

# Male involvement in birth preparedness and complication readiness in Ethiopia: A Systematic review and Meta-analysis

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## Research article

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# Abstract

**Background:** Male involvement during pregnancy, labor and post-partum care has been shown to improve positive maternal and newborn outcomes. Nevertheless, it continues to be low, especially in low income countries. One of the reasons is the lack of birth preparedness and complication readiness, which is recognized as the most cost-effective and achievable components of safe motherhood programs around the world. Thus, this systematic review and meta-analysis study tried to determine the pooled prevalence of male involvement in birth preparedness and complication readiness (BP/CR) and its associated factors in Ethiopia.

**Methods:** Searching of the primary articles was completed by PubMed/MEDLINE, EMBASE, CINAHAL, and Google Scholar, HINARI portal which includes the SCOPUS, African Index Medicus, and African Journals Online Database. The data was extracted by using a standard data extraction checklist that developed according to Joanna Briggs Institute (JBI). For assessing heterogeneity across the studies  $I^2$  statistics was used. The Funnel plot asymmetry and Egger's tests were used to check the presence of publication bias. A random effect model was used to estimate the pooled proportion of male involvement. Odds Ratio (OR) with the 95% confidence interval was also used to determine the association of identified factors with the outcome variable.

**Result:** From a total of 614, primary studies 8 were eligible for inclusion in the final systematic Review and meta-analysis. The pooled estimate of male involvement in birth preparedness and complication readiness was found to be 40.17% [95%CI (24.01-56.33)].

**Conclusion:** The pooled prevalence of male involvement in birth preparedness and complication readiness was relatively low. Thus, Minister of Health with its stake holders better to give emphasis on community awareness programs so as to increase male involvement for birth preparedness and complication readiness.

## Background

Male involvement in birth preparedness and complication readiness has a very crucial role in terms of positive maternal and child health outcomes. It helps the mother to get access to skilled maternal and neonatal services, promotes active preparation and timely decision making for delivery[1]. Maternal mortality is one of the most important markers of health inequalities in low, middle and high-income countries and remains a major contributor to unmet public health concerns worldwide [2]. The 2015 World Health Organization report, indicated that more than half a million women were dying each year from the complications of pregnancy and childbirth, in which 99% of these deaths occurring in the developing world [3]. Besides this, for every 100,000 live births, 240 women died during pregnancy, childbirth, or the postpartum period which are mostly from developed countries [4, 5]. There are notable disparities between and within countries in maternal deaths, with wide variations between rich and poor, urban and rural areas particularly in sub-Saharan Africa [6, 7]. Internationally, there was an estimated

303,000 maternal deaths happen year after year from pregnancy and childbirth related complications. About 99% of these deaths happen in underdeveloped countries and the great portion (62%) belongs to the sub-Saharan Africa region [6] .

Globally, around 1500 women die every day from complications related to pregnancy and childbirth [[4, 5, 8]. Globally, nearly 80% of the maternal morbidity and mortality are directly linked to pregnancy and childbirth complications. Different kinds of evidence showed that the commonest causes of maternal death among women in low-income and middle-income countries differ noticeably according to region. For example; In Africa, hemorrhage causes a third of maternal deaths. However, hypertensive disorders are the most common cause of maternal mortality in Latin American countries[5, 9]. Other major causes of death sepsis, obstructed labor, and complications from abortion also vary by geography [6, 10]. Obstetric related complications including severe hemorrhage, infection, hypertensive disorders, sepsis and obstructed labor, and unsafe abortion are among the key factors to maternal death [3]. Although, there is significantly declined in Abortion and infection related maternal deaths in the last decade, Obstructed labor , hypertensive disorders and hemorrhage continues to be the major cause of maternal deaths[10].

A male companion at antenatal care is rare and in many communities, it is unthinkable to find male companions accompanying a woman to the labor room during delivery. Thus male involvement in reproductive health has been promoted as a promising new strategy for improving maternal and child health [11, 12]. Although, birth preparedness and complication readiness is among the common approaches in employment for implementing safe motherhood programs, it may be hindered by male partners involvement since husbands had been the most influential decision-makers and as the key member of the family [13, 14]. According to the Ethiopian Federal Ministry of Health, health and health related indicators 82.20% coverage for ANC, only 18.4% of the deliveries are attended by health professionals, 42.10% for postnatal care coverage [15].

About 125,000 women and 870,000 neonates die every year in Africa, predominantly in the first week of post-partum period. The country Ethiopia, is one of six countries sharing 50% of the total global burden of maternal mortality[16]. Male involvement in pregnancy and labor care has been shown to improve maternal and newborn outcomes. Nevertheless, it continues to be low, especially in low income countries. Several strategies have been suggested to increase male involvement in reproductive health and maternity care, nonetheless no assessment has been made in terms of their effectiveness[11, 17]. One of the reasons is the lack of birth preparedness and complication readiness, which is recognized as the most cost-effective and achievable components of safe motherhood programs around the world[1, 18] . Due to this and that reason mothers who are productive and basis for countries development through delivering and growing new generation might be morbid and die. Thus, this systematic review and meta-analysis study tried to determine the pooled prevalence of male involvement in birth preparedness and complication readiness (BP/CR) and its associated factors in Ethiopia.

