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Habtewold, Tesfa Dejenie; Mohammed, Shimels Hussien; Endalamaw, Aklilu; Mulugeta, Henok; Dessie, Getenet; Berhe, Derbew Fikadu; Birhanu, Mulugeta Molla; Islam, Md Atiqul; Teferra, Andreas A; Asefa, Nigus Gebremedhin

Published in:
Acta Paediatrica

DOI:
10.1111/apa.15278

Publication date:
2020

MR. TESFA DEJENIE HABTEWOLD (Orcid ID : 0000-0003-4476-518X)

MR. SISAY MULUGETA ALEMU (Orcid ID : 0000-0002-9270-9281)

Article type : Review Article

Corresponding author mail mail id: tesfadej2003@gmail.com

Higher educational and economic status are key factors for the timely initiation of breastfeeding in Ethiopia: a review and meta-analysis

Running Head: Determinants of breastfeeding initiation in Ethiopia

Tesfa Dejenie Habtewold[1,2*], Shimels Hussien Mohammed[3], Aklilu Endalamaw[4], Henok Mulugeta[5], Getenet Dessie[6], Derbew Fikadu Berhe[7], Mulugeta Molla Birhanu[8], Md. Atiqul Islam[9], Andreas A. Teferra[10], Nigus Gebremedhin Asefa[2], Sisay Mulugeta Alemu[11]

[1]Department of Nursing, College of Health Science, Debre Berhan University, Debre Berhan, Ethiopia

[2]Department of Epidemiology, University Medical Centre Groningen, University of Groningen, Groningen, The Netherlands

[3]Department of Community Nutrition, School of Nutritional Sciences and Dietetics, Tehran University of Medical Sciences-International Campus (TUMS-IC), Tehran, the Islamic Republic of Iran

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/APA.15278

[4]Department of Pediatrics and Child Health Nursing, College of Medicine and Health Sciences, Bahir Dar University, Bahir Dar, Ethiopia.
[5]Department of Nursing, College of Health Science, Debre Markos University, Debre Markos, Ethiopia
[6]Department of Nursing, School of Health Science, College of Medicine and Health Science, Bahir Dar University, Bahir Dar, Ethiopia
[7]School of Pharmacy, College of Health Science, Mekelle University, Mekelle, Ethiopia
[8]School of Clinical Sciences, Department of Medicine, Epidemiology and Prevention Division, Monash University, Melbourne, Australia
[9]Department of Statistics, Shahjalal University of Science and Technology, Sylhet, Bangladesh
[10]Division of Epidemiology, College of Public Health, The Ohio State University, Columbus, OH, USA
[11]Global Health Unit, University Medical Centre Groningen, University of Groningen, Groningen, The Netherlands

* =Corresponding author: Tesfa Dejenie Habtewold, Department of Nursing, Debre Berhan University, 445 Debre Berhan, Ethiopia. Phone: +251910025860.

Abstract

Aim: To investigate the association between initiation of breastfeeding within one hour after birth (TIBF) and maternal educational status, paternal educational status, household income, marital status, media exposure and parity in Ethiopia.

Methods: We searched PubMed, EMBASE, Web of Science, SCOPUS, CINAHL and WHO Global health library databases. All studies were conducted in Ethiopia and published from 2000 to 2019 were included. To obtain the pooled odds ratio (OR), data was fitted in random-effects meta-analysis model. Statistical heterogeneity was quantified using Cochran's Q test, τ^2, and I^2 statistics. This meta-analytic review was reported in compliance with the PRISMA statement.

Results: Out of 553 studies retrieved, 25 fulfilled our inclusion criteria. High maternal educational status ($p < 0.001$), high paternal educational status ($p = 0.001$), high household income ($p = 0.002$), being married ($p = 0.001$) and multiparity ($p = 0.01$) were significantly associated with TIBF.

Conclusions: Our meta-analysis showed that TIBF was associated with high educational and economic status, being married and multiparity. This suggests that the meta-analysis detected small associations that many previous studies in Ethiopia have not been able to show. Our findings can be useful for comparisons with other countries.

Key Notes

- Findings from previous studies in Ethiopia on the association between initiation of breastfeeding within one hour after birth (TIBF) and different social determinants are inconsistent.
- TIBF in Ethiopia was associated with high educational and economic status, being married and multiparity.
- Our pooled data detected associations that were not found in the previous studies.

