Association of age and colostrum discarding with exclusive breastfeeding in Ethiopia: systematic review and meta-analyses

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Abstract

Introduction: Even though optimal breastfeeding is important, significantly low percentage of mothers' initiate breastfeeding timely and maintain exclusive breastfeeding for 6 months. The aim of this meta-analyses and systematic review was to investigate whether maternal/caregivers' age, infant age (0-6 months) and discarding colostrum affects timely initiation of breastfeeding (TIBF) and exclusive breastfeeding (EBF) in Ethiopia.

Methods: A systematic search of PubMed, SCOPUS, EMBASE, CINHAL, Web of Science and WHO Global Health Library electronic databases was done for all English published articles from 2000 to January 2018, supplemented by manual search of identified articles and grey literatures bibliographies. Two reviewers independently screened, extracted and graded the quality studies using Newcastle–Ottawa Scale (NOS). Heterogeneity was assessed using the I^2 and Cochran Chi-square statistics. A weighted inverse variance random-effects model meta-analysis was done.

Result: A total of 37 articles (i.e., 14 studies on TIBF and 23 on EBF) were included. TIBF was associated with colostrum discarding (Odds ratio (OR) = 0.38, 95% CI = 0.21-0.68) but not with maternal/caregivers' age (OR = 0.98, 95% CI = 0.83-1.15). In addition, colostrum discarding (OR = 0.56, 95% CI = 0.37-0.84) and infant age (OR = 1.86, 95% CI = 1.45-2.39) were significantly associated with EBF but not maternal/caregivers' age (OR = 1.07, 95% CI = 0.81-1.40).

Conclusion: This meta-analyses indicated absence of association between maternal/caregivers' age and breastfeeding practice. Colostrum discarding was associated with both EBF and TIBE. This evidence could be helpful to counsel all reproductive age mothers and who discard colostrum.

Key words: Breast Feeding, maternal age, infant, review, meta-analysis, Ethiopia

Introduction

World Health Organization (WHO) and United Nation Children's Fund (UNICEF) defines timely initiation of breastfeeding (TIBF) as putting a new born to breast within one hour of birth and exclusive breastfeeding (EBF) as feeding infants only human milk through breastfeeding or expressed breast milk and no other liquids or solids, except for drops or syrups with nutritional supplements or medicine.[1] All infants should receive human within the first hour of birth, exclusively breastfed for the first six months and thereafter, nutritionally adequate and safe complementary foods to be introduced with continued breastfeeding for at least two years.[2, 3] Breastfeeding is one of the smartest investment that prevents maternal and newborn morbidity and mortality.[4-7] For example, TIBF and EBF prevents 22% and 60% of neonatal deaths respectively.[2, 8, 9] Furthermore, exclusive breastfeeding for a longer duration benefits child neurodevelopment and increase IQ.[10]

Despite the aforementioned advantages, significantly low percentage of mothers initiate breastfeeding within the first hour of birth and maintain exclusive breastfeeding for 6 months. Globally, 44% and 40% of newborns breastfed with in the first hour and exclusively breastfeed for six months respectively.[4, 11] In developing countries, the prevalence of TIBF ranges 22.4 to 52.8% [17-23] and EBF ranges 10 to 49.1%.[11, 17, 18, 27, 28] In Ethiopia, based on our previous meta-analyses, (unpublished results) the national prevalence of TIBF and EBF is 67.5% and 60.5% respectively.

Previous studies have identified several associated factors, including maternal/caregiver's age, newborn age and colostrum discarding, of timely TIBF and EBF.[12-22] Previous studies shows that infant age and colostrum discarding have been associated with late initiation of breastfeeding and nonexclusive breastfeeding.[18, 20, 23-25] Regarding maternal/caregiver's age, most of the reviewed literatures reveals that older mothers practice TIBF[14, 19, 20, 26] and EBF[12, 17, 22, 27, 28] higher than young mothers although the age cut-off value varies between studies. Another study,[13] which measured age as a continuous variable, also concludes that increased maternal age positively associated TIBF and EBF. On the contrary, some studies showed that increased maternal age was associated with delayed initiation of breastfeeding and nonexclusive breastfeeding.[15, 16] Furthermore, other studies showed absence of association.[21, 29] Taken together, inconsistencies persisted and the association is inconclusive.

Hence, there is an urgent need to synthesize individual studies data to make a better conclusion on the association between maternal age, infant age and colostrum discarding and breastfeeding practice (i.e., TIBF and EBF). So far, several systematic reviews and meta-analyses have been conducted on TIBF and EBF.[14, 18, 20, 30-32] In Ethiopia, only one meta-analysis investigated the association of place of residence and delivery with TIBF.[32] In our previous meta-analyses, (unpublished results) we studied the association between maternal employment, breastfeeding counseling, model of delivery, place of delivery, sex of newborn, antenatal care and postnatal care and breastfeeding practice. We also investigated the association between TIBF and EBF. The present meta-analyses and systematic review aimed to determine whether maternal/caregivers age, infant age and colostrum discharging affects TIBF and EBF in Ethiopia. We hypothesized (i) increased maternal age positively associated with breastfeeding practice due to accumulated experience, (ii) increased infant age negatively associated with exclusive breastfeeding and (iii) colostrum discarding negatively associated with breastfeeding practice.

