

RESEARCH NOTE

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# Male involvement in prevention of mother to child transmission of human immunodeficiency virus and associated factors among partners' of reproductive age women at Debre Tabor town, Northwest Ethiopia: a community based cross sectional study

Enyew Dagnew<sup>1\*</sup>, Miteku Andualem<sup>2</sup>, Temesegen Worku<sup>2</sup>, Dawit Gebeyehu<sup>2</sup>, Wubet Taklual<sup>1</sup> and Abenezer Melkie<sup>1</sup>

## Abstract

**Objective:** The aim of this study was to determine the prevalence of male involvement in prevention of mother to child transmission (PMTCT) of human immunodeficiency virus (HIV) and associated factors among partners' of reproductive age women at Debre Tabor town, Northwest Ethiopia. A community based cross sectional study was employed among 561 study participants. Data was collected with pretested structured questionnaire. The data was entered by Epi-Info version 7 software and exported to SPSS version 23 for analysis. Statistical significance was declared at P value of < 0.05.

**Results:** In this study, only 119 (21.2%) of males (95% CI 17.8%, 24.8%) were involved in PMTCT of HIV. Being government employee (AOR = 3.73, 95%CI (2.169, 6.419)), had ever heard about PMTCT of HIV (AOR = 2.46, 95%CI (1.20, 5.02)), discussed with their partner (AOR = 3.11, 95%CI (1.43, 6.55)), partners' who were informed the need to go PMTCT of HIV clinic (AOR = 2.45, 95%CI (1.17, 5.14)), Health workers friendly approach (AOR = 2.36, 95%CI (1.34, 4.15)), and long waiting time (AOR = 0.36, 95%CI (0.216, 0.610)) were found to be significantly associated with male involvement in PMTCT of HIV. Improving service provision including respectful care and health education on PMTCT of HIV for males and their partners shall be emphasized by the government.

**Keywords:** Male involvement, PMTCT, Ethiopia, Debre Tabor

## Introduction

Globally male involvement is a part of woman-centered approach [1]. Worldwide males were participate in sexual and reproductive health (SRH) programs like; family

planning, anti-natal care (ANC), and PMTCT of HIV program which have a great impact on the health of women, children, families and communities at large [2].

Mother-to-child transmission (MTCT) of HIV infection remains a major public health problem and more than 90% of childhood HIV infections are due to MTCT [3, 4]. Male partner co-operation in PMTCT program have been proven to be effective to reduce the risk of MTCT of HIV [5]. However, studies showed that male

\*Correspondence: enyudagne@gmail.com

<sup>1</sup> College of Health Sciences, Debre Tabor University, Post Office Box: 272, Debre Tabor, Ethiopia

Full list of author information is available at the end of the article



involvement in PMTCT of HIV is low [6]. Studies conducted in Thailand, Uganda, Kenya, Mekelle Ethiopia and Gondar Ethiopia showed that the prevalence of male involvement in the PMTCT of HIV were 46%, 5%, 31%, 20.1%, and 27.3%, respectively [7–11]. Age, residence, marital status, educational level, occupational status, average monthly income, and distance from the health institution were the significant risk factors for the PMTCT of HIV in a previous studies [12–15].

Despite, high rate of MTCT of HIV in Ethiopia, there is insufficient information regarding to males involvement in PMTCT of HIV service utilization [16]. Therefore, assessing male involvement in PMTCT of HIV is very important for program implementers and evaluators in the nation specifically in the study area. In addition, to the best of our knowledge there are paucity of studies exploring the prevalence of males involvement and associated factors in PMTCT of HIV in the study area. Thus, the aim of this study was to assess the prevalence of male involvement and its associated factors at Debre Tabor Town, Northwest, Ethiopia.

## Main text

### Methods

#### *Study area, design and population*

A community based cross sectional study was conducted at Debre Tabor town from Dec 2018–Feb/2019. The town is located about 667 km North of Addis Ababa (the capital city of Ethiopia) and 98 km away from Bahir Dar (the capital city of Amhara Regional State). Debre Tabor is the first industrial village in Africa with King Tewodros second at Gaffat. The town has a total population of 87,627, among these 54% were females.

The study participants were males who have reproductive age group female partner. In this study males whose reproductive age group partners gave birth during the previous 1 year or pregnant and start ANC follow up at least once were included in the study area.

#### *Sample size determination*

The sample size was calculated by using a single population proportion formula with 95% confidence level, 5% margin of error, 20.9% of population proportion [13], and design effect of two. The final sample size after adding 10% non-response rate was 561.