## Methods

## **Reporting of the result**

The preferred reporting Items for systematic Reviews and Meta-analysis (PRISMA) guideline were used to report the result of this systematic reviews and Meta-analysis.

## **Data bases and Searching strategy**

We searched through PubMed, Web of Science Excerpt Medica Database (EMBASE), Google Scholar and psycEXTRA database for all available studies using the following search terms: “Male involvement”; “Birth preparedness”; “Complication readiness”; “Factors”; \*determinants\*; \*predictors\*; and “Ethiopia”. In this systematic Reviews and Meta-analysis the search string was developed using “AND” and “OR”. The Gerry literatures were also searched from Ethiopian’s Universities (Jimma, Gondar, and Addis Ababa) research repository online library. In addition, a manual search of the references lists included was performed so as to address all evidences.

## **Inclusion and exclusion criteria**

The studies were included in this review and meta-analysis if and only: they met the following criteria:(1) Crossectional observational studies, (2) Studies conducted in Ethiopia,(3) Studies that clearly reported the proportion of male involvement and complication readiness and/or factors (4) both published and unpublished studies at any time: Those studies with no clear report of the outcome ,program evaluation studies, qualitative studies and citations without full text were excluded from the review and meta-analysis.

## **Study selection and quality assessment**

All the retrieved studies were exported to Endnote version 7 (Thomason Reuters, London) reference manager and duplicated studies were carefully removed. Three investigators (CKM, NGD and HKA) independently screened the titles and abstracts which were followed by a full-text review to determine the eligibility of each study. The disagreement was solved by consensus.

The quality of each study was evaluated by using Joanna Briggs Institute (JBI) quality appraisal criteria adapted for studies reporting prevalence data, Crossectional studies, and case control studies [19].

## **Data extraction**

Data were independently extracted by two authors using standardized data extraction format that developed according to 2014 Joanna Briggs Institute Reviewers’ Manual[20]. The tool includes Authors, Region, country, and study year, study design, sample size and proportion of Male involvement in birth preparedness and complication readiness in Ethiopia as well as associated factors. Articles that fulfilled the predefined criteria were used as a source of data for the final analysis. The three independent reviewers (CKM, HKA and NGD) extracted the data by using Excel spread sheet and cross checked to insure consistency. Any discrepancy was solved through discussion and repeating the procedure to

overcome the difference occurred during extracting each single study. The information regarding author, year of publication, study design, sample size, proportion/prevalence of male involvement in birth preparedness and complication readiness, and odds ratio (OR) for associated factors were extracted.

### **Heterogeneity and publication bias**

The percentage of total variation across studies due to heterogeneity was assessed by using  $I^2$  statistics[21]. The value of  $I^2$ , 25, 50, and 75% represented low, moderate, and high heterogeneity respectively. Funnel plot and Egger's regression test was done to check whether publication bias exists or not across studies [22]. Visual examination of funnel plot asymmetry, Begg-Mazumdar Rank correlation tests and Egger's regression tests were utilized to check for publication bias [22]

### **Data Analysis**

The overall pooled proportion of male involvement was estimated using random effect model. The pooled odds ratio (OR) of knowledge of pregnancy danger signs, previous pregnancy and post-partum complication was done. Subgroup analysis was done based regional location in the country to adjust the variation in the pooled estimate of the prevalence/proportion of male involvement in birth preparedness and complication readiness. STATA version 11 (Stata Corp, College Station, TX, USA) statistical software was used for all statistical analysis. The Begg and Egger's weighted regression method were used to detect evidence of publication bias. The p-value of  $\leq 0.05$  was considered as presence of significant publication bias.

### **Measures of outcomes**

Birth preparedness and complication readiness is the process of planning ahead for normal birth and anticipating the actions needed in case of emergency situation related to child birth (delivery or post-partum period). We measure birth preparedness and complication readiness if at least three of the following steps had accomplished in each article: prepared birth kits, identified a skilled attendant, saved money, new where to go in case of emergency, contact blood donor in case needed and prepared transportation in advance(prior to delivery, during delivery, and postpartum periods) [23-25].

## **Result**

### **Selection and identification of articles**

A total of 614 with (3413 participants) were retrieved through electronic databases and other sources. The title and abstract of every study was screened and duplicated or irrelevant articles were removed using EndNote Version7 software. Doing these, 146 articles were removed due to duplication and the remaining 468 articles, 460 were removed due to their title and abstracts was not in-line with our inclusion criteria( did not correctly report the correct outcome, studies conducted outside of Ethiopia). Finally, a total of only 8 articles were included for this systematic review and meta-analysis (Fig.1).

## Description of the included studies

We included a total of 8 cross-sectional observational studies with 3413 participants in the final systematic review and meta-analysis. The smallest sample size was 233 in the study conducted from Southern Nations and nationalities region of Ethiopia [26]. Whereas, the largest sample size, was 824 from the study conducted in the Amhara region, Ethiopia. The detailed characteristics of the included studies were presented (Table 1). In the current systematic review and meta-analysis, four regions and one administrative town in the country were included. Three studies were from Tigray [27-29], two were from Oromia region [23, 30].

