern Sudan. *Journal of Infection and Public Health*, 2012; 5(1), 63–66.
39. Fikadu, D., & Dejene, T. Assessment of Utilization of Provider Initiated HIV Testing and Counseling and Associated Factors among Adult Outpatient Department Patients in Wonchi Woreda, South West Shoa Zone, Central Ethiopia. *Journal of Infectious Diseases & Therapy*, 2016; 04(02), 1–10. <https://doi.org/10.4172/2332-0877.1000276>.
40. Dalal, S., Lee, C. won, Farirai, T., Schilsky, A., Goldman, T., Moore, J., & Bock, N. N. Provider-initiated HIV testing and counseling: Increased uptake in two public community health centers in south africa and implications for scale-up. *PLoS ONE*, 2011; 6(11). <https://doi.org/10.1371/journal.pone.0027293>,
41. Abebe, Z. Z., Mengistu, M. Y., Gete, Y. K., & Worku, A. G. Factors influencing prevention of mother to child HIV transmission service utilization among HIV positive women in Amhara National Regional State, Ethiopia: A thematic content analysis. *BioRxiv*, 2019; 1–24. <https://doi.org/10.1101/613752>.
42. Sarker, M. Determinants of HIV counselling and testing participation in prevention of mothetr to child transmission. Office of the US Global AIDS Coordinator, Burkina Fa 2017.
43. World Health Organisation (WHO). Women's experiences in services for preventing the mother-to-child transmission of HIV: a literature review. Who; 2013, 27p. <http://www.who.int/iris/handle/10665/90780>.
44. Asefa, A., & Mitike, G. Prevention of Mother-to-Child Transmission (PMTCT) of HIV services in Adama town, Ethiopia: Clients' satisfaction and challenges experienced by service providers. *BMC Pregnancy and Childbirth*, 2014; 14(1), 1–7. <https://doi.org/10.1186/1471-2393-14-57>.
45. Oliveira, F., Arieta, E., Temporini, R., & Jose, K. Quality of health care: patient satisfaction in a University Hospital. *Arq Bras Oftalmol*, 2016; 69(5), 731–736.
- 46.

CITE AS: Kakungulu Yusuf (2024). Enhancing Utilization of PMTCT Services: Investigating Knowledge Factors Among Pregnant and Breastfeeding Mothers at Kiryandongo General Hospital, Western Uganda. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN MEDICAL SCIENCES, 5(1):79-94. <https://doi.org/10.59298/NIJRMS/2024/79.9457.1400>