Following international recommendations, the Ethiopian government has taken steps to improving infant and young child feeding practices. Several national nutritional strategies,[33] guidelines[34] and nutrition programs[35, 36] have been developed by Ministry of Health of Ethiopia since 2004. Likewise, the Health Sector Transformation Plan of Ethiopia[37] has targeted to increase exclusive breast feeding to 72 % by 2020. Furthermore, Ethiopia has recently started celebrating world breastfeeding week every year.[38] However, TIBF and EBF coverage is still below the WHO recommendation and attributed to several factors. This meta-analyses information could be valuable to provide updated evidence to develop national guidelines and strategies.

Methods

Protocol registration and publication

The protocol has been registered with the University of York Centre for Reviews and Dissemination International prospective register of systematic reviews (PROSPERO) (http://www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42017056768) and published. [39]

Data source and search strategy

For all available publications, systematic search of PubMed, SCOPUS, EMBASE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science and WHO Global Health Library electronic databases was done. In addition, bibliographies of identified articles and grey literatures were hand-searched. A comprehensive search strategy was developed for each database in consultation with a medical information specialist (Supplementary file 1).

Eligibility criteria

All studies published in English from 2000 to January 2018 were included. In addition, observational studies (cross-sectional, case–control, cohort, survey and surveillance reports) conducted in Ethiopia were included. However, studies on preterm newborn infants, infants in neonatal intensive care unit or a special care baby unit, low birth weight and mothers or infants with medical problems were excluded. Further, commentaries, anonymous reports, letters, duplicate studies, editorials, qualitative studies and citations without full text were excluded.

Study screening and selection

All studies obtained from databases and manual search were exported to EndNote citation manager. The title and abstract of all studies were screened by reviewers (SM & TD) independently. Agreement between the reviewers, as measured by Cohen's Kappa, was 0.76. Any disagreement was resolved by discussion. When consensus could not be reached, a third reviewer approved the final list of retained studies. A full-text review was performed by two independent investigators (SM & TD).

Quality assessment and data extraction

Newcastle-Ottawa Scale (NOS), which has good inter-rater reliability and validity, was used to assess the quality of studies and for potential publication bias.[40, 41] In addition, to define outcome measurements, WHO infant and young child feeding practice guideline was strictly followed. Based on previous systematic review report,[14, 42, 43] maternal/Caregiver's age was dichotomized as ≥ 25 versus <25 years old whereas infant age was dichotomized as ≤ 3 versus 3 to 6 months age. Joanna Briggs Institute (JBI) tool was used to extract the following data: study area (region and place), method (design), population, number of mothers (calculated sample size and participated in actual study) and cross-tabulated data. Geographic regions were categorized based on the current Federal Democratic Republic of Ethiopia administrative structure (Supplementary file 2). Discrepancies were resolved by consensus and cross-checking with the full-text.

Statistical analysis

A weighted inverse variance random-effects model meta-analyses was implemented. Publication bias was assessed by visual inspection of funnel plot and Egger's regression test for funnel plot asymmetry using standard error as a predictor in mixed-effects meta-regression model at p-value threshold ≤ 0.01.[44] Duval and Tweedie trim-and-fill method[45] was used if we found asymmetric funnel which indicate publication bias. Heterogeneity was assessed by Cochran's Q X^2 test (p-value ≤ 0.05) and I^2 statistics (reference value > 80%).[39] The data was analyzed using "metaphor" packages in R software version 3.2.1 for Window.

Data synthesis and reporting

We analyzed the data in two groups of outcome measurements: TIBF and EBF. Results for each variable were shown using forest plots. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline was strictly followed (Supplementary file 3).

Minor post hoc protocol changes

Before analysis was done, we made the following changes to our methods from the published protocol. We added the Joanna Briggs Institute (JBI) tool to extract the data. In addition, we used Duval and Tweedie trim-and-fill method to manage publication bias.

Result

Search results

We obtained 169 articles from PubMed, 24 from EMBASE, 200 from Web of Science, 85 from SCOPUS and 5 from other (CINHAL and WHO Global Health Library) electronic database searching. Forty-eight additional articles were found through a manual search of reference lists of included articles. After removing duplicates and screening of titles and abstracts, full-text of 82 studies were reviewed to assess eligibility. Forty-five articles were excluded after a full-text review due to several reasons: 19 studies on complementary feeding, 3 on pre-lacteal feeding, 3 on malnutrition, 19 with different variables of interest and one project review report. As a result, 37 articles (i.e., 14 studies on timely initiation of breastfeeding and 23 on exclusive breastfeeding) fulfilled the inclusion criteria and were included in the meta-analyses. The PRISMA flow diagram of literature screening and selection process is shown in figure 1.