Table 1: Descriptive summary of eight studies included in the final systematic review and meta-analysis overall male involvement in birth preparedness and complication readiness in Ethiopia

Author	Year	Design	Region	Sample	r(pwo)	Proportion(p)	NOS Score
Ataw et al.[24]	2014	Cross-sectional	Addis Ababa	403	264	65.5	5
Messie et al.[23]	2016	Cross-sectional	Oromia	374	224	50.8	6
Atu et al.[30]	2018	Cross-sectional	Oromia	421	127	30.2	7
Raki et al. [31]	2019	Cross-sectional	Tigray	399	187	46.9	7
Idearegay et al.[27]	2015	Cross-sectional	Tigray	376	227	60.4	6
Ersha et al.[32]	2016	Cross-sectional	Amhara	824	82	10	6
Brehiwot et al.[28]	2013	Cross-sectional	Tigray	376	101	26.9	7
Alos et al.[26]	2020	Cross-sectional	SNNPR	233	72	30.9	6

## Male involvement in birth preparedness and complication readiness

### Overall involvement in birth preparedness and complication readiness

From a total of 8 studies [23, 24, 26-28, 30-32] cross-sectional observational studies, all studies provided information on overall involvement of males in birth preparedness and complication readiness. As stated in the forest plot (Fig.2), the pooled estimate of overall male involvement was 40.17% [95%CI (24.01-56.33)]. High heterogeneity was observed (I-squared= 99.2%), however there was no evidence to show publication bias using Egger's statistical test (p-value=0.258) (see additional file 1: Table S1). For reducing the potential random variations between the included studies, we conducted a sub-group analysis by region where the primary studies conducted. According to the sub-group analysis the highest proportion of male involvement was observed from Addis Ababa 65.5% [95%CI (60.86-70.14)], followed by Tigray 44.71% [95%CI (25.29-64.13)] (Fig.3).

A Meta regression analysis was done using year of study and sample size as covariate to explore the possible source of heterogeneity (see additional file 1: Table S2). But, there was no significant statistical evidence that show the presence of heterogeneity, which explained by using these two variables

In addition, sensitivity analysis was conducted by using a random effect model to identify the effect of single study on overall pooled estimate. The analysis showed that there was no evidence of single study influence on overall pooled estimate (see additional file 2: Fig S1)

### **Male involvement in three main domains (Antenatal, delivery, and post-partum)**

In this systematic review and meta-analysis, we would assess male involvement using three domains such as involvement during antenatal care (ANC), during delivery, and post-partum period. Accordingly, eight studies [23, 24, 26-28, 30-32] which reported antenatal care involvement were included in the pooled analysis of male involvement during ANC. In this meta-analysis, the proportions of pooled male involvement during antenatal care were found to be 41.14% [95% CI (23.68-58.60)] (Fig.4). According to the sub-group analysis the highest proportion of male involvement during ANC was observed from Addis Ababa 73.2% [95%CI (68.88-77.52)] followed by Tigray 44.71% [95%CI (25.29-64.13)] (Additional file2: Fig S4). Whereas, male involvement during delivery and post-partum period was found unfortunately similar with the pooled proportion of 45.56% [95%CI (28.82-62.13)] (Figs.5&6). High heterogeneity was observed ( $I^2=99.3\%$ ,  $p \leq 0.001$ ), for reducing the potential random variations between the included studies, we conducted a sub-group analysis by region where the primary studies conducted (Additional file2: Figs S 5&6). We found Six studies [23, 27, 28, 30-32] that describe about male involvement during delivery and post-partum periods from three regions of Ethiopia (Oromia, Amhara, and Tigray). Similarly there was high heterogeneity for delivery and post-partum involvements ( $I^2=98.9\%$ ,  $p \leq 0.0001$ ). Having this in mind we have done sub-group analysis by region and we found that the highest proportion of male involvement during delivery and post-partum period was reported from Tigray region of Ethiopia 51.09% [95%CI(23.55-78.64)] followed by 47.23%[95%CI(14.60-79.87)] in Oromia region of Ethiopia(Additional file2: Figs S12). We have also done the statistical tests of Egger's and Begg's to assess publication bias for the included studies in the Meta-analysis of male involvement during delivery and post-partum period (see additional file:Tables S3&S5). There was no evidence of bias ( $p\text{-value} > 0.069$ ) (see additional file:Table S5). We have performed meta-regression by using year of study and sample size as a covariate (see additional file:Table S6).

### **Factors associated with male involvement in birth preparedness and complication readiness (see Additional File 3: Figures S1-S6)**

Among the variables included in the meta-analysis husband's level of education was found to be statistically significant in three studies [23, 30, 32]. However, the pooled odds ratio found to be border-line statistically significant with [OR=1.27, 95% CI (0.26-6.30)] (**see Additional File 3: Figure S1**). Distance from health facilities was also statistically significant in three primary studies [26, 30, 32]. But, it was also border-line significant [OR=0.75, 95%CI (0.10-5.83)] (**see Additional File 3: Figure S2**). Moreover, husband's knowledge of at least one danger sign during pregnancy was statistically significant in four included primary articles [23, 27, 30, 32]. The pooled odds ratio was found to be border line significant [OR=3.18, 95%CI [(0.54-18.66)] with male involvement for birth preparedness and complication readiness (**see**

**Additional File 3: Figure S3).** The husband's knowledge of danger signs during delivery was also found to be significant in two primary studies[27, 32]. However, the pooled odds ratio was found to be borderline significant [OR=4.60, 95%CI (0.06-375.06)] predictors of male involvement in birth preparedness and complication readiness (see Additional File 3: Figure S4). Similarly husband's knowledge about post-partum danger signs was found to be [OR=2.50, 95%CI (0.06-104.65)] with involvement in birth preparedness and complication readiness (see Additional File 3: Figure S5). Husband's attendance of at least one ANC visit with their wives was found to be [OR=3.20, 95% CI (1.97-5.19)] statistically significant predictor of male involvement (see Additional File 3: Figure S6).