#### *Sampling procedure and data collection method*

Multi-stage cluster sampling technique was used. The town has four kebeles and each kebele was considered as a cluster. Simple random sampling technique was used to select clusters and we were select kebele one and three. The kebeles have been subdivided by ketsenas. Kebele one has 7 ketsenas and kebele three has five ketsenas.

Finally, three ketsenas from kebele one and two ketsenas from kebele three were selected using simple random sampling technique. Systematic sampling technique with proportional allocation was used to select study participants until the desired sample size fulfill from the selected ketsenas.

Data was collected by pretested structured questionnaire through face to face interview by trained data collectors. The questionnaire used for this study was adapted from different studies [17, 18] (Additional file 1). The quality of the data was maintained during interview, entry, cleaning and analysis.

#### *Data analysis*

Data was entered by Epi-Info version 7 software and exported to SPSS version 23 for cleaning, editing and analysis. Bivariable and multivariable logistic regression analysis were performed to identify factors associated with male involvement on PMTCT of HIV. Variables with P value of < 0.2 in the bivariable analysis were entered in the multivariable model to identify predictors of male involvement on PMTCT of HIV. P value of < 0.05 with 95%CI was used to declare statistical significance.

#### *Ethical approval*

Ethical clearance was obtained from research review committee of University of Gondar, college of medicine and health sciences. Written informed consent was obtained from each study participants. Confidentiality and anonymity of the information was also maintained.

#### *Operational definitions*

*Male involvement* When partners' of pregnant women attended both HIV counselling and testing (HCT) during ANC visit for the purpose of PMTCT of HIV service utilization [12].

*Knowledge about PMTCT* When respondents knew at least one way of PMTCT from three questions [19].

*Partners* Those male who had relation with woman that gave birth and or pregnant for him in the study period [19].

## Result

### *Socio-demographic characteristics of study participants*

More than half 317 (56.5%) of the respondents were between the age range of 25–34 years with the mean age of 34.23 years old. Most of the participants 531 (94.6%) were married. Majority of the participants 376 (67.0%) and their partners 406 (72.4%) were attained secondary education and above (Table 1).

**Table 1 Socio demographic characteristics of the study participants in Debre Tabor town, Northwest Ethiopia, 2018 (n = 561)**

| Variables                    | Frequency | Percentage |
|------------------------------|-----------|------------|
| Age                          |           |            |
| 25–34                        | 317       | 56.5       |
| 35–44                        | 196       | 34.9       |
| ≥ 45                         | 48        | 8.6        |
| Religion                     |           |            |
| Orthodox                     | 539       | 96.1       |
| Others <sup>a</sup>          | 22        | 3.9        |
| Marital status               |           |            |
| Married                      | 531       | 94.6       |
| Single cohabitated           | 19        | 3.4        |
| Separated                    | 11        | 2.0        |
| Ethnicity                    |           |            |
| Amhara                       | 554       | 98.8       |
| Others <sup>b</sup>          | 7         | 1.2        |
| Male educational status      |           |            |
| Not formal education         | 85        | 15.2       |
| Primary education            | 100       | 17.8       |
| Secondary and above          | 376       | 67.0       |
| Partners’ educational status |           |            |
| Not formal education         | 64        | 11.4       |
| Primary education            | 91        | 16.2       |
| Secondary and above          | 406       | 72.4       |
| Male occupation              |           |            |
| Self-employee                | 235       | 41.9       |
| Government employee          | 326       | 58.1       |
| Partners’ occupation         |           |            |
| Self-employee                | 302       | 53.8       |
| Government employee          | 259       | 46.2       |
| Monthly income in ETB        |           |            |
| Below 1000 birr              | 77        | 13.7       |
| 1000–1999                    | 62        | 11.1       |
| 2000–2999                    | 83        | 14.8       |
| Above 3000                   | 339       | 60.4       |

Key words: others<sup>a</sup> = Muslim (2.9%), Catholic (0.9%) and protestant (0.2%). Others<sup>b</sup> = Tigray (1.1%) and Oromo (0.2%)

**Male partners’ reproductive history**

Around a third 212 (37.8%) of male partners’ were pregnant and all of them were attend ANC. Most of them 482 (85.9%) have at least one child and almost all 468 (97.1%) were gave birth at heath institution (Table 2).

