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Male partners involvement in human immune deficiency virus testing and counseling during prenatal care visits in Bichena town Westcentral Ethiopia: a cross-sectional study

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Abstract

Objective Transmission of the Human immune deficiency virus (HIV) from mother to child remains a significant problem in developing countries. Male partners' involvement in HIV testing and counseling is a major entry point for the prevention of mother-to-child transmission (PMTCT) of HIV. This study aimed to assess male partners' involvement in HIV testing and counseling during prenatal care visits in Bichena town, Westcentral Ethiopia.

Results A community-based cross-sectional study design was conducted from October 1/2018 to June 15/2019 among 406 male partners. Less than half (41.38%) [95% CI: 36.20–46.10%] of the male partners were involved in HIV testing and counseling. In multivariable analysis male partners who are found in the age group of 20–29 years, secondary, and diploma and above educational level, good knowledge of the services provided in the prenatal care visits, male partners whose wife had ≥ 4 prenatal care visits, good knowledge of mother to child transmission (MTCT) and PMTCT of HIV, entering the prenatal care room together with his wife, discussing maternal health issue with health care providers, and travel < 15 min to reach a nearby health facility were associated with male partners involvement in HIV testing and counseling.

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Introduction

Human Immunodeficiency Virus (HIV) counseling and testing is the access point to HIV prevention, care, and treatment programs [1]. The World Health Organization (WHO) recommends offering HIV testing and counseling (HTC) to couples, wherever HTC is available, including in prenatal care/PMTCT clinics [2]. In Ethiopia, the HIV testing algorithm includes three rapid test kits (RTKs): STAT PACK (screening test), ABON (confirmatory test), and SDBIOLINE (tie-breaker test) [3]. Deoxyribonucleic Acid Polymerase Chain Reaction (DNA/PCR) test is also used for children under the age of 18 months [4]. The WHO also recommends testing for hepatitis B virus (HBV) surface antigen (HBsAg) 1 and syphilis at least once and as early as possible in the pregnancy [5]. Due to similar blood-borne transmission routes of HBV and hepatitis C virus (HCV) infections are common among HIV-positive individuals [6–8].

Without intervention, the risk of HIV infection from infected pregnant mothers to their unborn children ranges from 25 to 35% in developing countries, while with the implementation of core PMTCT interventions, this risk can be reduced to 2–5% [9]. In Ethiopia, the prevalence of MTCT of HIV ranges from 4.16 to 15.7% [10, 11], with a pooled prevalence of 9.93% [12]. Male partner involvement (MPI) in HTC increases the use of PMTCT interventions and improved HIV-free survival among infants [13–16]. However, the low MPI in the PMTCT results in pregnant women not getting tested for HIV [17]. A study conducted in Uganda indicates that more than 50% of pregnant women who refused HTC in a PMTCT setting reported the need for male partner (MP) permission before they could be tested [18].

In Ethiopia, the rate of MTCT of HIV is still >5% since the implementation of the option B+ regime [19]. Lack of support and absence of MPI is the main reason for the low option B+ regimen adherence [20]. However, HIV testing and counseling of pregnant women with their MP is essential to initiate early antiretroviral therapy that improves maternal health and decreases the risk of MTCT [21]. MPI in HTC is critical for PMTCT [22], and it has been recognized as an apriority focus area to be strengthened in PMTCT [23, 24]. Ending the epidemics of HIV/AIDS and eliminating MTCT of HIV is a global public health priority [25]. In Ethiopia, despite the availability of antiretroviral treatment, MTCT of HIV is still higher [26]. Therefore, assessing the level of MPI in HTC during prenatal care visits, and its associated factors are important for the implementation of the Sustainable Development Goals [27].

Materials and methods

Study design and period

A community-based cross-sectional study was conducted from October 1/2018 to June 15/2019 in Bichena town, Westcentral Ethiopia.

Study setting

This study was conducted in Bichena town, which is located in the East Gojjam Zone of the Amhara Region, Ethiopia. The town has five kebeles (the lowest administrative unit in Ethiopia, next to the district) with a total number of households of 7174 [28].

Study participants

All MP whose wives gave birth within the last one year before the study and had prenatal care visits in Bichena town.