## Discussion

This systematic review and meta-analysis was conducted to assess male involvement in birth preparedness and complication readiness with its major components. The overall pooled estimate of male involvement in birth preparedness and complication readiness was found to be 40.17% [95%CI(24.01-56.33)]. This result was in line with the studies conducted in Uganda (40.82%) and Nepal(50.49%) respectively [25, 33]. It was also consistent with another study conducted in Nepal in which (50.07%) of males were involved in birth preparedness [34].

This meta-analysis study result was higher than the study conducted in Northern Nigeria (32.1%) of males were involved in birth preparedness and complication readiness[29]. The possible explanation might be due to the fact that there was time gap between the current study and Nigeria that was in 2010. The finding was lower than the study conducted in Per-Urban Northern Uganda in which (65.4%) males were involved in accessing the skilled birth delivery [35]. The possible explanation might be due to the fact that the socio-demographic variation because the study in Uganda was conducted only in the urban. Male involvement has a great impact on maternal and child health during pregnancy, labor and postpartum [17]. The meta-analysis result of male involvement during ANC 41.1%[95%CI(23.68-58.60)] was in line with the study conducted in Rural Uganda which was 29.4% of males were involved during antenatal care of their wives[36]. It was also found consistent with the study conducted in Nepal in which 48.0% of males were involved during ANC period.[33]. Similarly the finding of this meta-analysis was in line with another study conducted in Nepal in which 39.3% of husband's were involved during ANC of their wives[34].

In this meta-analysis the pooled estimate of male involvement during delivery was found to be 45.56% [95%CI(28.82-62.13)] which was in line with the study conducted with the study conducted in Nepal[34] in which 47.9% of males were involved ,but higher than the study conducted in Rural Uganda in which (22.3%)of husbands were involved during delivery[36]. The possible explanation might be due to the fact that the study in Uganda was conducted in rural communities only, but not the meta-analysis. The finding of this meta-analysis was found lower than the study conducted in India in which 67.7% of males were involved during delivery[37].

In the current meta-analysis post-partum male involvement was found to be 45.56%[95%CI(28.82-62.13)] which was in line with the study conducted with the study conducted in Nepal[34] in which 47.9% of males were involved. But, lower than the study conducted in India in which 67.4% of the husbands were involved during post-partum period[37]. The possible explanation might be socio-demographic variations and the size of the studies could bring the discrepancy. Male involvement during the three domains (ANC, delivery, and post-partum periods) played a significant role to healthy maternal and child outcomes. This claim has been supported by a systematic and meta-analysis studies [17, 38]. Husband's attendance of at least one ANC visit with their wives was found to be three times more likely to involve as compared with no attended at all. The possible explanation might be those who attend at least once could have an insight about the importance of their involvement that not attending at all.

## Limitation Of The Study

### Limitation of the study

This systematic review and meta-analysis included only articles reporting in English language, which may restrict our findings. The majority of the articles use small sample size, might be affect the prevalence estimation. All included studies were cross sectional study design in which the result might potentially affected by confounding variables. In addition the meta-analysis didn't include all regions which only include four regions and one administrative city of the country. Therefore; further country based studies to assess other factors related to health service, health policy and health care giver related factors for the involvement of males in birth preparedness and complication readiness, in Ethiopia are recommended.

## Conclusion

The overall proportion of male involvement for birth preparedness and complication readiness was found to be low. Husband's attendance of at least one antenatal visit was found to be significant predictor of male involvement. Therefore, Minister of Health with its stake holders should emphasis on community and institution based programs in the manner to improve male involvement to bring positive maternal and child health outcomes.

## Abbreviations

ANC; Antenatal Care, CI; Confidence Interval, OR; Odds Ratio, SNNR; Southern Nations and Nationality Region,

## Declarations

### Ethics approval and consent to participate

Not applicable

## Consent for publication

Not applicable

## Availability of data and materials

Data will be available from the corresponding author upon reasonable request.

**Competing interests:** We all the authors ascertained that there is no competing interest concerning this manuscript.

## Funding

No funding was obtained for this study.

## Authors' contributions

CKM developed the protocol and involved in the design, selection of study, data extraction, statistical analysis and developing the initial drafts of the manuscript. HKA and NGD involved in quality assessment. CKM, HKA and NGD prepared and revising subsequent drafts as well as prepared the final draft of the manuscript. We authors read and ascertained the final draft of this manuscript.

## Acknowledgments

Not applicable.