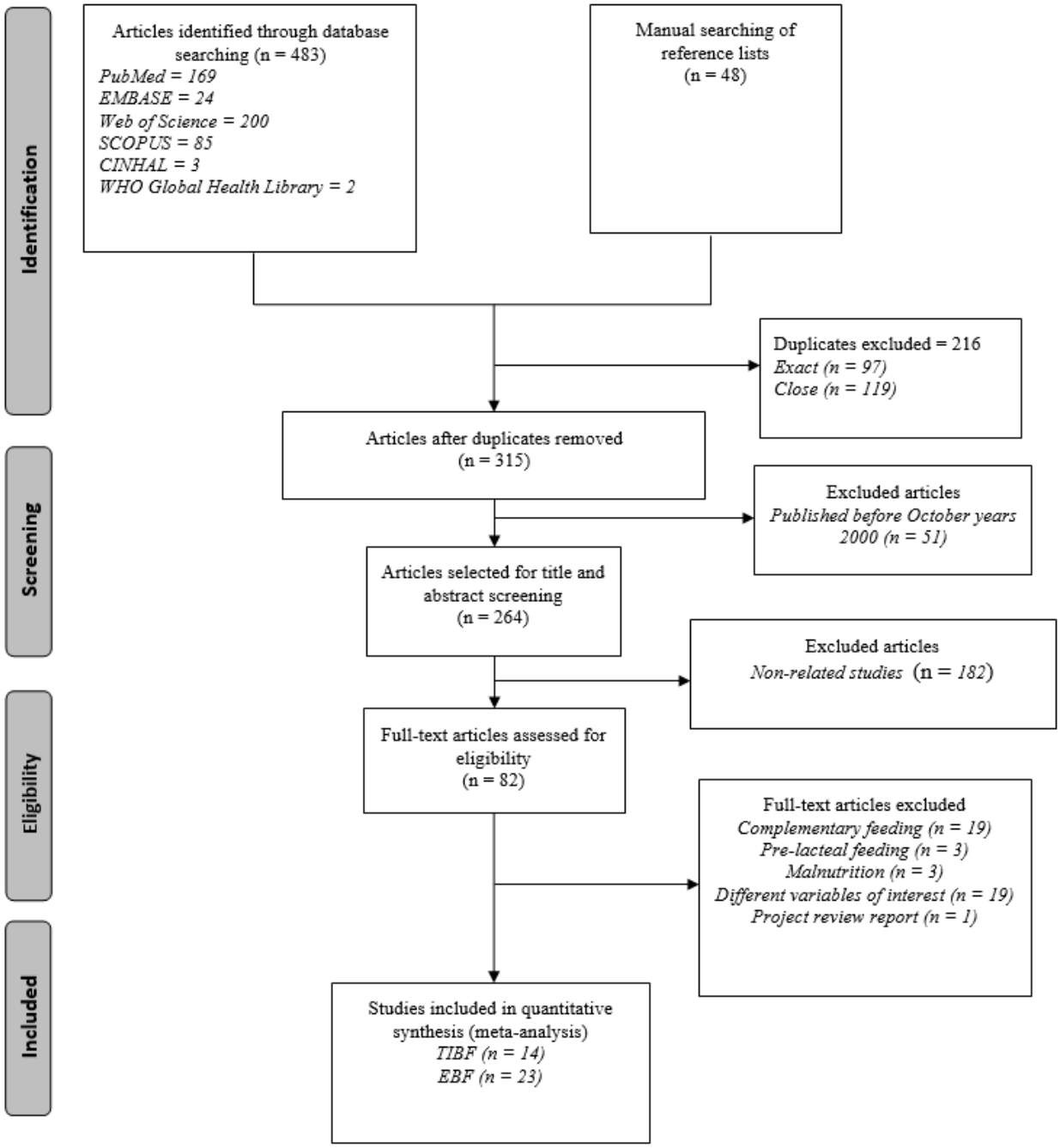

Figure 1: PRISMA flow diagram of literature screening and selection process; "n" in each stage represents the total number of studies that fulfilled a particular criterion.

Study characteristics

Of these 14 studies on TIBF, most studies were conducted in Southern Nations Nationalities and People (SNNPR) region and Oromia region. Regarding maternal/caregiver's residence, six and three studies conducted in urban and rural dwellers respectively (Table 1).

Table 1: Characteristics of studies included on TIBF

Author/publication year	Study area (Region and place)	Study method/design	Study population	Calculated Sample size/Participated	Factors	Breastfeeding initiation (outcome)		
						Within 1 hour	After 1 hour	Total
Maternal/Caregiver's age versus timely initiation of breastfeeding								
Wolde et.al. 2014	Oromia, Nekemte twon	Cross-sectional	Mothers who had child less than 24 month	182/174	<25 years	43	5	48
					≥25 years	111	15	126
					Total	154	20	174
Woldemichael et.al. 2016	Oromia, Tiyo Woreda	Cross-sectional study	mothers who have children Less Than One Year Age	386/373	<25 years	83	39	122
					≥25 years	168	83	251
					Total	251	122	373
Adugna et.al 2014	SNNPR, Arba Minch Zuria	cross-sectional study	Women who had children under two years	384/383	<25 years	181	132	313
					≥25 years	38	32	70
					Total	219	164	383
Beyene et.al 2017	SNNPR, Dale Woreda	Cross-sectional study	mothers of children under 24 months	634/ 634	<25 years	180	49	229
					≥25 years	337	52	389
					Total	517	101	618
Alemayehu et.al 2014	Tigray, Axum town	cross sectional study	mothers who had children aged 6-12 months	418/418	<25 years	75	49	124
					≥25 years	169	125	294
					Total	244	174	418
Berhe et.al 2013	Tigray, Mekelle town	Cross-sectional study	mothers of children aged 0 to 24 months	361/361	<25 years	120	27	147
					≥25 years	158	52	210
					Total	278	79	357
Setegn et.al 2011	Oromia, Goba district	cross sectional study	mothers with children (< 12 months	668/ 608	<25 years	107	108	215
					≥25 years	207	177	384
					Total	314	285	599
Tamiru et.al 2015	SNNPR, Arba Minch Zuria Woreda	cross-sectional study	mothers of infants aged two years and younger	384/384	<25 years	150	109	259
					≥25 years	70	54	124
					Total	220	163	383
Regassa 2014	SNNPR, Sidama zone	Cross-sectional study	with infants aged between 0 and 6 months old	1100/ 1094	<25 years	354	77	431
					≥25 years	522	141	663
					Total	876	218	1094
Ekubay et al 2018	Addis Ababa Town	Cross-sectional study	mothers with infants younger than or equal to six months of age	597/583	<25 years	134	94	228
					≥25 years	195	141	336
					Total	329	235	564
Discarding colostrum versus timely initiation of breastfeeding								
Wolde et.al. 2014	Oromia, Nekemte town	Cross-sectional study	mothers who had child less than 24 month	182/174	Discarding	10	3	13
					No	144	17	161
					Total	154	20	174
Adugna et.al. 2014	SNNPR, Hawassa city	Cross-sectional	Mothers with infants aged 0–6 months	541/529	Discarding	21	21	42
					No	198	143	341