**Knowledge of the participant on PMTCT of HIV**

Most of the participants 438 (78.1%) were responding PMTCT of HIV is used for protecting the baby getting HIV from mother. More than half of the study

**Table 2 Reproductive health characteristics of partners at Debre Tabor town, Northwest Ethiopia, 2018**

| Variables               | Frequency | Percentage |
|-------------------------|-----------|------------|
| Number of pregnancy     |           |            |
| One                     | 229       | 40.8       |
| More than one           | 332       | 59.2       |
| Number of child         |           |            |
| None                    | 79        | 14.1       |
| 1–4 children            | 469       | 83.6       |
| 5 and above             | 13        | 2.3        |
| Last child age (year)   |           |            |
| ≤ 1                     | 357       | 74.1       |
| > 1                     | 125       | 25.9       |
| Place of delivery       |           |            |
| Health institution      | 468       | 97.1       |
| Home                    | 14        | 2.9        |
| Current pregnant status |           |            |
| Yes                     | 212       | 37.8       |
| No                      | 349       | 62.2       |
| Number ANC              |           |            |
| Yes                     | 212       | 100        |
| No                      | 0         | 0          |

participants 333 (54%) were describing HIV can be transmitted from mother to child during pregnancy. Around a third of the participants weren’t go to PMTCT clinic.

**Programmatic factors**

Barriers of involving in PMTCT of HIV clinic service utilization were; lack of space to accommodate male 46 (8.2%), harsh language of health professionals 68 (12.1%), no availability of permanent PMTCT services 11 (2%), and long waiting time 52 (9.3%).

**Factors associated with male involvement in PMTCT of HIV**

In this study 119 (21.2%) of males (95%CI 17.8%, 24.8%) were involved in PMTCT of HIV. Being government employee (AOR = 3.73, 95%CI (2.169, 6.419)), partners’ who had ever heard about PMTCT (AOR = 2.46, 95%CI (1.20, 5.02)), discussed with their partners’ about PMTCT (AOR = 3.11, 95%CI (1.43, 6.55)), partners’ who were inform the need to go PMTCT clinic (AOR = 2.45, 95%CI (1.17, 5.14)), health workers’ friendly approach (AOR = 2.36, 95%CI (1.34, 4.15)), and long waiting time (AOR = 0.36, 95%CI (0.216, 0.610)) were found to be significantly associated with male involvement in PMTCT of HIV (Table 3).

**Discussion**

The study result revealed that 21.2%, (95%CI 17.8%, 24.8%) of males were involved in PMTCT of HIV

**Table 3 Multivariable analysis of factors affecting male involvement in PMTCT of HIV in Debre Tabor town, Northwest Ethiopia, 2018 (n = 561)**