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# Figures

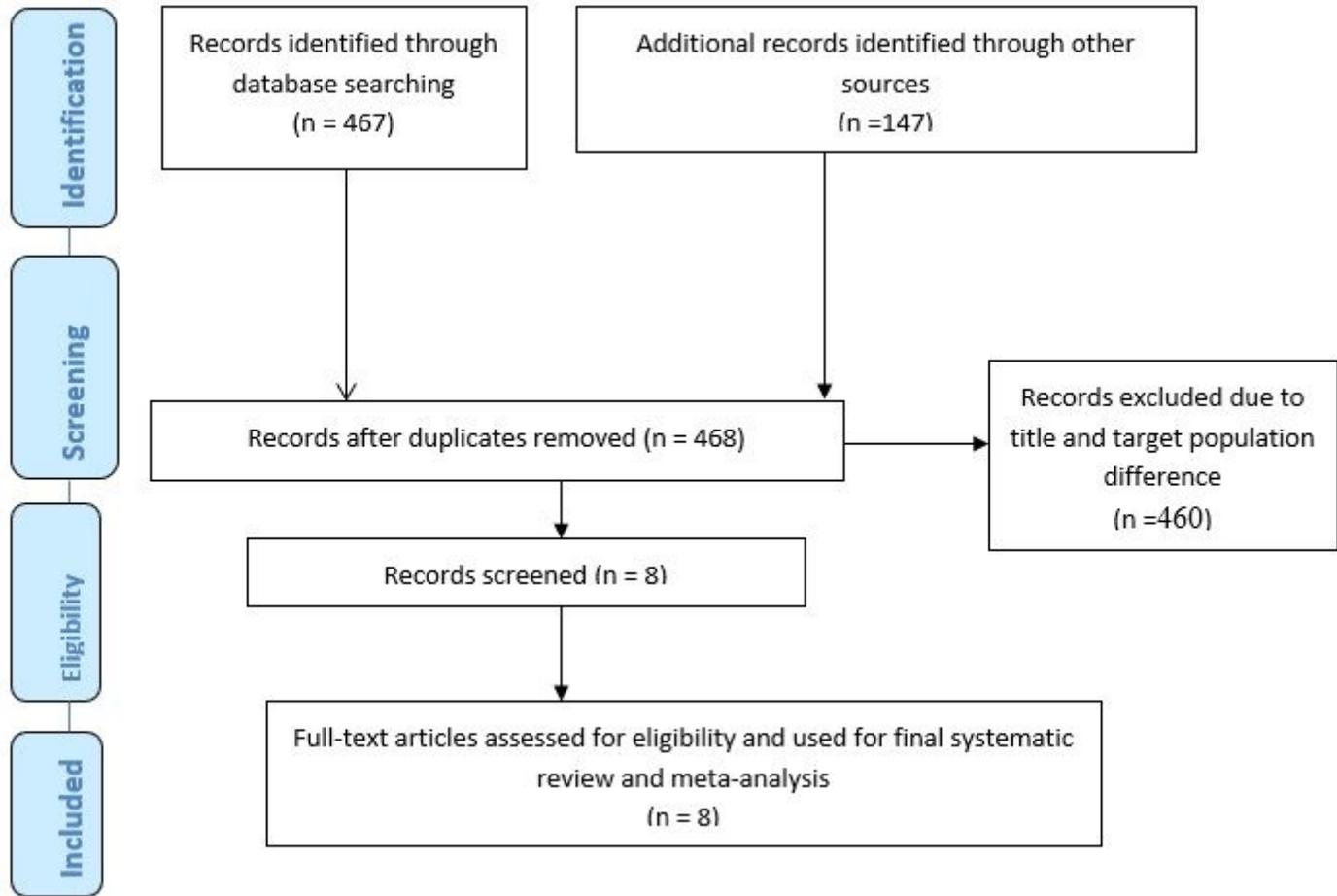
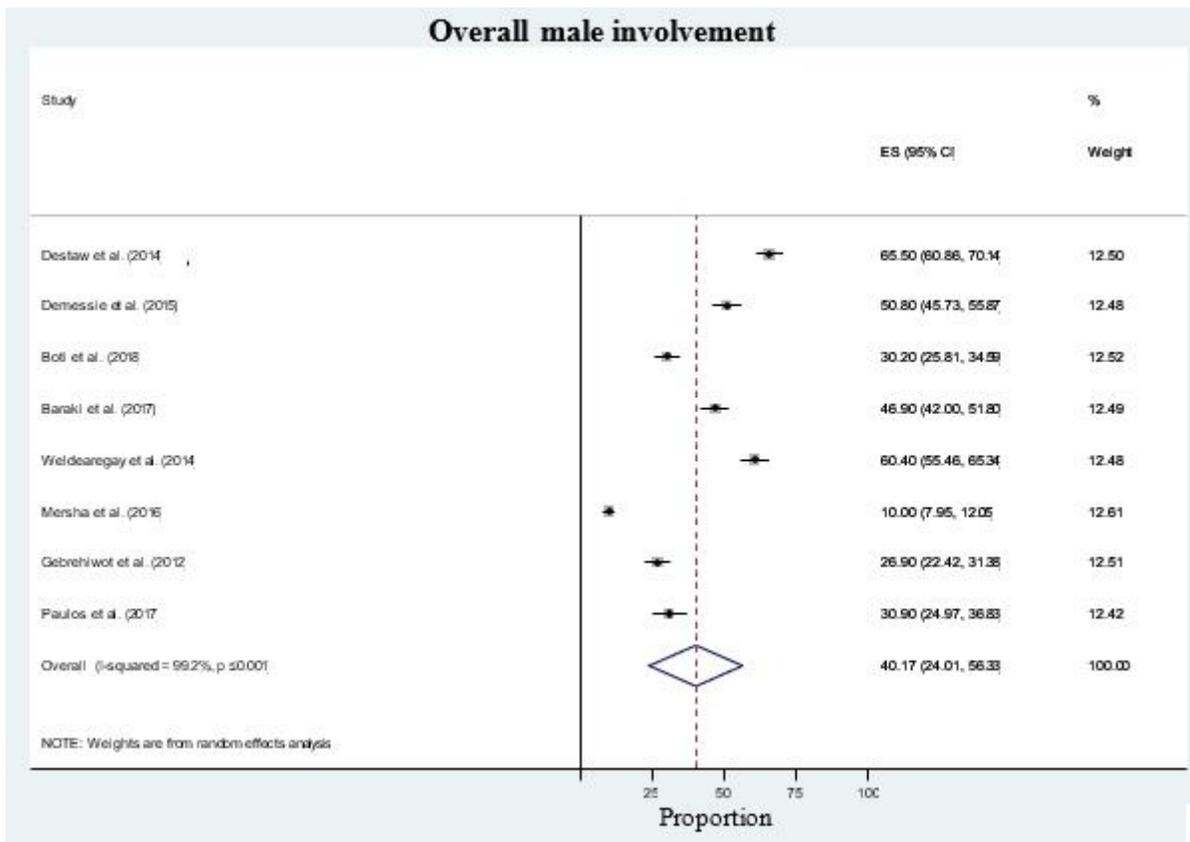