		study			Total	219	164	383
Hailemariam et.al. 2015	Oromia, East Wollega zone	cross-sectional study	Mothers who had children less than 24 months	594/593	Discarding	30	15	45
					No	443	81	524
					Total	473	96	569
Tewabe 2016	Amhara, Motta town	cross-sectional study	mothers with infant less than six month old	423/405	Discarding	49	33	82
					No	270	53	323
					Total	319	86	405
Tilahun et.al. 2016	Amhara, Debre Berhan town	cross sectional study	mothers who had children less than six months of age	416/ 409	Discarding	15	46	61
					No	241	91	332
					Total	256	137	393
Liben and Yesuf 2016	Afar, Amibara district	Cross-sectional study	mothers of children aged less than 24 months	407/ 403	Discarding	83	142	225
					No	68	88	156
					Total	151	230	381

Majority of studies on EBF were done in Amhara, SNNP and Oromia regions with 7, 6 and 3 studies respectively. Likewise, nine and seven studies conducted in urban and rural dwellers respectively. Furthermore, two studies used a nationally representative data of Ethiopian Demographic and Health Survey (EDHS) (Table 2).

Table 2: Characteristics of studies included on EBF

Author/publication year	Study area (Region and place)	Study method/design	Study population	Calculated Sample size/Participated	Factors	Exclusive breastfeeding		
						Yes	No	Total
Maternal/Caregiver's age versus exclusive breastfeeding								
Abera 2012	Harari, Harar twon	Cross-sectional study	Mothers of children aged less than two years	604/583	<25 years	49	31	80
					≥25 years	158	161	319
					Total	207	192	399
Getahun et.al. 2017	SNNPR, Kemba Woreda	Cross-sectional study	Mothers who have children from 6 months to 2 years age	567/562	<25 years	134	105	239
					≥25 years	200	123	323
					Total	334	228	562
Asfaw et.al. 2015	Amhara, Debre Berhan District	Cross sectional study	Mothers with their index infant aged under 12 months	634/ 634	<25 years	47	61	108
					≥25 years	388	138	526
					Total	435	199	634
Gizaw et.al. 2017	Afar, Hadaleala district	Cross-sectional study	Mothers who have children aged between 6 and 24 months	258/ 254	<25 years	56	23	79
					≥25 years	132	43	175
					Total	188	66	254
Hunegnaw et.al. 2017	Amhara, Gozamin district	Cross-sectional study	Mothers who had Infants aged between 6 and 12 months	506/478	<25 years	72	26	98
					≥25 years	286	104	390
					Total	358	130	488
Lenja et.al. 2016	SNNPR, Offa district	Cross-sectional study	Mothers of infants younger than 6 months	403/396	<25 years	96	22	118
					≥25 years	213	65	278
					Total	309	87	396
Setegn et.al. 2012	Oromia, Bale Zone, Goba	Cross-sectional	Mothers-infant pairs	668/608	<25 years	79	27	106
					≥25 years	120	53	173