Operational definitions

Male partner an individual with whom the pregnant woman was in an intimate sexual relationship, and was responsible for her pregnancy whether they were legally married or not [29].

Male partner involvement in HTC Refer to the MPI in both HIV counseling and testing during his wife's prenatal care visit [29].

Knowledge of MTCT When MP knows at least one timing of transmission of MTCT of HIV from three questions (during pregnancy, delivery, and breastfeeding), considered as having knowledge of MTCT [29, 30].

Knowledge of PMTCT When MP knows at least one PMTCT method from the three knowledge measuring items (using anti-retroviral therapy, delivery by cesarean section, and avoiding breastfeeding), considered to as having knowledge of PMTCT [29, 30].

Sample size determination

The sample size was calculated using a single population proportion formula by considering the following assumptions: the proportion of MPI in HTC at Gondar town was (40.10%) [29], $Z_{\alpha/2}$ =critical value for normal distribution at 95% confidence level, which is equal to 1.96 (Z value of $\alpha=0.05$) or 5% level of significance ($\alpha=0.05$) and a 5% margin of error ($d=0.05$). The sample size was adjusted by adding a 10% non-response rate and the final sample size was 406.

Sampling procedure and techniques

The total sample size was proportionally allocated for each kebele of the town based on the total number of MP whose wives gave birth within the last one year and had

Table 1 Socio-demographic characteristic of the MP in Bichena town, Westcentral, Ethiopia, 2019, (n = 406)

Variables	Categories	Frequency	Percentage
Age of male partners	20–29	88	21.68
	30–39	216	53.20
	40–60	102	25.12
Religion	Orthodox	327	80.54
	Muslim	68	16.75
	Protestant	11	2.71
Male partners' education level	Had no formal education	89	21.92
	Primary school	109	26.85
	Secondary school	84	20.69
	Diploma and above	124	30.54
Male partners' occupation	Employed (public/NGO)	95	23.40
	Farmer	139	34.23
	Merchant	89	21.92
	Driver	39	9.61
	Others*	44	10.84
Wives education level	Had no formal education	110	27.09
	Primary school	114	28.08
	Secondary school	94	23.15
	Diploma and above	88	21.68
wives occupation	Housewife	235	57.88
	Employed (public/NGO)	68	16.75
	Merchants	72	17.73
	Others**	31	7.64
Age of male partners at first marriage	15–19	81	19.95
	20–24	144	35.47
	25–29	137	33.74
	≥ 30	44	10.84
Length of marriage	≤ 10	143	35.22
	11–20	187	46.06
	≥ 21	76	18.72
Family size	3–4	214	52.71
	≥ 5	192	47.29
Number of under-five children	One child	299	73.64
	Two or more children	107	26.36
Is the pregnancy was planned	Yes	384	94.58
	No	22	5.42

* Driver, daily laborer, and carpenter, ** student, and daily laborer

prenatal care visits. Before data collection, a census was conducted to identify MP whose wives gave birth within the last one year and had prenatal care visits in each kebele of the town. The total number of MP whose wives gave birth within the last one year and had prenatal care visits in the five kebeles of the town was 864. The study participants were selected by simple random sampling techniques.

Data collection tools and procedures

The questionnaire was developed by the authors after reviewing different kinds of literature on the topic [29–33]. The data were collected using structured and pre-tested interviewer-administered questionnaires through face-to-face interviews. The data was collected by five-diploma midwives and supervised by two BSc midwives.

Data quality control

The data collectors and supervisors trained for two days on the objectives, relevance of the study, and techniques of interviews. The questionnaire was pre-tested before the actual data collection period on 5% (20) MP at Debre Werke town to ensure the clarity of the questionnaire and confirm the logical sequence of the questions.

Data processing and analysis

The data were entered by using Epi data 3.1, then exported to SPSS version 23.0 for analysis. All explanatory variables which have a significant association in bivariate analysis with a P-value < 0.20 were entered into a multivariable logistic regression model to get an adjusted odds ratio (AOR), and those variables with 95% of confidence intervals (CI) and a P-value of < 0.05 was considered as statistically significant with MPI in HTC.