Figure 1

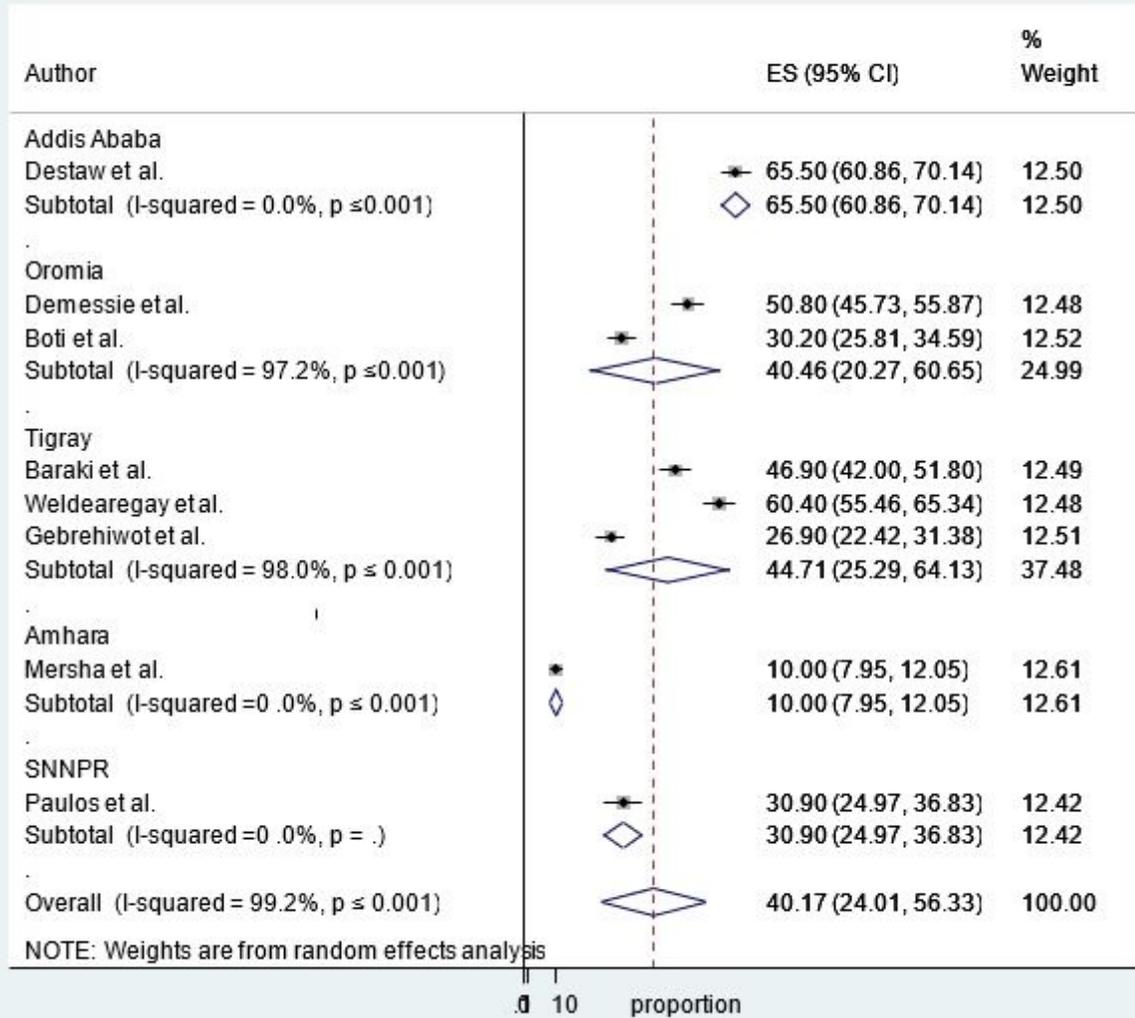
PRISMA flow diagram of included studies



**Figure 2**

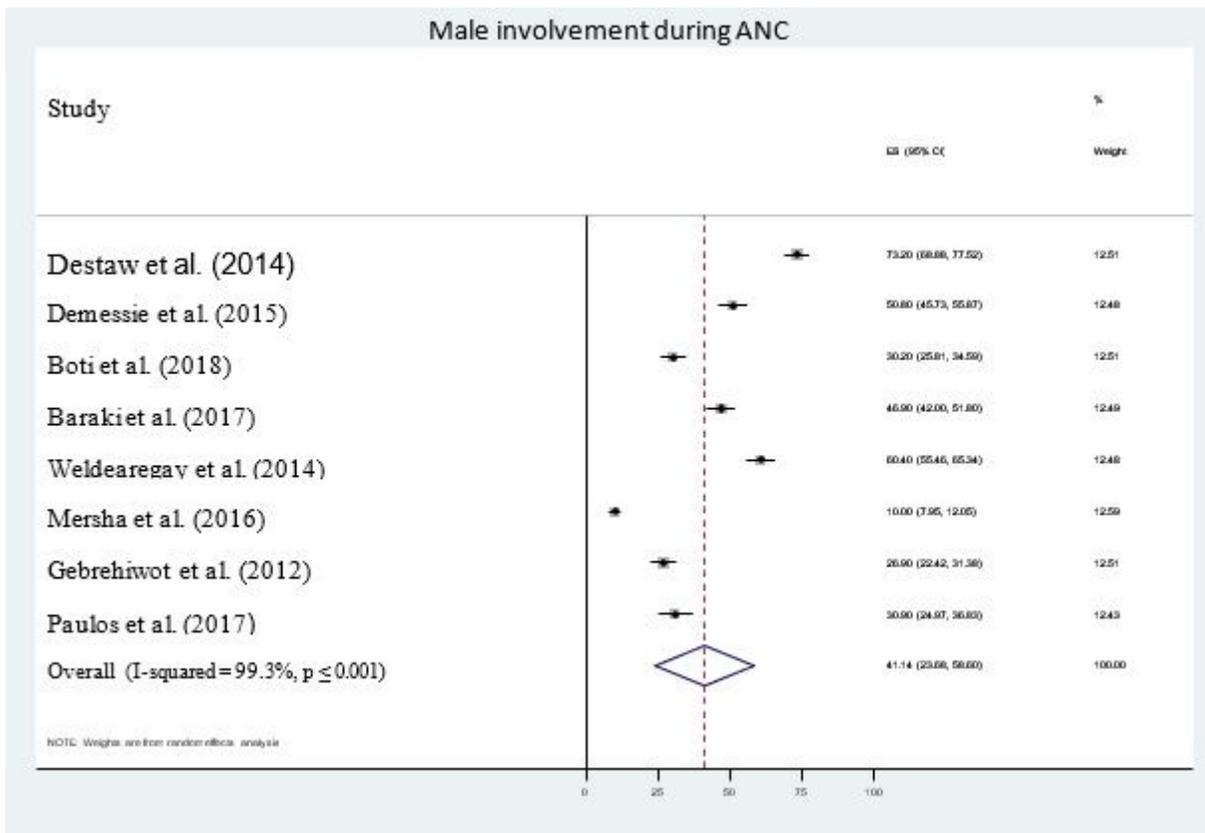
Meta-analysis (forest plot) for the overall all proportion of male involvement in birth preparedness and complication readiness in Ethiopia