Keywords
Breast milk
Breastfeeding
Breastfeeding initiation
Systematic review
Meta-analysis
Ethiopia

Introduction

World Health Organization (WHO) defines timely initiation of breastfeeding (TIBF) as the percentage of children born in the last two years who were breastfed within the first hour of birth.(1) The 2010 Global Burden of Disease study reveals that suboptimal breastfeeding, including delayed initiation, is one of the three leading causes of diseases in Sub-Saharan African countries (2) that increases the risk of newborn morbidity and mortality up to five times.(3) In total, 1.45 million of childhood deaths in low- and middle-income countries could be attributed to suboptimal breastfeeding.(4,5) According to the 2019 Ethiopian Mini Demographic Health Survey (EmDHS) report, which is done from 2015 to 2019, the neonatal mortality in Ethiopia is estimated at 30 deaths per 1000 live births and constitutes over half of the under 5 mortality rate of 55 per 1000 live births.(6)

Global initiatives have been made to improve the national and international breastfeeding practice, which can help to reduce morbidity and mortality related to malnutrition. Some of these initiatives are the International Code of Marketing of Breast-milk Substitutes (aka the Code), Innocenti Declaration, Baby-Friendly Hospital Initiative (i.e. Ten Steps to Successful Breastfeeding), Millennium Development Goals, Global Nutrition Targets 2025 and Sustainable Development Goals. The Ethiopian government has endorsed and implemented these policies and programs to reduce infant and child mortality and morbidity related to poor breastfeeding. In addition, the Ethiopian Federal Ministry of Health has developed infant and young child feeding guidelines and provided breastfeeding promotion since 2004.(7) A national nutrition strategy and program has also been developed and implemented in a multi-sectoral approach. Moreover, to improve the nutritional status of mothers and children, the Health Sector Development Plan-IV has integrated nutrition into the health extension program.(8) Consequently, the rates of stunting, underweight and wasting have declined in Ethiopia.(6)

Despite the remarkable reduction of malnutrition and neonatal, infant and under-five morbidity and mortality, the rate of TIBF has fallen short of the national Health Sector Transformation Plan 2016-2020 (8), National Nutrition Program 2016-2020 (9) and WHO global target.(10) Numerous factors influence mothers' decisions and ability to initiate breastfeeding within one hour of birth. Previous studies show that TIBF has been associated with different determinants, including educational status, household income, marital status, media exposure and parity though the results are inconsistent.(11,12) In our previous systematic review of 70 observational studies conducted in Ethiopia, we identified 18 factors that significantly associated with TIBF at least in one study. These factors categorized into four groups: proximal (i.e., maternal occupational status, maternal knowledge on TIBF, and breastfeeding guidance and counselling), proximal-intermediate (i.e., place of delivery, mode of delivery, birth attendant and

sex of newborn), distal-intermediate (i.e., antenatal care, postnatal care, prelacteal feeding, and colostrum feeding) and distal (i.e., paternal educational status, household income, marital status, media exposure, family size, breastfeeding experience, place of residence, birth order, parity, and iron-folate supplementation).(13) We also observed huge inconsistencies in results as well as sample size and selection of predictors. In the follow-up meta-analyses (13-15), we found that breastfeeding guidance and counselling, vaginal delivery, health institution delivery, at least one antenatal care visit and colostrum discarding are significantly associated with increased TIBF practice, whereas being non-employed, increased maternal or caregiver's age and male gender of newborn are not significantly associated with increased TIBF practice.

Given the unsatisfactory rates of TIBF practice in Ethiopia and inconsistencies in previous studies, it is important to further investigate the pooled effect of various factors that influence TIBF. Therefore, the aim of this meta-analysis was to investigate the association between TIBF and maternal educational status, paternal educational status, household income, marital status, media exposure, and parity in Ethiopia. We hypothesized that high educational status, high household income, being married, exposure to media and multiparity would significantly increase TIBF practice.

Methods

Protocol and registration

This systematic review and meta-analysis was conducted based on the registered (CRD42017056768) and published protocol.(16) Based on the authors' decision, the following changes were made to the published protocol.(16) Joanna Briggs Institute (JBI) tool was used to extract data. Furthermore, cumulative meta-analysis and mixed-effects meta-regression analysis were done to reveal the trends of evidence and identify possible sources of between-study heterogeneity, respectively.

Measurement variables

The outcome measurement was timely initiation of breastfeeding (TIBF). Based on our previous systematic review(13), the following exposure factors were selected.