	district	study			Total	199	80	279
Sonko et.al. 2015	SNNPR, Halaba special woreda	Cross-sectional study	Mothers With children less than six months of age	422/420	<25 years	56	24	80
					≥25 years	240	100	340
					Total	296	124	420
Regassa. 2014	SNNPR, Sidama zone	Cross-sectional study	with infants aged between 0 and 6 months old	1100/ 1094	<25 years	78	14	92
					≥25 years	120	22	142
					Total	198	36	234
Alemayehu et.al. 2014	Tigray, Axum town	cross sectional study	mothers who had children aged 6-12 months	418/418	<25 years	46	78	124
					≥25 years	125	169	294
					Total	171	247	418
Berhe et.al. 2013	Tigray, Mekelle town	Cross-sectional study	mothers of children aged 0 to 24 months	361/361	<25 years	54	32	86
					≥25 years	56	39	95
					Total	110	71	181
Teka et al. 2015	Tigray, Enderta Woreda	Cross-sectional study	Mothers having children aged less than 24 months	541/530	<25 years	139	52	191
					≥25 years	233	106	339
					Total	372	158	530
Newborn age versus exclusive breastfeeding								
Arage et.al. 2016	Amhara, Debre Tabor Town	Cross-sectional study	Mothers of Infants Less Than Six Months of Age	470/453	≤3 months	201	80	281
					>3 months	96	72	168
					Total	297	152	449
Alemayehu et.al. 2009	9 regions, National	Health and demographic survey	Women with infants Less than six months of age	14,500 /1142	≤3 months	682	1335	2017
					>3 months	326	683	1009
					Total	1008	2018	3026
Asemahagn. 2016	Amhara, Azezo district	Cross-sectional study	Women having children aged from 0–6 months	346/ 332	≤3 months	129	22	151
					>3 months	133	48	181
					Total	262	70	332
Liben et.al. 2016	Afar, Dubti town	Cross-sectional study	Mothers of infants aged less than 6 months	346/333	≤3 months	199	36	235
					>3 months	71	27	98
					Total	270	63	333
Seid et.al. 2013	Amhara, Bahir Dar city	Cross-sectional study	Mothers who Delivered in the last 12 months	819/819	≤3 months	103	91	194
					>3 months	300	366	666
					Total	403	457	860
Setegn et.al. 2012	Oromia, Bale Zone, Goba district	Cross-sectional study	Mothers-infant pairs	668/608	≤3 months	122	27	149
					>3 months	61	33	94
					Total	183	60	243
Sonko et.al. 2015	SNNPR, Halaba special woreda	Cross-sectional study	Mothers With children less than six months of age	422/420	≤3 months	121	43	164
					>3 months	175	81	256
					Total	296	124	420
Tadesse et.al. 2016	SNNPR, Sorro District	Cross-sectional Study	Mothers With infants aged of 0–5 months	602/ 579	≤3 months	214	129	343
					>3 months	56	115	171
					Total	270	244	514
Tewabe et.al. 2017	Amhara, Motta town, East Gojjam zone	Cross-sectional Study	Mothers with infant less than six Months old	423/405	≤3 months	106	68	174
					>3 months	97	134	231
					Total	203	202	405
Berhe et.al. 2013	Tigray, Mekelle town	Cross-sectional study	mothers of children aged 0 to 24 months	361/361	≤3 months	96	51	147
					>3 months	14	20	34
					Total	110	71	181
Discarding colostrum versus exclusive breastfeeding								
Arage et.al 2016	Amhara, Debre Tabor Town	Cross-sectional	Mothers of Infants Less Than Six Months of Age	470/453	Discarding	7	5	12
					No	361	280	641

		study			Total	368	285	653
Egata et.al. 2013	Oromia, Kersa district	Cross-sectional study (DHS based)	Mothers of children under-two years of age	881/860	Discarding	44	29	73
					No	573	214	787
					Total	617	243	860
Lenja et.al. 2016	SNNPR, Offa district	Cross-sectional study	Mothers of infants younger than 6 months	403/396	Discarding	53	33	86
					No	256	49	305
					Total	309	82	391
Liben et.al. 2016	Afar, Dubti town	Cross-sectional study	Mothers of infants aged less than 6 months	346/333	Discarding	33	19	52
					No	237	44	281
					Total	270	63	333
Mekuria et.al. 2015	Amhara, Debre Markos	Cross-sectional study	Mothers who had an infant Less than six months old	423/413	Discarding	83	71	154
					No	168	91	259
					Total	251	162	413
Seid et.al. 2013	Amhara, Bahir Dar city	Cross-sectional study	Mothers who Delivered in the last 12 months	819/819	Discarding	56	80	136
					No	356	323	679
					Total	412	403	815
Tadesse et.al. 2016	SNNPR, Sorro District	Cross-sectional Study	Mothers With infants aged of 0–5 months	602/ 579	Discarding	68	101	169
					No	202	143	345
					Total	270	244	514
Tewabe et.al. 2017	Amhara, Motta town, East Gojjam zone	Cross-sectional Study	Mothers with infant less than six Months old	423/405	Discarding	18	64	82
					No	185	138	323
					Total	203	202	405
Tamiru et.al. 2012	Oromia, Jimma Arjo Woreda	Cross-sectional study	Mothers of index children aged 0 to 6 months	384/ 382	Discarding	61	42	103
					No	122	157	279
					Total	183	199	382
Tamiru et.al. 2015	SNNPR, Arba Minch Zuria Woreda	cross-sectional study	mothers of infants aged two years and younger	384/384	Discarding	23	19	42
					No	232	110	342
					Total	255	129	384
Alemayehu et.al. 2014	Tigray, Axum town	cross sectional study	mothers who had children aged 6-12 months	418/418	Discarding	49	118	167
					No	122	66	188
					Total	171	184	355
Teka et al. 2015	Tigray, Enderta Woreda	Cross-sectional study	Mothers having children aged less than 24 months	541/530	Discarding	350	141	491
					No	22	17	39
					Total	372	158	530

Timely initiation of breastfeeding (TIBF)

Among 14 studies, 10 studies[46-55] reported the association between TIBF and maternal/caregiver's age in 4,963 mothers. The pooled odds ratio (OR) of maternal/caregiver's age was 0.98 (95% CI 0.83 - 1.15, p = 0.78) (figure 2). Although not statistically significant, mothers ≥ 25 years old age had 2% lower chance of initiating breastfeeding within one hour compared to their younger counterparts. Egger's regression test for funnel plot asymmetry was not significant (z = -0.40, p = 0.69).