| Variables  | Male involvement in PMTCT services utilization |              | COR (95%CI)               | AOR (95%CI)                | P-value |
|--|--|--------------|---------------------------|----------------------------|---------|
|  | Involved                                       | Not involved |                           |                            |         |
| Partner educational status                             |  |              |                           |                            |         |
| Not formal education                                   | 8  | 77           | 1.00                      | 1.00                       | 1.00    |
| Primary education                                      | 6  | 94           | 0.61 (0.21, 1.85)         | 0.57 (0.17, 1.95)          | 0.37    |
| Secondary and above                                    | 105  | 271          | <i>3.73 (1.74,7.99)*</i>  | 1.25 (0.50, 3.80)          | 0.64    |
| Male educational status                                |  |              |                           |                            |         |
| No formal education                                    | 5  | 59           | 1.00                      | 1.00                       | 1.00    |
| Primary education                                      | 15   | 76           | 2.33 (0.80, 6.77)         | 0.96 (0.27, 3.32)          | 0.94    |
| Secondary and above                                    | 99   | 307          | <i>3.8 (1.49, 9.75)*</i>  | 0.75 (0.23, 2.46)          | 0.64    |
| Partners occupational status                           |  |              |                           |                            |         |
| Self-employee  | 21   | 214          | 1.00                      | 1.00                       | 1.00    |
| Government employee                                    | 98   | 228          | 4.38 (2.38, 7.27)         | <i>3.73 (2.17, 6.42)**</i> | < 0.001 |
| Male occupational status                               |  |              |                           |                            |         |
| Self-employee  | 54   | 248          | 1.00                      | 1.00                       | 1.00    |
| Government employee                                    | 65   | 194          | <i>1.54 (1.02, 2.31)*</i> | 0.68 (0.38, 1.20)          | 0.18    |
| Income per month                                       |  |              |                           |                            |         |
| Below 1000 birr  | 7  | 70           | 1.00                      | 1.00                       | 1.00    |
| 1000–1990 birr   | 5  | 57           | 0.88 (0.26, 2.91)         | 0.72 (0.19, 2.72)          | 0.62    |
| 2000–2999  | 14   | 69           | 2.03 (1.68, 8.52)         | 1.08 (0.35,3.37)           | 0.90    |
| Above 3000 birr  | 93   | 246          | <i>3.78 (1.68, 8.52)*</i> | 1.20 (0.41, 3.33)          | 0.78    |
| Go to ANC clinic with partner                          |  |              |                           |                            |         |
| Yes  | 91   | 253          | <i>2.43 (1.53, 3.86)*</i> | 0.97 (0.55, 1.72)          | 0.92    |
| No   | 28   | 189          | 1.00                      | 1.00                       | 1.00    |
| Couples HCT  |  |              |                           |                            |         |
| Yes  | 96   | 257          | <i>3 (1.84, 4.92)*</i>    | 1.5 (0.60, 3.80)           | 0.39    |
| No   | 23   | 185          | 1.00                      | 1.00                       | 1.00    |
| Ever heard about PMTCT                                 |  |              |                           |                            |         |
| Yes  | 11   | 144          | 4.74 (2.47,9.10)          | <i>2.46 (1.20, 5.02)**</i> | 0.014   |
| No   | 108  | 298          | 1.00                      | 1.00                       | 1.00    |
| Discussion about PMTCT with partner                    |  |              |                           |                            |         |
| Yes  | 106  | 220          | 8.23 (4.49, 15.07)        | <i>3.11 (1.43, 6.55)**</i> | 0.004   |
| No   | 13   | 222          | 1.00                      | 1.00                       | 1.00    |
| Partners who were informed the need to go PMTCT clinic |  |              |                           |                            |         |
| Yes  | 105  | 226          | 7.12 (3.98,12.91)         | <i>2.45 (1.17, 5.14)**</i> | 0.017   |
| No   | 14   | 216          | 1.00                      | 1.00                       | 1.00    |
| Health workers friendly approach                       |  |              |                           |                            |         |
| Yes  | 98   | 217          | 4.84 (2.92, 8.03)         | <i>2.36 (1.34, 4.15)**</i> | 0.003   |
| No   | 21   | 225          | 1.00                      | 1.00                       | 1.00    |
| Long waiting time                                      |  |              |                           |                            |         |
| Yes  | 4  | 48           | 0.347 (0.16, 0.74)        | <i>0.35 (0.15, 0.79)**</i> | 0.012   |
| No   | 115  | 394          | 1.00                      | 1.00                       | 1.00    |

NB 1.00= reference. \* Statistically significant on bivariate analysis, \*\* Statistically significant on multivariable analysis

Significantly associated values are indicated in italic

program. Our finding is comparable with a previous studies reported from Gondar town, North west Ethiopia, and Mekelle, Northern Ethiopia 20.9% and 20%,

respectively [10, 11]. This implies that male participation in PMTCT of HIV is poor. However, the finding of this study is lower than with a previous studies reported in

Arba Minich Town, Southern Ethiopia [12], and Addis Ababa City, Central Ethiopia [13]. The difference might be due to the inclusion criteria of the study population in both studies. In Arba Minch town, Southern Ethiopia, all male partners of reproductive age women who gave birth during the previous 1 year where as in Addis Ababa, central Ethiopia sampled male partners' who were attending ANC/PMTCT services were included in the study population. In addition, the study setting, educational status, urbanization status, availability and accessibility of the service might be the difference on the service utilization. The finding of this study also lower than a previous studies conducted in Kenya, 31% [15], Thailand 46% [16], and Uganda 26% [17]. The difference also might be due to accessibility and availability of the service. In our study area there are few public and very limited private health institutions that provide PMTCT of HIV service. In contrast, the finding is higher than a study conducted in Mwanza District, Malawi which had 13.7% of males involved in PMTCT of HIV service [14]. The difference could be related to difference in study period, information education communication and behavioral change in communication, since male involvement on PMTCT of HIV services is increased time to time due to mass media and health care provider's awareness creation effort.

In our study, men's whose occupation were government employee were 3.7 times more likely to be involved in PMTCT of HIV as compared to self-employee (AOR = 3.73, 95%CI 2.169, 6.419). This finding is in line with a previous studies conducted at Addis Ababa, Ethiopia and Gondar, Ethiopia [10, 12]. This might be due to government employees are more likely educated, and the fact that they are more exposed to information and can able to understand the burden of the problem.