- Educational status: Educational status was determined as per the Ethiopian educational system and categorized as 'uneducated' (including mothers who able to read and write without formal schooling), 'primary' (grades 1 to 8) and 'secondary and above' (grades 9 or above).
- Household income: Household income was categorized as 'high', 'medium' and 'low'. Because of substantial inconsistency in the reported household income, we used a qualitative classification of income for all included studies based on authors' educational judgment.
- Marital status: Marital status was categorized as 'currently married' and 'others' (i.e. single, divorced, widowed).
- Media exposure: Media exposure represents exposure to or ownership of any print media (newspaper, leaflet, brochure) and broadcasting (radio and television) and categorized as 'yes' and 'no'. This does not include Facebook, email, YouTube, or WhatsApp as most mothers did not have access to internet as well as smart phone. If studies reported accessibility or exposure to more than one media tools, we choose to extracted data on only one of them in the following order: radio followed by television then print media.
- Parity: Parity refers to the total number of births after 28 weeks and was categorized as 'primipara' if the mothers have only one birth and 'multipara' if the mothers have at least two births.

Search for literature

We searched PubMed, EMBASE, Web of Science, SCOPUS, CINAHL and WHO Global health library databases. The interactive searching syntax was developed for all databases (Supplemental file 1) in consultation with librarian, who was an expert on literature searching. We also manually searched the table of contents of Ethiopian Journal of Health Development,

Ethiopian Journal of Health Sciences, Ethiopian Journal of Reproductive Health, International Breastfeeding Journal, BMC Pregnancy and Childbirth, BMC Public Health, BMC Paediatrics, Nutrition Journal and Italian Journal of Paediatrics. We further searched cross-references and grey literature on Addis Ababa University institutional research collection repository database. The last search was done in March 2019.

Inclusion and exclusion criteria

The studies were included if they met all of the following inclusion criteria: (1) observational studies, such as cross-sectional, case-control and cohort studies; (2) studies conducted in Ethiopia; (3) studies reported on the association between TIBF (i.e. operationalized based on the WHO definition) and at least one of the following factors: maternal and paternal educational status, household income (at least three categories of income must be reported), marital status, media exposure (not exposed or no access to media category must be reported) and parity; (4) studies published from September 2000 (i.e. the time when last revision of the global breastfeeding recommendations occurred) to March 2019. Program evaluation reports, systematic reviews and meta-analyses, qualitative studies and studies on mothers with medical conditions including HIV/AIDS and pre-term or ill health newborn were excluded.

Screening and selection of studies

Initially, all identified studies were exported into RefWorks citation manager version 4.6 for Windows. Afterward, duplicate studies were deleted from further screening. Next, a pair of reviewers (TD and SM) independently screened the abstracts and titles using Microsoft Excel spreadsheet for relevance, and compliance with our measurements of interest and inclusion criteria. Based on Cohen's Kappa inter-rater reliability test, the agreement between the two reviewers was 0.76 indicating substantial agreement between the two reviewers. Disagreements on the inclusion of titles or abstracts were solved through discussion and consensus. After removing irrelevant studies, full text of selected abstracts were downloaded and reviewed for further eligibility. The Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) flow diagram was also used to illustrate the screening and selection processes of studies.(17) Finally, using JBI data extraction tool, two independent reviewers (TD and SM) extracted the following information: author name, publication year, residence, study design, study population, number of participants, source of funding, and observed data. If funding source was not explicitly mentioned, we reported as 'not mentioned', whereas 'no funding' category was used if the author explicitly mentioned there was no funding or funding not applicable. If funding was not given directly but through other donors, the original donor was mentioned. Newcastle-Ottawa Scale (NOS) for cross-sectional studies was used to examine the quality of studies and the potential risk of bias. The scoring system, selection of cut-off value and interpretation used in this

meta-analysis were published in our protocol.(16) Furthermore, we reported the results in compliance with the recommendation of PRISMA statement (Supplemental file 2).(17)

Statistical analysis

To obtain the pooled odds ratio (OR), extracted data was fitted in a random-effects meta-analysis model. In addition, a cumulative meta-analysis was done to illustrate the trend of evidence regarding the effect of predictors on TIBF and interpreted as stable, steadily increased/decreased, slightly increased/decreased or dramatically increased/decreased. Publication bias was assessed by subjective evaluation of the funnel plot, and then, we performed Egger's regression statistical test to objectively confirm the presence of significant publication bias at p-value ≤ 0.01. We used Cochran's Q test to test statistical heterogeneity, τ^2 to estimate the amount of total/residual between-study variance, and I^2 statistics to measure the proportion of total variation between study due to heterogeneity. Clinical and methodology heterogeneity were also carefully evaluated. Factors attributed to between-study heterogeneity were investigated using mixed-effects meta-regression analysis using region, residence, sample size and publication year as covariates. The residual amount of heterogeneity was subtracted from the proportion of heterogeneity and divided by the total amount of heterogeneity to obtain the total amount of heterogeneity (R^2) explained by covariates. Omnibus test of moderators was applied to assess the moderation effect of these covariates. Meta-regression analysis was done only when heterogeneity threshold (I^2) was ≥ 80%. Jackknife sensitivity analysis was done to examine the influence of outlier studies on the pooled OR estimate, a significance level of estimate and between-study heterogeneity.(18) The study was excluded when the pooled OR estimate increased or decreased by one and changes the significance level after lifting out that study from the meta-analysis. Because of the small number of studies available for some variables, the change in heterogeneity threshold was not considered as a primary criterion to detect and exclude the outlier study. The data was analyzed using "metafor" packages in R software version 3.2.1 for Windows.