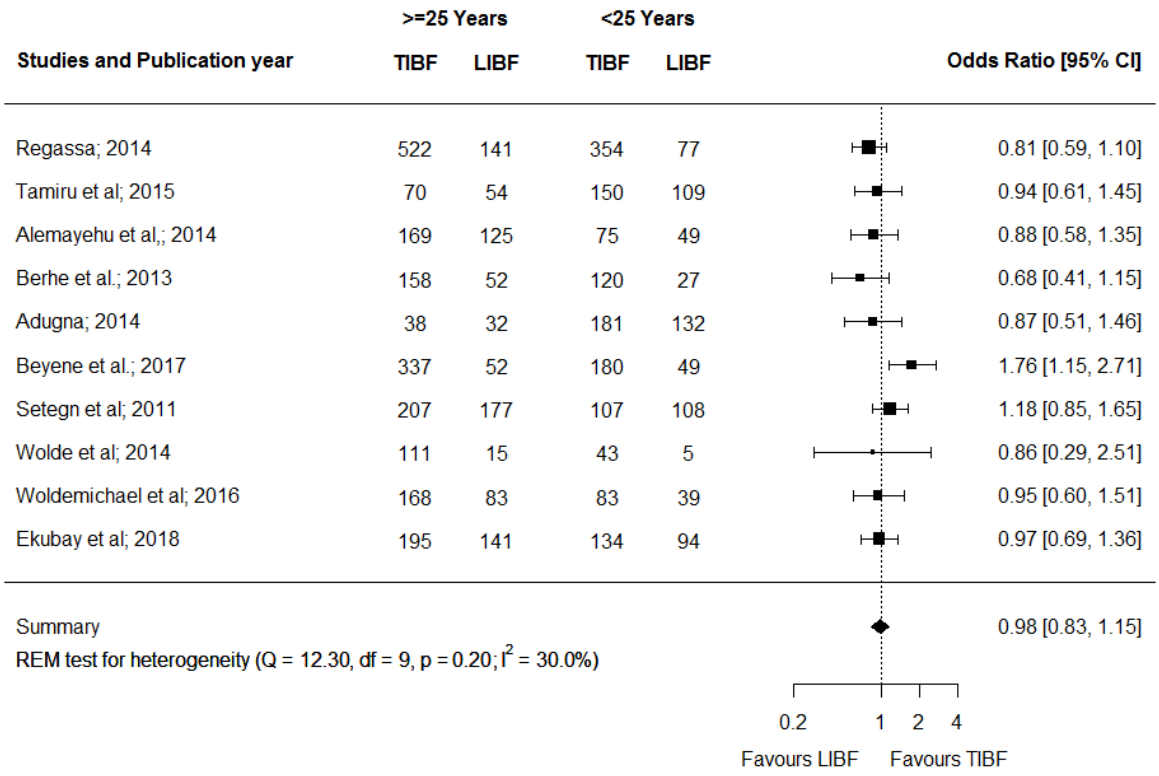

Figure 2:Forest plot of the unadjusted odds ratios with corresponding 95% CIs of studies on the association of maternal/caregiver's age and TIBF. The horizontal line represents the confidence interval, the box and its size in the middle of the horizontal line represent the weight of sample size. The polygon represents the pooled odds ratio. TIBF = timely initiation of breastfeeding; LIBF = late initiation of breastfeeding; REM = random-effects model.

Likewise, 6 out of 14 studies reported the association between TIBF and colostrum discarding in 2,305 mothers [46, 48, 56-59]. The pooled OR of colostrum discarding was found to be 0.38 (95% CI 0.21 – 0.68, p = 0.001) (figure 3). Compared to mothers who feed colostrum, mothers who discard colostrum had 62% significantly lower chance of initiating breastfeeding within one hour. Egger's regression test for funnel plot asymmetry was not significant (z = -0.24, p = 0.81).