Results

Socio-demographic characteristics of the male partners

A total of 406 MP participated with a response rate of 100%. The mean age of the MP was 35.08 years and ranged from 20 to 60 years. Of the MP, 124 (30.54%) had a diploma and above educational level (Table 1).

Knowledge of male partners about the services provided in prenatal care/PMTCT clinic

Two third (65.77%) of the MP had good knowledge of the services in prenatal care clinics. The availability of HTC, and PMTCT knew by 249 (61.33%), and 177 (43.60%) of MP respectively. Nearly four in ten (41.38%) of MP knew the provision of hepatitis virus screening during prenatal care visits (Supplementary material 1 Table S1).

Involvement in prenatal care/PMTCT

About, 287 (70.70%) MP was involved in making a joint prior plan for the prenatal care visit. Of the MP, 214 (52.70%) accompanied their wife to prenatal care visit at least once, and 196 (48.30%) physically entered the prenatal care/PMTCT room together with their wives (Figure S1).

Health care facility and cultural influence

Of the MP, 244 (60.10%) have a health facility nearby to their home, which is taking about 15–30 min to reach, and 393 (96.80%) knew that the maternal health service provision at public health facilities is free (Supplementary material 1 Table S2).

Level of male partners' involvement in HTC

In this study, 168 (41.38%) with [95% CI = 36.20–46.10] of MP involved in HTC. Of the MP, 249 (61.33%), and 177 (43.60%) knew at least one timing of MTCT, and PMTCT methods respectively (Table 2).

Table 2 Level of MPI in HTC in Bichena town, Westcentral, Ethiopia, 2019, (n = 406)

Variables	Categories	Frequency	Percentage	
Visited the PMTCT/prenatal care clinic with his wife at least once	Yes	214	52.71	
	No	192	47.29	
Reasons for not accompanying to the PMTCT/prenatal care clinic, (n = 192)*	The inflexibility of PMTCT/prenatal care visiting time	165	85.94	
	Work overload	145	75.52	
	Long waiting time	139	72.39	
	Prenatal care/PMTCT is a concern of the women	88	45.83	
	Limited space to accommodate both parents	66	34.38	
	Other family members accompanied her	103	53.65	
	Male feel shame	45	23.44	
	Women do not allow their partners to accompany	37	19.27	
	Do not know pregnancy could result in a complication	31	16.14	
	Number of male partners in prenatal care visited (n = 214)	1	125	58.41
		2	49	22.89
3		26	12.15	
≥4 ⁺		14	6.54	
Numbers of wives prenatal care visited	<3	126	31.03	
	≥4 ⁺	280	69.97	
Involved in both testing and counseling of HIV	Yes	168	41.38	
	No	238	58.62	
Know at least one timing of MTCT	Yes	249	61.33	
	No	157	38.67	
Timing of MTCT (n = 249)*	During pregnancy	146	58.63	
	During delivery	187	75.10	
	During breastfeeding	74	29.72	
Knew at least one PMTCT method	Yes	177	43.60	
	No	229	54.40	
Methods of PMTCT (n = 177)*	Anti-retroviral therapy	158	89.27	
	Delivery by cesarean section	29	16.38	
	Avoiding breastfeeding	43	24.29	

* Multiple responses are possible

Factors associated with MPI in HTC

In bivariate analysis variables with a P-value of less than 0.20 were entered into the multivariable analysis. In the multivariable analysis: MP's who are found in the ages group of 20–29 years, secondary, and diploma and above educational level, having good knowledge of the services provided in prenatal care visits, knowing at least one timing of MTCT and PMTCT method, entering the prenatal

care/PMTCT clinic together with his wife, discussed maternal health issues with health care providers, whose wife had four and above prenatal care visits, and traveled <15 min to reach a nearby health facility were significantly associated with MPI in HTC at a P-value of less than 0.05 (Table 3).

Discussion

Only screening pregnant mothers are not satisfactory for PMTCT, it is necessary involving MP to improve women's uptake of PMTCT services [34, 35]. This study identified 41.38% [95% CI: 36.20–46.10%] of the MP involved in HTC. This finding is in line with a study conducted in Gondar Town (40.10%) [29]. However, the finding of this study is higher than studies conducted in Goba town (22.70%), and Mekelle town (16.50%) [35, 36]. The implementation of health extension workers increases the awareness of MP on the advantage of involving in HTC [37, 38]. The finding of this study is lower than studies conducted in Delanta District (53.70%) [31], Arba Minch (53.60%) [33], Debre Markos town (59.10%) [39], and Addis Ababa (63.70%) [32]. The discrepancy might be the differences in the study setting, and the provision of health care services differs from facility to facility.