Those participants who had discussion about PMTCT of HIV with their wives had increased involvement of PMTCT of HIV by 3 times as compared to their counterparts (AOR = 3.11, 95%CI 1.43, 6.55). This finding is in line with studies reported in Southern Ethiopia, Northwest Ethiopia, and in Addis Ababa, Ethiopia [9, 13, 18]. The possible reason might be due to men having discussion with their wives about HIV/AIDS, and PMTCT will help to share information and increase males' understanding to focus on and give attention about PMTCT program.

Programmatic factors such as waiting time at PMTCT of HIV service and health professional unfriendly approach were decrease males' involvement in PMTCT of HIV. Long waiting time at PMTCT of HIV clinic were decrease males' involvement in PMTCT of HIV program by 2.9 times than those who got the service timely (AOR = 0.348, 95%CI 0.1, 0.790). The finding is consistent with studies conducted in Cameron [19],

and rural Western Kenya [10]. The difference could be related to the difference in patient flow proportional to health professionals, and availability of trained health professionals in PMTCT of HIV at ANC clinic. Health professionals friendly approach were 2.4 times more likely to increase male involvement in PMTCT of HIV service utilization than the counterpart (AOR = 2.358, 95%CI 1.34, 4.15). The finding is comparable with a study conducted in Zimbabwe and Sub-Saharan Africa [20, 21]. This might be due to good welcoming approach and respectful care will improve the service utilization.

Men's who had ever heard about PMTCT were 2.5 times more likely involved on PMTCT of HIV services program as compared to those who had no information (AOR = 2.45, 95%CI 1.20, 5.02). This finding is in line with a study finding in Gondar, North Ethiopia [10]. The possible explanation might be having information about PMTCT of HIV will help to know the benefit of PMTCT of HIV programme for them as well as their new borns.

Males who were informed by their partners' about the need to go with them and availability of PMTCT of HIV at ANC clinic were 2.5 times higher to be accompanied than their counterparts (AOR = 2.45, 95%CI 1.17, 5.14). This finding is consistent with a previous studies conducted at Mekele, Northern Ethiopia and Arba Minch town and Zuria Woreda, Southern Ethiopia [8, 11]. This could be due to the fact that their partners did not tell the need to go with them and utilize PMTCT services might failed to appreciate the importance of males' involvement for prevention HIV infection from mother to child.

In this study males and their partners' who attended secondary education and above were significantly associated in bivariable analysis but not in multivariable analysis. On the other hand, a study done in Arba Minch town and Arba Minch zuria woreda those who attended secondary education and above were four times more involved in PMTCT of HIV than the counterpart [8]. The difference could be related to the difference in the study area and period.

## Conclusion

The prevalence of male involvement in PMTCT of HIV at Debere Tabor Town was poor. Ever heard about PMTCT of HIV, discussed about PMTCT of HIV, female partner told the need to go PMTCT of HIV clinic, health workers friendly approach, being government employee and long waiting time were the determinate factors of male involvement in the PMTCT of HIV service. Improving service provision including respectful care and health



education on PMTCT of HIV for males and their partner shall be emphasized by the government.

### Limitations of the study

Self-report might have introduced social desirability bias. Since, we have used cross sectional study design it is a poor predictor of cause and effect relationship.

### Supplementary information

**Supplementary information** accompanies this paper at <https://doi.org/10.1186/s13104-020-05023-3>.

**Additional file 1.** Data collection tool.

### Abbreviations

AIDS: Acquired immune deficiency syndrome; ANC: Ante natal care; AOR: Adjusted odds ratio; CI: Confidence interval; COR: Crude odds ratio; HIV: Human immune deficiency virus; MTCT: Mother to child transmission; PMTCT: Prevention of mother to child transmission.

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### Authors' contributions

ED, MA, TW, DG, WT, AM contributed in the study design, data collection, analysis, and write-up. All authors read and approved the final manuscript.

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### Availability of data and materials

The data set used in this study is available from the corresponding author and can be accessible through reasonable request.

### Ethics approval and consent to participate

Ethical clearance was obtained from research review committee of University of Gondar, college of medicine and health sciences. Written informed consent was obtained from each study participants. Confidentiality and anonymity of the information was also maintained.

### Consent for publication

Not applicable.

### Competing interests

The authors declare that they have no competing interests.