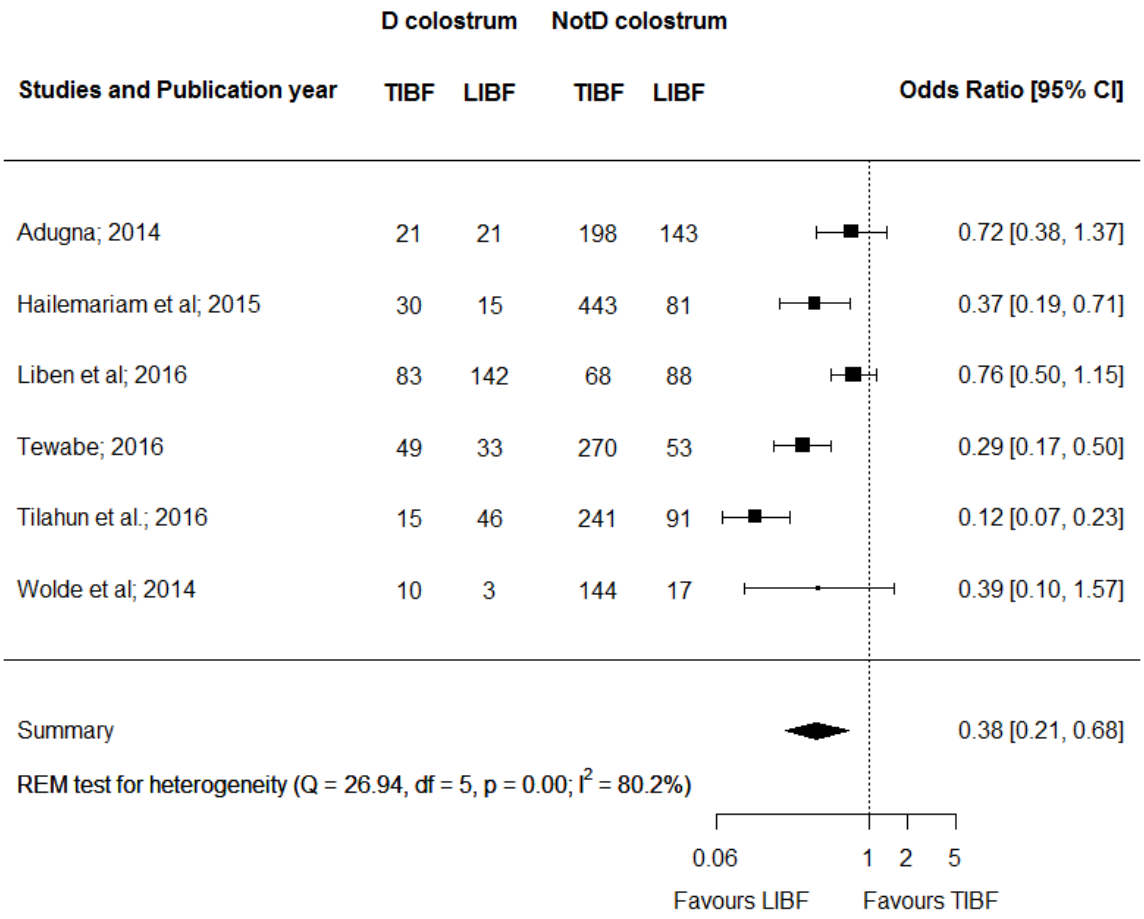

Figure 3: Forest plot of the unadjusted odds ratios with corresponding 95% CIs of studies on the association of colostrum discarding and TIBF. The horizontal line represents the confidence interval, the box and its size in the middle of the horizontal line represent the weight of sample size. The polygon represents the pooled odds ratio. TIBF = timely initiation of breastfeeding; LIBF = late initiation of breastfeeding; REM = random-effects model; D=Discarding; NotD = Not discarding.

Exclusive breastfeeding

Twelve studies[50, 51, 54, 60-68] involving 4,929 individuals reported the association between EBF and maternal/caregiver's age. As showed in figure 4, the pooled OR of maternal/caregiver's age was 1.07 (95% CI 0.81 - 1.40, p = 0.63). Mothers ≥ 25 years old age had 7% higher chance of exclusively breastfeeding during the first six months compared to mothers <25 years old;

however, it was not statistically significant. Egger's regression test for funnel plot asymmetry was not significant (z = -0.99, p = 0.32).