Male partners who are found in the age group of 20–29 years were 3.34 times more likely involved in HTC. It is in line with other studies [29, 36]. Young age group MP may pay more care and attention to their wife. MPI in HTC is increased with increasing educational levels. This finding is in line with other studies [15, 33, 40]. Educated men have more information regarding the advantage of getting the service provided at the health facility.

Entering the PMTCT clinic together with wives increased the MPI in HTC by 15.77 times. It is in line with another study [31]. During the counseling session, they may understand that HTC is the responsibility of both parents. The odds of MPI in HTC were 3.13 times higher among MP whose wives had ≥4 prenatal care visits. This is agreed with another study [31]. Having support from the husband makes the pregnant woman to completion of the prenatal care visits, which in turn also increases MPI in HTC [41]. MP's who discussed maternal health issues with health care providers were 14.65 times more likely involved in HTC. Making a bilateral decision regarding the health of families increases the utilization of health care services [42–44].

Having a health facility nearby to the living home increased MPI in HTC. This is congruent with another study [33]. This might be making the visiting time convenient. Knowing the service provided at the PMTCT clinic increased MPI by 3.25 times. This finding is in line with other studies [15, 33, 45]. The MPI in HTC was 3.17 times higher among MP who knew at least one timing of MTCT. This is consistent with other studies [29, 32, 46].

Table 3 Logistic regression analysis for the MPI in HTC at Bichena town, Westcentral, Ethiopia, 2019, (n = 406)

Variables	Involved in HTC		COR(95% CI)	AOR(95% CI)	P-value
	Yes	No			
Age of male partners					
≥40	23	79	1	1	0.345
30–39	81	135	2.06 (1.20–3.54)	1.59 (0.61–4.17)	0.021*
20–29	64	24	9.16 (4.73–17.72)	4.05 (1.23–113.34)	
Male partners' education level					
Had no formal education	11	78	1	1	0.909
Primary education	37	72	3.64 (1.73–7.68)	1.08 (0.31–3.74)	0.037*
Secondary education	38	46	5.85 (2.73–12.57)	4.13 (1.09–15.67)	0.008*
Diploma and above	82	42	13.84 (6.65–28.80)	5.32 (1.55–18.26)	
Wives education level					
Had no formal education	40	70	1	1	0.316
Primary education	65	69	1.14 (0.66–1.96)	0.56 (0.18–1.75)	0.455
Secondary education	40	54	1.30 (0.74–2.29)	0.65 (0.21–2.01)	0.326
Diploma and above	43	54	1.67 (0.95–2.96)	0.53 (0.15–1.87)	
Knowledge of male partners about prenatal care					
Poor knowledge	19	120	1	1	0.029*
Good knowledge	149	118	7.95 (4.64–13.70)	3.25 (1.13–9.35)	
Knew at least one timing of MTCT					
No	39	118	1	3.17 (1.34–7.49)	0.009*
Yes	129	120	3.25 (2.10–5.05)		
Knew at least one PMTCT method					
No	56	173	1	1	0.030*
Yes	112	65	5.32 (3.47–8.18)	2.55 (1.10–5.91)	
Physically entered the prenatal care/PMTCT clinic together with his wife					
No	18	192	1	1	0.001*
Yes	150	46	34.78 (19.37–62.45)	15.77 (6.48–38.35)	
Numbers of wives prenatal care visited					
< 3 times	20	106	1	1	0.023*
4+	148	132	5.94 (3.49–10.12)	3.13 (1.17–8.38)	
Discussed maternal health issues with health care providers					
No	52	219	1	1	0.001*
Yes	116	19	25.71 (14.52–45.54)	14.65 (6.44–33.31)	
Time to reach the nearest health facility					
> 30 min	28	76	1	1	0.667
15–30 min	100	144	1.88 (1.14–3.12)	0.81 (0.31–2.13)	0.034*
≤ 15 min	40	18	6.03 (2.98–12.21)	3.99 (1.11–14.31)	
Decision-maker to seek health facility					
Ether husband/wife	8	43	1	1	0.720
Together	160	195	4.41 (2.01–9.65)	1.27 (0.34–4.76)	

*Significant at a P-value of < 0.05

MP who know at least one PMTCT method were 2.55 times more likely involved in HTC. This finding agrees with other studies [15, 32, 33, 39]. Knowing MTCT/PMTCT could increase the MPI in HTC and it may also make them understand that pregnancy is their shared responsibility.