Results

Search results

In total, 483 studies through electronic databases and 70 studies through manual searching were retrieved for further screening. Following a rigorous screening, 28 studies were selected for full text review. Three studies were excluded after the full text review: one study (19) reported only the prevalence of TIBF, and the other two studies (20,21) did not report the selected factors of our interest. A total of 25 studies were included in this meta-analysis, which most of them conducted on mothers with newborn less than 23 months. All these studies had good methodological quality (NOS score ≥7). One study reported more than one predicting factors. The screening and selection process is illustrated below using the PRISMA flow diagram (Figure 1). The detailed characteristics of studies that reported each variable is presented in Supplemental file 3, Table S1.

Predicting factors

Maternal educational status

Seventeen out of 25 included studies reported the association between maternal educational status and TIBF in 31066 mothers (Supplemental file 3, Table 1a).(22-38) Out of these 17 studies, four studies were conducted in Amhara region, three in Oromia region, three in Southern Nations, Nationalities and Peoples Region (SNNPR), and the remaining five studies in other regions (i.e., Addis Ababa, Afar, and Tigray). Two studies used nationally representative data. Our meta-analysis showed that higher educational status was significantly associated with TIBF (primary vs uneducated: OR = 1.23; p = 0.02 (Figure 2); secondary or above vs uneducated: OR = 1.82; p < 0.001 (Supplemental file 3, Figure S1); secondary or above vs primary: OR = 1.43; p = 0.002 (Supplemental file 3, Figure S2)). The meta-regression analysis showed that 78.7% of between-study heterogeneity was explained by the variation in region and publication year. Region had also significant moderation effect (QM= 22.7, df = 6, p < 0.01). In all the above three comparisons, there was no significant publication bias (Supplemental file 3, Figures S3, S4, S5) and the evidence on the effect of maternal educational status on TIBF did not markedly change over time (Supplemental file 3, Figures S6, S7, S8). Similar results were obtained on the association between paternal education status and TIBF (Supplemental file 3, Table 1b and Figure S9 – S17).

Household income

Of 25 included studies, eight studies (30,32,34,35,39-42) with 21265 mothers examined the association between household income and TIBF (Supplemental file 3, Table 1c). Three studies were conducted in Amhara region and three studies were in Addis Ababa, Tigray and SNNPR. The other two studies were nationally conducted. The pooled data indicated that the odds of TIBF

among mothers who had higher household income was high although the results were not consistent when the level of income changed (high vs medium: OR = 1.16; p = 0.002 (Figure 3); medium vs low: OR = 1.10; p = 0.64 (Supplemental file 3, Figure S18); high vs low: OR = 1.28; p = 0.25 (Supplemental file 3, Figure S19)). The meta-regression analysis showed that between-study heterogeneity accounted for variation in the region, residence and sample size, and these factors had also moderation effect. There was no significant publication bias in all comparisons (Supplemental file 3, Figures S20, S21, S22). The evidence on the effect of income on TIBF was slightly increased over time (Supplemental file 3, Figures S23, S24, S25).

Marital status

Regarding the association between marital status and TIBF, 12 studies (23,24,26-29,31,32,34-36,43) involving 17259 mothers were used for pooling results (Supplemental file 3, Table 1d). Three studies were conducted in Amhara region, three in Oromia region and the rest were conducted in Addis Ababa, Afar, and Tigray while one study was nationally conducted. One outlier study (36) was excluded after Jackknife sensitivity analysis. The odds of TIBF among married mothers was 39% significantly higher than unmarried mothers (OR = 1.39; p = 0.001) (Figure 4). There was no significant publication bias (Supplemental file 3, Figure S26). The evidence on the effect of marital status on TIBF increased slightly over time (Supplemental file 3, Figure S27).