### Author details

<sup>1</sup> College of Health Sciences, Debre Tabor University, Post Office Box: 272, Debre Tabor, Ethiopia. <sup>2</sup> College of Medicine and Health Sciences, Gondar University, Gondar, Ethiopia.

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### References

- UNAIDS. Report on the global AIDS Epidemic. 2010.
- WHO, Global HIV/AIDS response epidemic update and health sector progress towards Universal Access, Progress Report 2011. Geneva: World

- Health Organization; 2011. [http://www.who.int/hiv/pub/progress\\_report2011](http://www.who.int/hiv/pub/progress_report2011). Accessed 18 Nov 2018.
- UNAIDS. Report on the global AIDS epidemic. Geneva: Joint United Nations Programme on HIV/AIDS. 2012.
- FMOH, F. Training manual draft for the prevention of mother to child transmission of HIV in Ethiopia. Addis Ababa, Ethiopia. 2007.
- WHO. PMTCT STRATEGIC VISION 2010–2015. Preventing mother-to-child transmission of HIV to reach the UNGASS and Millenium Development Goals. Geneva: World Health Organization HIV/AIDS Department; 2010. [http://www.who.int/hiv/pub/mtct/strategic\\_vision.pdf](http://www.who.int/hiv/pub/mtct/strategic_vision.pdf). Accessed 18 Nov 2018.
- UNICEF, Preventing Mother-to-Child Transmission (PMTCT) of HIV fact-sheets on the status of national PMTCT responses in the most affected countries. 2010.
- Lolekha R, Kullerk N, Wolfe MI, et al. Assessment of a couples HIV counseling and testing program for pregnant women and their partners in antenatal care (ANC) in 7 provinces, Thailand. *Int Health Hum Rights*. 2014;14:39.
- Byamugisha R, Tumwine JK, Semiyaga N. Determinants of male involvement in the prevention of mother-to-child transmission of HIV programme in Eastern Uganda: a cross-sectional survey. *Reprod Health*. 2010;7:12.
- Aluisio A, Richardson BA, et al. Male antenatal attendance and HIV testing are associated with decreased infant HIV infection and increased HIV free survival. *NIH Public Access*. 2012;56(01):76–82.
- Haile F, Brhan Y. Male partner involvements in PMTCT: a cross sectional study, Mekelle, Northern Ethiopia. *Pregnancy Childbirth*. 2014;14(65):1471–2393.
- Zenebe A, Gebeyehu A, Derseh L, Ahmed KY. Male partner's involvement in HIV counselling and testing and associated factors among partners of pregnant women in Gondar town, Northwest Ethiopia. *J Pregnancy*. 2016.
- 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;6.
- Tilahun M, Mohamed S. Male involvement in PMTCT and associated factors among men whom their wives had ANC visit 12 months prior to the study in Gondar town, North west Ethiopia. *Pan Afr Med J*. 2014.
- Adera A, Wudu M, Yimam Y, Kidane M, Woreta A, Molla T. Assessment of male partner's involvement in prevention of mother-to-child transmission of HIV and associated factors among males in PMTCT service. *Am J Health Res*. 2015;3(4):221–31.
- Makoni A, Chemhuru M, Chimbetete C, Gombe N, Bangure D, et al. Factors associated with male involvement in the prevention of mother to child transmission of HIV, Midlands Province, Zimbabwe, 2015—a case control study. *Public Health*. 2016;16:331.
- Central Statistical Agency (CSA). Ethiopia demographic and health survey 2016. Addis Ababa: CSA; 2017.
- Deressa W, et al. Utilization of PMTCT services and associated factors among pregnant women attending antenatal clinics in Addis Ababa, Ethiopia. *BMC Pregnancy Childbirth*. 2014;14(1):328.
- Kwambai TK, et al. Perspectives of men on antenatal and delivery care service utilisation in rural western Kenya: a qualitative study. *BMC Pregnancy Childbirth*. 2013;13(1):134.
- Ditekemena J, et al. Determinants of male involvement in maternal and child health services in sub-Saharan Africa: a review. *Reprod Health*. 2012;9(1):32.
- Amano A, Musa A. Male involvement in PMTCT and associated factors among men whom their wives had ANC visit 12 months prior to the study in Gondar town, North west Ethiopia. *Pan Afr Med J*. 2014.
- Abuhay Y, Abebe L, Fentahun N. Male involvement in prevention of mother to child transmission of HIV and associated factors among males in Addis Ababa, Ethiopia. *Am J Health Res*. 2014;2(6):338–43.

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