Less than half (41.38%) of the MP mentioned screening for hepatitis virus as one of the services provided in the prenatal care clinics. Hepatitis virus infection is a public health problem among pregnant women and the risk of acquiring HBV infection in HIV-infected patients is higher compared to HIV-negative individuals [47]. Besides the HTC of the MP, screening the MP

for hepatitis virus and creating awareness is a good entry point to prevent its complications [48].

Conclusion

Male partners' involvement in HTC in the study area was low compared to other studies conducted in Ethiopia. We suggest emphasizing awareness creation on the timing of MTCT of HIV, PMTCT methods, and the services provided at prenatal care visits. The health care providers should have to encourage the MP to have HTC during his wife's pregnancy and to discuss maternal health issues. Increasing access to education, encouraging women to have at least four prenatal care visits, making

health facilities accessible, and designing programs that will encourage MP involvement in HTC are important.

Limitation

This study has certain limitations: it was not triangulated with the qualitative method. Recall bias might be introduced on some of the questions that required the MP to recall past information.

Abbreviations

AIDS	Acquired Immune Deficiency Syndromes.
AOR	Adjusted Odds Ratio.
CI	Confidence Interval.
COR	Crude Odds Ratio.
DNA/PCR	Deoxyribonucleic Acid Polymerase Chain Reaction.
HBV	Hepatitis B Virus.
HCV	Hepatitis C virus.
HIV	Human Immune Deficiency Virus.
HTC	HIV Counseling and Testing.
MP	Male Partner.
MPI	Male Partner Involvement.
MTCT	Mother to Child Transmission.
PMTCT	Prevention of Mother to Child Transmission.
WHO	World Health Organization.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s13104-022-06215-9>.

Supplementary Material 1

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Authors' contribution

NAG, GBG, and AMA were responsible for the conception of the research idea, study design, data collection, analysis and interpretation, and supervision. NAG and WFB participated in the data collection, entry, analysis, and manuscript write-up. All authors have read and approved the final manuscript.