Media exposure

Likewise, 11 studies (25-27,30,31,34,35,38,44-46) with 22315 mothers investigated the association between media exposure and TIBF (Supplemental file 3, Table 1e). Two studies were conducted nationally, four studies in SNNPR, two studies in Amhara region, two studies in Oromia region and one study in Addis Ababa. The odds of TIBF among mothers who were exposed to media was higher than mothers who were not exposed media, although the difference was not statistically significant (OR = 1.05; p = 0.74) (Figure 5). There was no significant publication bias (Supplemental file 3, Figure S28). The evidence on the effect of media exposure on TIBF over time was stable (Supplemental file 3, Figure S29). The meta-regression analysis result showed that 62.6% of the between-study heterogeneity accounted for the variation in region and publication year, however, none of these factors had moderation effect (QM= 16.4, df = 5, p = 0.05).

Parity

Finally, nine studies (23,24,27-29,31,34,37,44) explored the association between parity and TIBF in 4993 mothers (Supplemental file 3, Table 1f). Of these, two studies were conducted in Addis Ababa, two in Amhara, two in Oromia, two in SNNPR and one in Afar region. The odds of TIBF among multiparous mothers was 39% significantly higher than primiparous mothers (OR = 1.39; p

= 0.01) (Figure 6). There was no significant publication bias (Supplemental file 3, Figure S30). The evidence on the effect of parity on TIBF was steadily increased over time (Supplemental file 3, Figure S31).

Discussion

For the first time, this meta-analytic review provided national evidence on the association between TIBF and different social determinants in Ethiopia. The key finding was that TIBF was significantly associated with high parental educational and economic status, being married and multiparity.

In this study, the odds of TIBF among mothers with primary education was significantly higher than for uneducated mothers. The association was even stronger when we compared mothers with secondary education or above with uneducated mothers and mothers who attained primary education. We observed a similar association between paternal educational status and TIBF. This finding was in line with our hypothesis and studies in India, Nepal, and Timor-Leste.(47,48) It is likely that education plays an important role in changing the beliefs and attitudes of mothers toward breastfeeding, and increasing confidence, spousal support, maternal decision making, antenatal care follow-up and health institution delivery. In addition, highly educated mothers and fathers could have high expectations, pose questions and request to be properly counselled. On the other hand, other studies (11,49,50) reported the absence of a significant association between education status and TIBF. Another study (51) revealed that high educational status found to be associated with delayed initiation of breastfeeding. This inconsistency might be attributed to the difference in the study population, sample size and socioeconomic status. The pooled results of our meta-analysis and others (India, Nepal, and Timor-Leste) were based on nationally available studies or data.(47,48) In addition, delayed initiation of breastfeeding in highly educated mothers may be due to the use of private maternities and the larger rate of caesarean section.(52) Moreover, cultural differences may be another possible reason for this discrepancy. For example, public breastfeeding is an acceptable norm in Ethiopia while it might be a taboo in other nations.

In agreement with previous studies (50,52) and our hypothesis, we also showed mothers who had high household income are likely to practice TIBF compared with mothers with low household income. This might be due to mothers in a wealthy family are more likely to follow the recommended level of antenatal care visits, deliver at health institution and receive adequate postnatal care, which can help them to initiate breastfeeding within one hour after birth, whereas mothers in poor family are deprived of those economic advantages.(53) In our previous meta-analyses (13,14), we found that health institution delivery and antenatal and postnatal care follow-up were significantly associated with TIBF. In contrast, evidence from Timor-Leste demographic and health survey showed that income was not associated with TIBF.(49)

Moreover, in line with our hypothesis, our meta-analysis showed that currently married mothers timely initiate breastfeeding compared with currently unmarried (i.e., single, widowed,

divorced) mothers. This finding was supported by previous longitudinal family-based study.(54) This may be due to different reasons. Married mothers could have higher educational and economic status (55), as we showed socioeconomic advantage increased the likelihood of TIBF. In addition, previous study has shown that married mothers are more satisfied, committed to spousal relationships, get shared spousal support and reported less conflict, and therefore, married mothers can have high emotional responsibility to keep the health of the newborn and more likely to engage in positive parenting behaviours.(56) Despite these facts, a systematic review by Esteves and colleagues reported the absence of association between marital status and TIBF in 10 out of 12 reviewed studies.(52) This discrepancy might be due to a difference in cultural significance of marriage, as a result, the rate of marriage is low or high.