### Sub-group analysis of male involvement by region



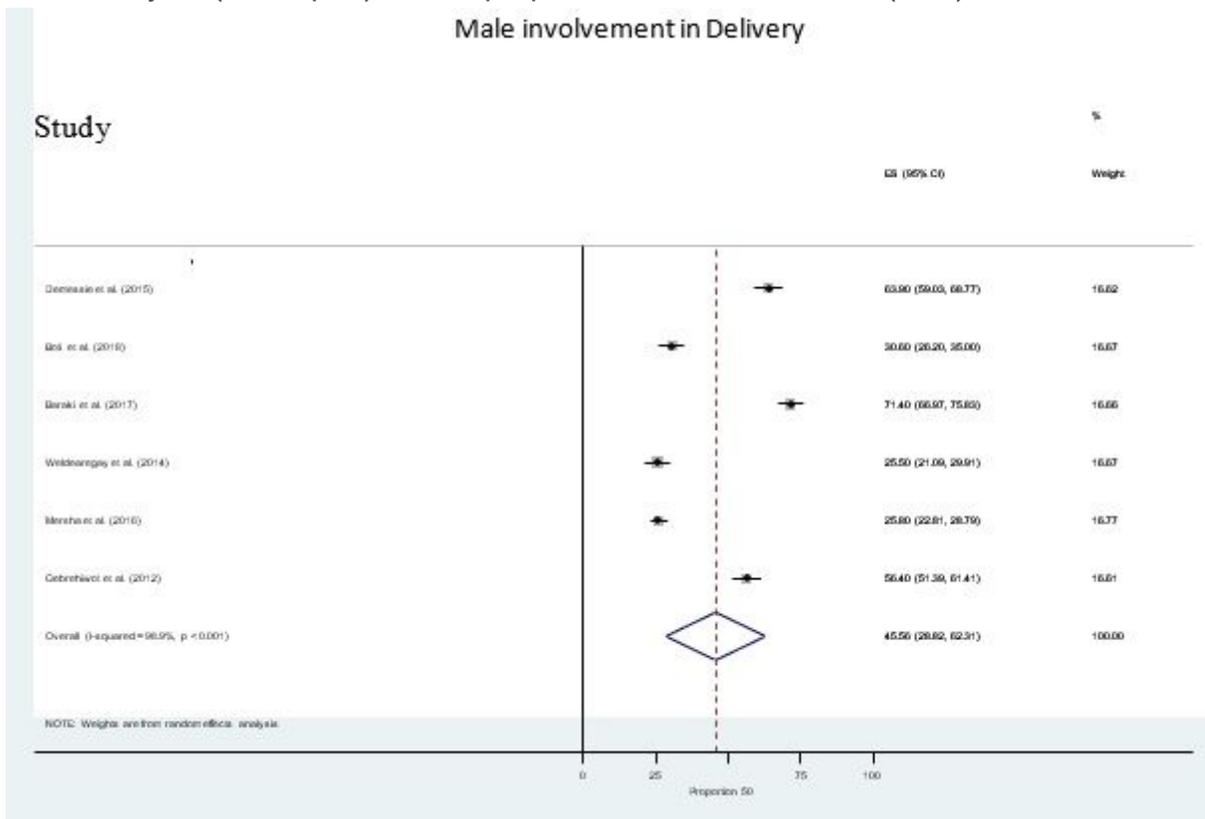
**Figure 3**

Sub-group analysis of the proportion of male involvement by region in Ethiopia.



**Figure 4**

Meta-analysis (forest plot) for the proportion of antenatal care (ANC) involvement of males' in Ethiopia



**Figure 5**

# Meta-analysis (forest plot) of the proportion of male involvement during delivery in Ethiopia

## Male involvement during post-partum period

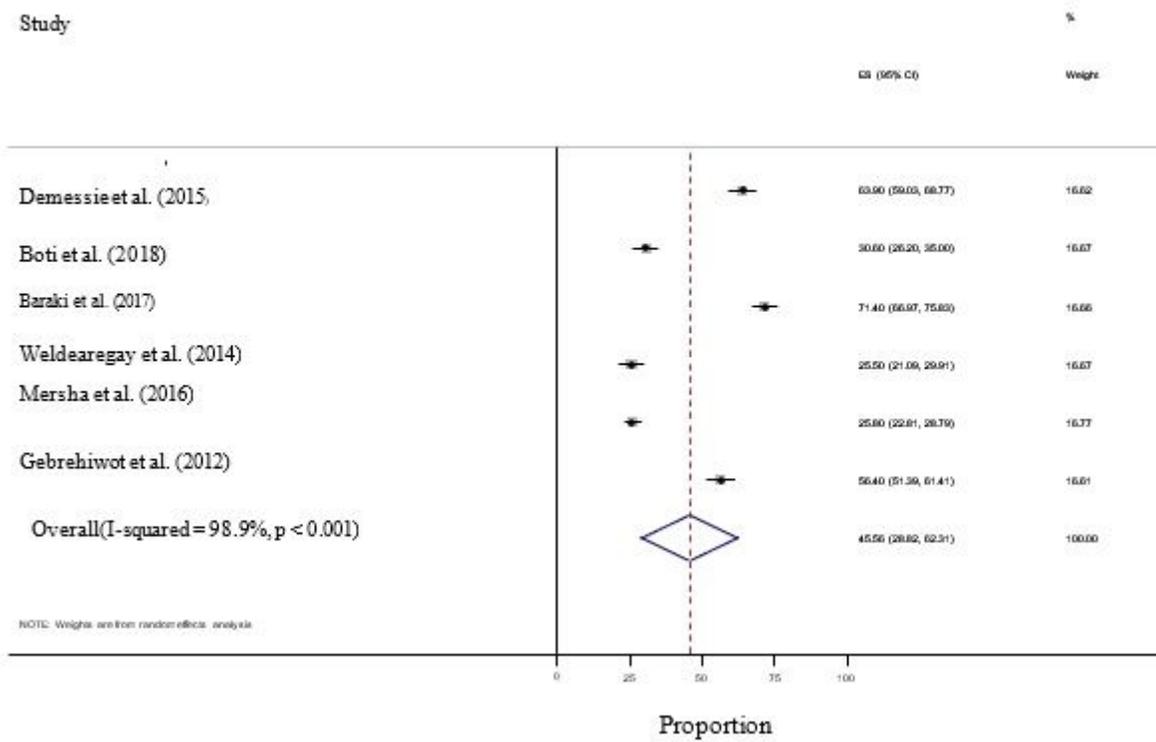


Figure 6

Meta-analysis (forest plot) of male involvement during post-partum period in Ethiopia

## Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [Additionalfiles1TablesS1S6.pdf](#)
- [Additionalfiles2.pdf](#)
- [Additionalfile3.pdf](#)