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Data availability

All related data have been presented within the manuscript. The data set supporting the conclusion of this article is available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board of Bahir Dar University, College of medicine and health sciences. Letter of permission was also obtained from Bichena town health office administration for each kebele of the town. The purpose of the study was explained to each male partner. At the time of data collection, written consent was obtained from each study participant. All respondents were assured that the data would not have any negative consequence on any aspects of their life.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. WHO, U. Guidance on provider-initiated HIV testing and counseling in health facilities. Geneva: World Health Organization; 2007.
2. Avert R. Global information and education on HIV and AIDS. Prevention of mother-to-child transmission (PMTCT) of HIV retrieved from <https://www.avert.org/professionals/HIVprogramming/prevention/prevention-mother-child>, 2017.
3. Bekele A, Gemechu F, Ayalew M. Assessment of HIV Rapid Test Kits Inventory Management Practice and Challenges in Public Health Facilities of Addis Ababa, Ethiopia. *Integr Pharm Res Pract.* 2022;11:85.
4. FHAPCO F. Guideline for prevention of mother to child transmission of HIV in Ethiopia: Federal HIV. AIDS Prevention and Control office, Federal Ministry of Health; 2007.
5. Organization WH. WHO. Prevention of mother-to-child transmission of hepatitis B virus: guidelines on antiviral prophylaxis in pregnancy [Internet]. Geneva: World Health Organization; 2020. [cited 2020 Oct 15].
6. Utsumi T, Lusida MI. Viral hepatitis and human immunodeficiency virus co-infections in Asia. *World J Virol.* 2015;4(2):96.
7. Behzadi P, Ranjbar R, Alavian SM. Nucleic acid-based approaches for detection of viral hepatitis. *Jundishapur Journal of Microbiology*, 2015. 8(1).
8. Behzadi P, Behzadi E, Alavian SM. DNA microarray technology in HBV genotyping. *Minerva Med.* 2017;108(5):473–6.
9. Organization WH, Global HIV/AIDS response: epidemic update and health sector progress towards universal access: progress report 2011. 2011.
10. Tadele T, Tamiso A, Tadele T. Incidences and predictors of HIV positivity among infants who born from HIV positive mother who has followed up at two hospitals of southern Ethiopia, 2014. *Sci J Public Health.* 2014;2(5):431–9.
11. Wudineh F, Damteb B, Mother-to-child transmission of HIV infection and its determinants among exposed infants on care and follow-up in Dire Dawa City, Eastern Ethiopia. *AIDS Res Treat.* 2016.
12. Kassa GM. Mother-to-child transmission of HIV infection and its associated factors in Ethiopia: a systematic review and meta-analysis. *BMC Infect Dis.* 2018;18(1):1–9.
13. Aluisio AR, et al, Male partner participation in antenatal clinic services is associated with improved HIV-free survival among infants in Nairobi, Kenya: a prospective cohort study. *J Acquir. Immune Defic Syndr.* 1999;2016:7(2):169.
14. Audet CM, et al. Engagement of men in antenatal care services: increased HIV testing and treatment uptake in a community participatory action program in Mozambique. *AIDS Behav.* 2016;20(9):2090–100.
15. Adane HA, et al. Male involvement in prevention of mother to child transmission of human immunodeficiency virus and associated factors in Enebesarmider District, north West Ethiopia, 2018: a cross-sectional study. *BMC Pregnancy Childbirth.* 2020;20(1):1–8.
16. Adera A, et al. Assessment of male partner's involvement in prevention of mother-to-child transmission of HIV and associated factors among males in PMTCT services. *Am J Health Res.* 2015;3(4):221–31.
17. Morfaw F, et al. Male involvement in prevention programs of mother to child transmission of HIV: a systematic review to identify barriers and facilitators. *Syst reviews.* 2013;2(1):1–13.