In this study, we further found a significant positive association between multiparity and TIBF. This finding supported our hypothesis and similar to studies report in Middle East countries.(11) This may be due to the knowledge advantage that experience give to multiparous women compared with the inexperienced primiparous women. There is evidence that multiparity is associated with better breastfeeding-related knowledge.(57) In addition, the increased knowledge and experience may change maternal attitude and behaviour towards breastfeeding. In contrast, a systematic review were reported the absence of association between parity and initiation of breastfeeding.(52)

This meta-analysis showed a significant association of various social determinants with TIBF and provided national evidence. Of note, the meta-analysis were detected small associations that many previous studies in Ethiopia have not been able to show. To minimize the possibility of missing relevant studies, we have used a combination of electronic databases search and manual search of cross-references, grey literature, and table of contents of relevant journals. Furthermore, this meta-analysis was conducted based on a published protocol that helps to minimize methodological biases.

This meta-analysis has also limitations, which should be taken in to account during the translation of results. All the studies included in this meta-analysis were cross-sectional study, which hinders inference on cause-effect relationships. The risk of measurement error and recall bias should also be acknowledged. Interestingly, almost all included studies were conducted in mothers with a newborn less than 23 months. In relation to this, the maternal recall is found to be a valid and reliable estimate of breastfeeding initiation and duration when the data is collected within three years of breastfeeding history.(58) Social desirability bias could also be evident given that self-reported breastfeeding experience, and educational and economic status were used. In addition, the household income classifications are not standardized and did not account for indices such as inflation, which changes over time. Another limitation was that the effect sizes

pooled in this meta-analysis were not adjusted to important confounders, such as institutional delivery. The rate of institutional delivery is rapidly increasing in Ethiopia. The 2019 EmDHS report showed that the percentage of health institution live births increased from 5% in 2005 to 48% in 2019.(6) Studies were lacking in some regions for some variables, which may limit the generalizability of our findings. Despite this fact, at least one study used nationally representative data per each variable. This meta-analysis only covers studies in Ethiopia; therefore, a comparative meta-analysis from other low- and high-income countries is required. Moreover, statistical heterogeneity was observed in some of the analyses. A further limitation of this study was maternal and paternal education represents the formal education gained through schooling and it may not reflect the health literacy of the mothers and fathers.

Conclusions

Our meta-analysis showed that initiation of breastfeeding within one hour after birth in Ethiopia has been associated with high educational status and household income, being married and multiparity. This suggests that the pooled data can detect small associations that many previous studies in Ethiopia have not been able to show. This finding in Ethiopia can be useful for cross-country and cross-cultural comparisons with other countries. In line with the WHO recommendations (59), public health interventions, such as health education, increasing media coverage, counselling and peer education targeting the disadvantaged groups are important.

Acknowledgment

We would like to Sjoukje van der Werf (librarian at the University Medical Center Groningen, the Netherlands) for her expert advice on search strategies and Balewgizie Sileshi (University of Groningen, the Netherlands) for his help to screen titles and abstracts.

Competing interests

The authors declare that they have no competing interests.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

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Figure legends

Figure 1. PRISMA flow diagram showing the schematics of literature screening and selection.

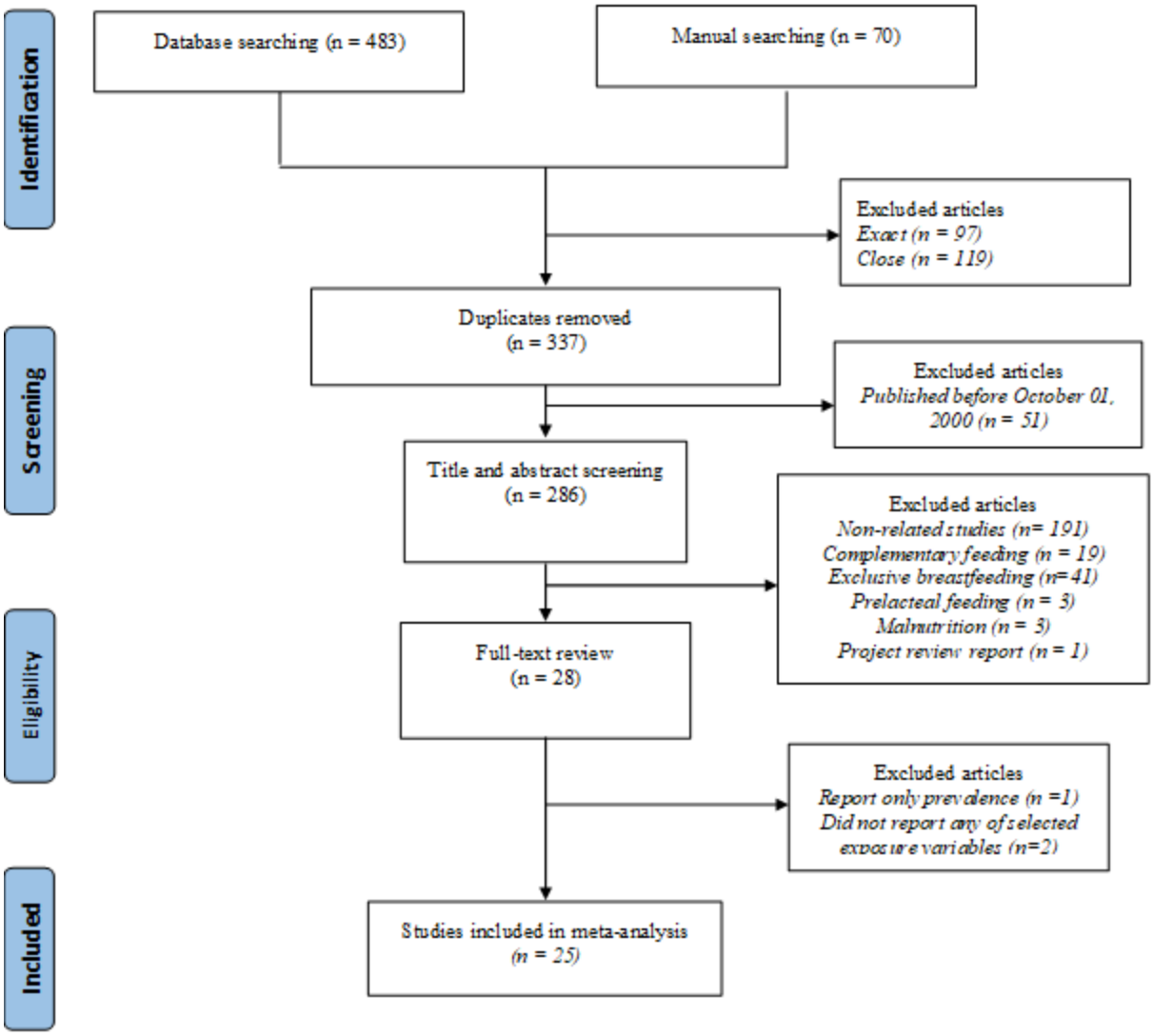
Figure 2: Forest plot showing the results of 17 studies examining the association between maternal educational status (primary education versus uneducated) and TIBF.

Figure 3: Forest plot showing the results of eight studies examining the association between household income (high versus medium) and TIBF.

Figure 4: Forest plot showing the results of 11 studies examining the association between marital status (married versus others) and TIBF.

Figure 5: Forest plot showing the results of 11 studies examining the association between media exposure (yes versus no) and TIBF.

Figure 6: Forest plot showing the results of nine studies examining the association between parity (multiparous versus primiparous) and TIBF.



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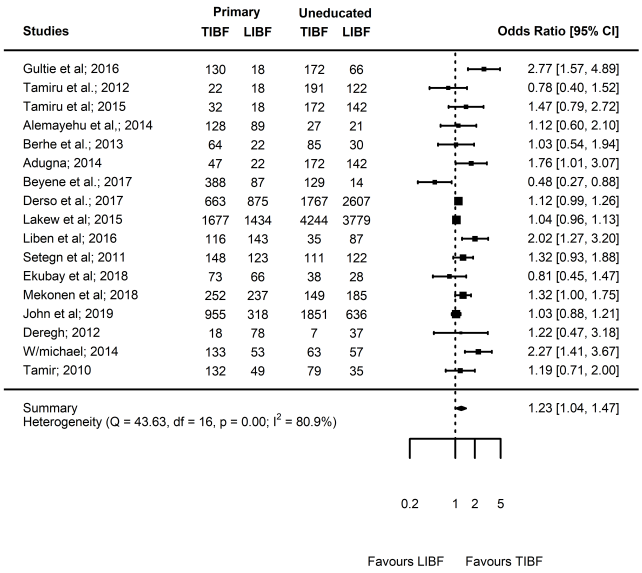