18. Homsy J, et al. Routine intrapartum HIV counseling and testing for prevention of mother-to-child transmission of HIV in a rural Ugandan hospital. *JAIDS J Acquir Immune Defic Syndr*. 2006;42(2):149–54.
19. Getaneh T, et al. Early diagnosis, vertical transmission of HIV and its associated factors among exposed infants after the launch of option B + regimen in Ethiopia: a systematic review and meta-analysis. *IJID Regions*; 2022.
20. Getaneh T, Negesse A, Dessie G, Experiences and Reasons of Attrition from Option B + Among Mothers Under Prevention of Mother to Child Transmission Program in Northwest Ethiopia: Qualitative Study. *HIV/AIDS (Auckland, NZ)*, 2021;13:851.
21. Ethiopia Mo.H.F.D.R.o., National guidelines for comprehensive HIV prevention, care, and treatment. 2014.
22. Kashitala J, et al. Is male involvement in ANC and PMTCT associated with increased facility-based obstetric delivery in pregnant women? *Afr J Reprod Health*. 2015;19(2):116–23.
23. Mangeni JN, et al. Male involvement in maternal healthcare as a determinant of the utilization of skilled birth attendants in Kenya. *East Afr Med J*. 2012;89(11):372–83.
24. Varkey LC, et al. Involving men in maternity care in India. New Delhi: Population Council; 2004.
25. Harries AD, et al., Ending the HIV/AIDS epidemic in low-and middle-income countries by 2030: is it possible? *F1000Research*, 2016;5.
26. Degavi G, et al., A Retrospective Study of Incidence and Predictors on Mother-to-Child Transmission of HIV among HIV-Exposed Infants in West Guji Zone, Southern Ethiopia. *AIDS Res Treat*, 2022.
27. Assembly UG, Transforming our world: the 2030 agenda for sustainable development, 21 October 2015. 2015, A/RES/70/1.
28. Ababa A. Federal Democratic Republic of Ethiopia central statistical agency population projection of Ethiopia for all regions at Wereda level from 2014–2017. Addis Ababa: Central Statistical Agency; 2014.
29. Zenebe A, et al., Male Partner's involvement in HIV counseling and testing and associated factors among Partners of Pregnant Women in Gondar town, Northwest Ethiopia. *J. Pregnancy*, 2016.
30. Molla G, et al., Factors associated with HIV counseling and testing among males and females in Ethiopia: evidence from Ethiopian Demographic and Health Survey data. *Journal of AIDS and Clinical Research*, 2015. 6(3).
31. Chanyalew H, et al. Male partner involvement in HIV testing and counseling among partners of pregnant women in the Delanta district. *Ethiopia PLoS one*. 2021;16(3):e0248436.
32. Kachero MM, Kinfe AA, Utilization of HIV Test Service Among Pregnant Women's Partners and Its Associated Factors in Selected Sub-Cities of Addis Ababa, 2019: A Community-Based Cross-Sectional Study. *HIV/AIDS (Auckland, NZ)*, 2021;13:135.
33. Tilahun M, Mohamed S, Male partners' involvement in the prevention of mother-to-child transmission of HIV and associated factors in Arba Minch Town and Arba Minch Zuria Woreda, Southern Ethiopia. *Biomed Res. Int.*, 2015.
34. Gebru AA, et al. Factors that affect male partner involvement in PMTCT services in Africa: review literature. *Sci J Public Health*. 2015;3(4):460–7.
35. Haile F, Brhan Y. Male partner involvements in PMTCT: a cross-sectional study, Mekelle, Northern Ethiopia. *BMC Pregnancy Childbirth*. 2014;14(1):1–6.
36. Alemayehu M, Haidar J. Male involvement in prevention of mother-to-child transmission of HIV in the context of partner testing in Goba town, Ethiopia: A facility-based cross-sectional study. *South Afr Med J*. 2017;107(10):864–70.
37. August F, et al. Community health workers can improve male involvement in maternal health: evidence from rural Tanzania. *Global health action*. 2016;9(1):30064.
38. Ediau M, et al. Trends in antenatal care attendance and health facility delivery following community and health facility systems strengthening interventions in Northern Uganda. *BMC Pregnancy Childbirth*. 2013;13(1):1–11.
39. Amsalu E, Tiruneh G, Abajobir AA. Level of male partner involvement and associated factors in the prevention of mother to child transmission of HIV/AIDS services in Debreworkos town, Northwest Ethiopia. *BMC Pediatr*. 2013;10:16–25.
40. Byamugisha R, et al. Determinants of male involvement in the prevention of mother-to-child transmission of HIV program in Eastern Uganda: a cross-sectional survey. *Reproductive health*. 2010;7(1):1–9.
41. Ftawi M, et al. Coverage of completion of four ANC visits based on a recommended time schedule in Northern Ethiopia: A community-based cross-sectional study design. *PLoS ONE*. 2020;15(8):e0236965.
42. Gibore NS, et al., Determinants of men's involvement in maternity care in Dodoma Region, Central Tanzania. *J. Pregnancy*, 2019.
43. Story WT, Burgard SA. Couples' reports of household decision-making and the utilization of maternal health services in Bangladesh. *Soc Sci Med*. 2012;75(12):2403–11.
44. Semrau K, et al. Women in couples antenatal HIV counseling and testing are not more likely to report adverse social events. *AIDS*. 2005;19(6):603.
45. Demissie DB, Bulto GA, Terfassa TG. Involvement of male in antenatal care, birth preparedness and complication readiness and associated factors in Ambo town, Ethiopia. *J Health Med Nurs*. 2016;27(5):14–23.
46. Worku MG, Teshale AB, Tesema GA, Prevalence and Associated Factors of HIV Testing Among Pregnant Women: A Multilevel Analysis Using the Recent Demographic and Health Survey Data from 11 East African Countries. *HIV/AIDS (Auckland, NZ)*, 2021;13:181.
47. Mutagoma M, et al. Hepatitis B virus and HIV co-infection among pregnant women in Rwanda. *BMC Infect Dis*. 2017;17(1):1–7.
48. Guingané AN, et al. Screening for Hepatitis B in partners and children of women positive for surface antigen, Burkina Faso. *Bull World Health Organ*. 2022;100(4):256.

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