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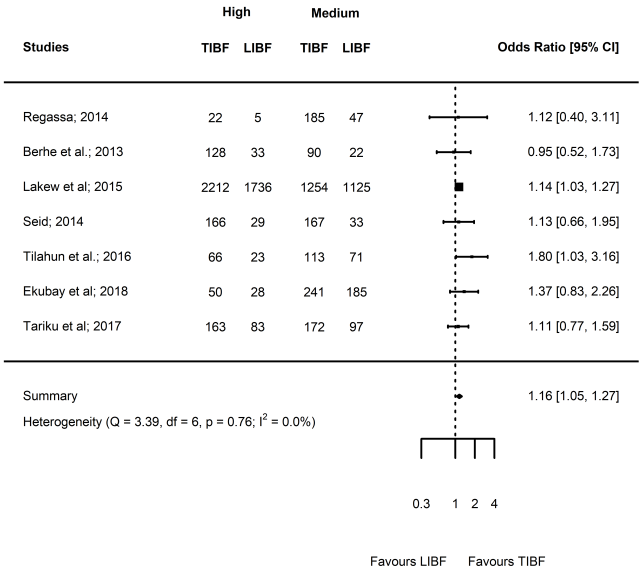

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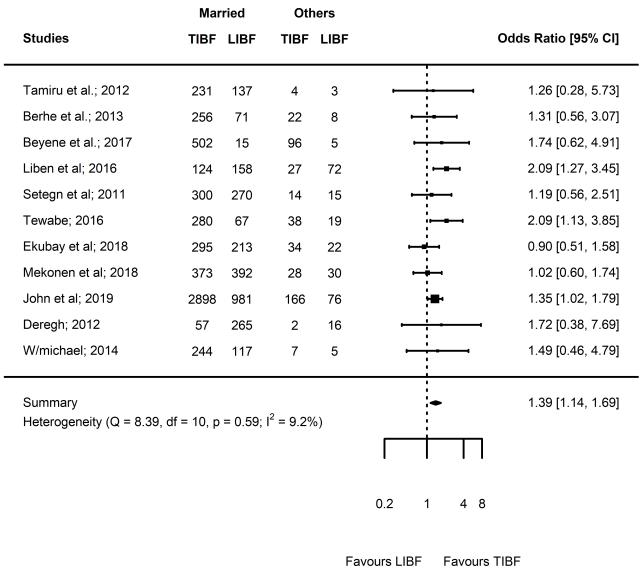

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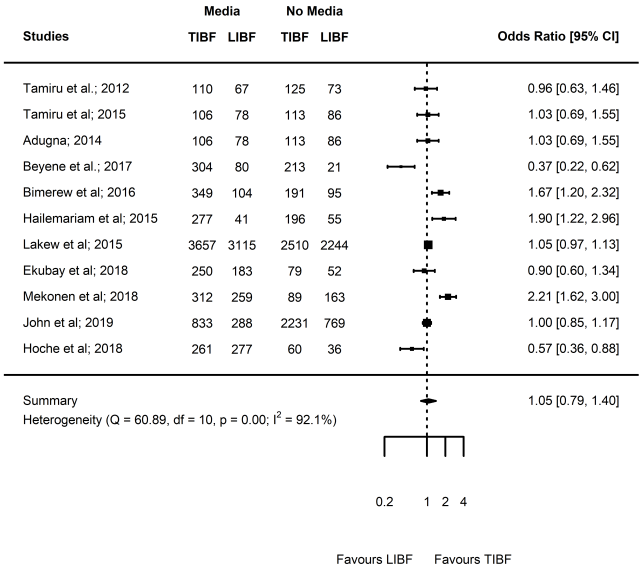

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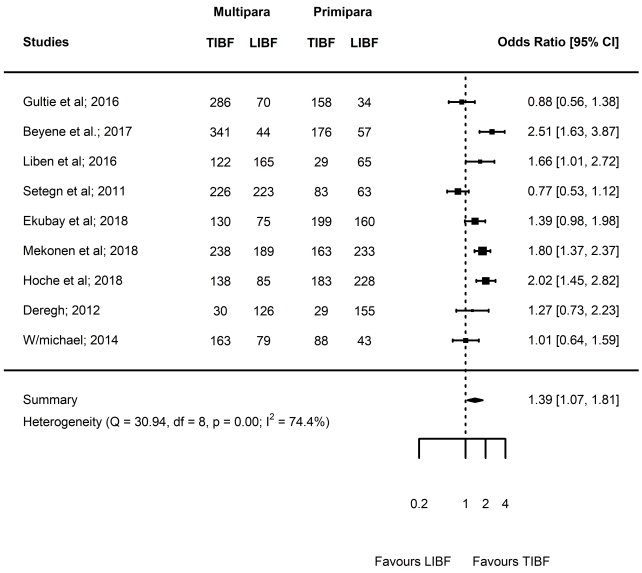

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