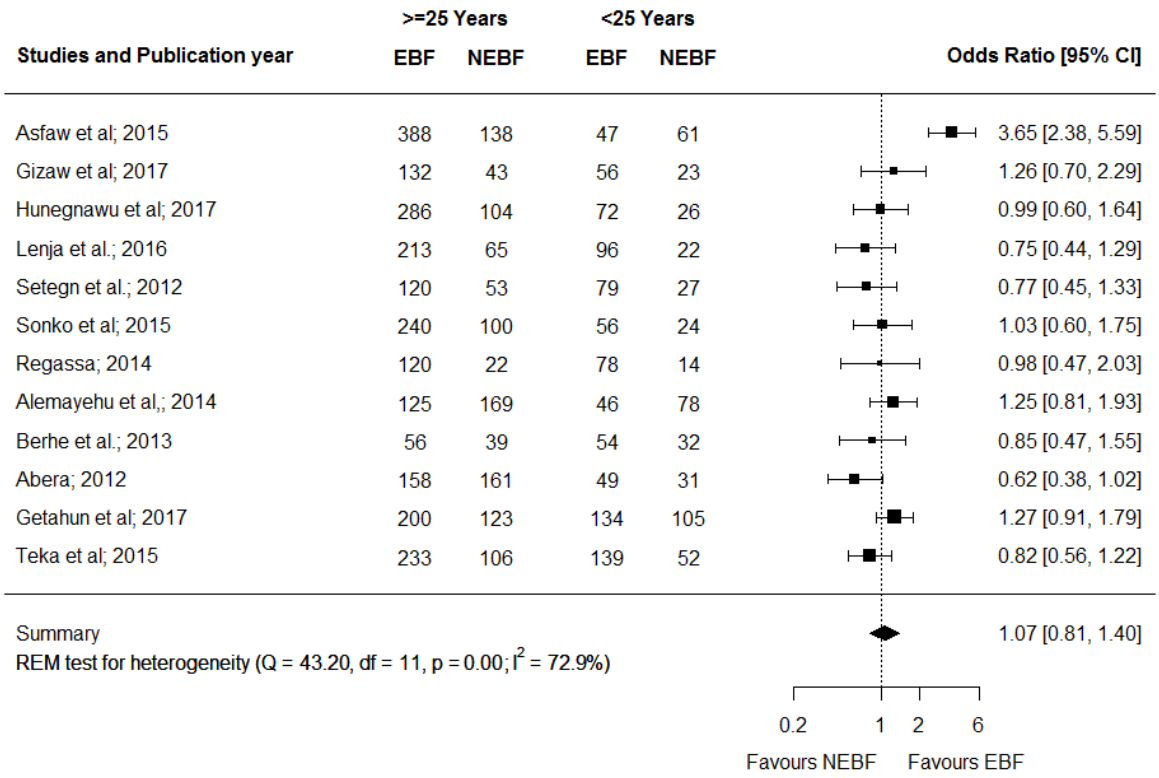

Figure 4: Forest plot of the unadjusted odds ratios with corresponding 95% CIs of studies on the association of maternal/caregiver's age and EBF. The horizontal line represents the confidence interval, the box and its size in the middle of the horizontal line represent the weight of sample size. The polygon represents the pooled odds ratio. EBF = Exclusive breastfeeding; NEBF = Non-exclusive of breastfeeding; REM = random-effects model.

In addition, ten[51, 65, 66, 69-75] out of 23 studies reported the association between EBF and infant age with a total sample of 6,763 mothers. The pooled OR of infant age was 1.86 (95% CI 1.45 - 2.39, p <0.001) (figure 5). Children ≤3 months old had 86% statistically significant higher chance of being exclusively breastfed compared to children older than 3 months. Egger's regression test for funnel plot asymmetry was not significant (z = 2.31, p = 0.02).

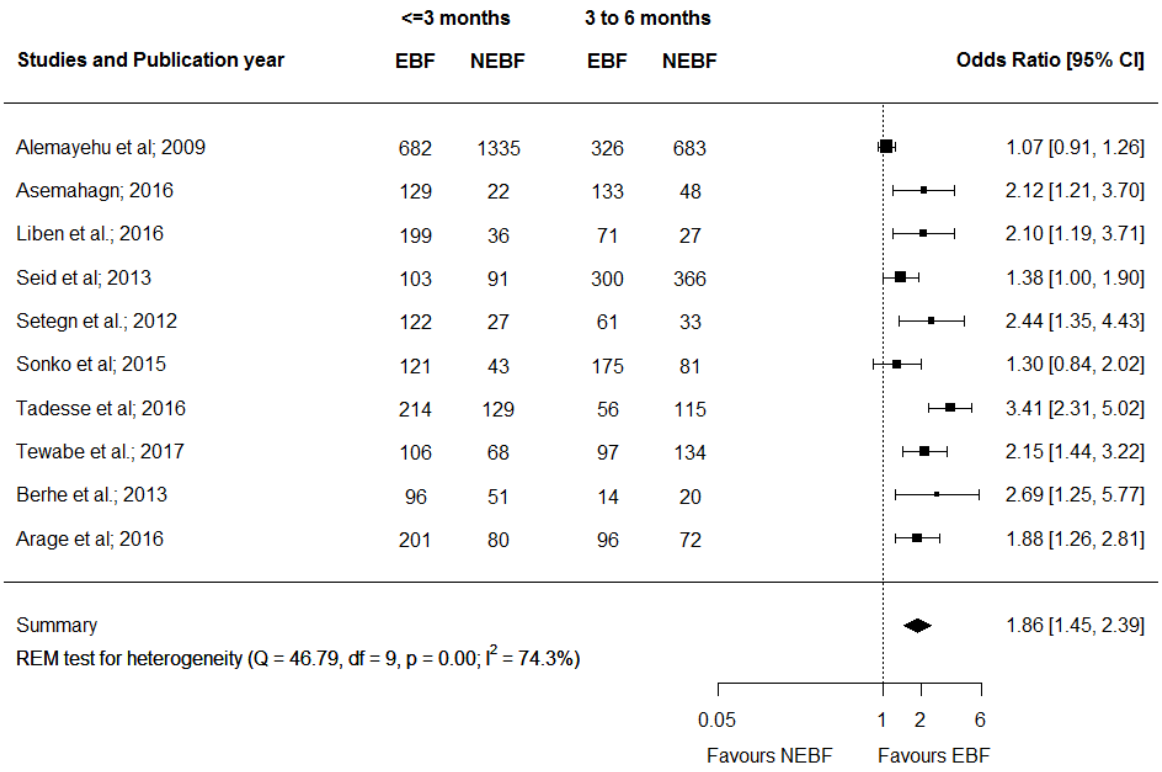

Figure 5: Forest plot of the unadjusted odds ratios with corresponding 95% CIs of studies on the association of infant age and EBF. The horizontal line represents the confidence interval, the box and its size in the middle of the horizontal line represent the weight of sample size. The polygon represents the pooled odds ratio. EBF=Exclusive breastfeeding; NEBF=Non-exclusive of breastfeeding; REM=random effects model.

Finally, 12 studies[50, 53, 64, 68, 71-78] reported the association between EBF and colostrum discarding with a sample of 6,035 mothers. As indicated in figure 6, the pooled OR of colostrum discarding was 0.56 (95% CI 0.37 - 0.84, p = 0.005). Mothers who discard colostrum had 44% statistically significant lower chance of exclusively breastfeeding during the first 6 months compared to mothers who feed colostrum. Egger's regression test for funnel plot asymmetry was not significant (z = 0.68, p = 0.49).

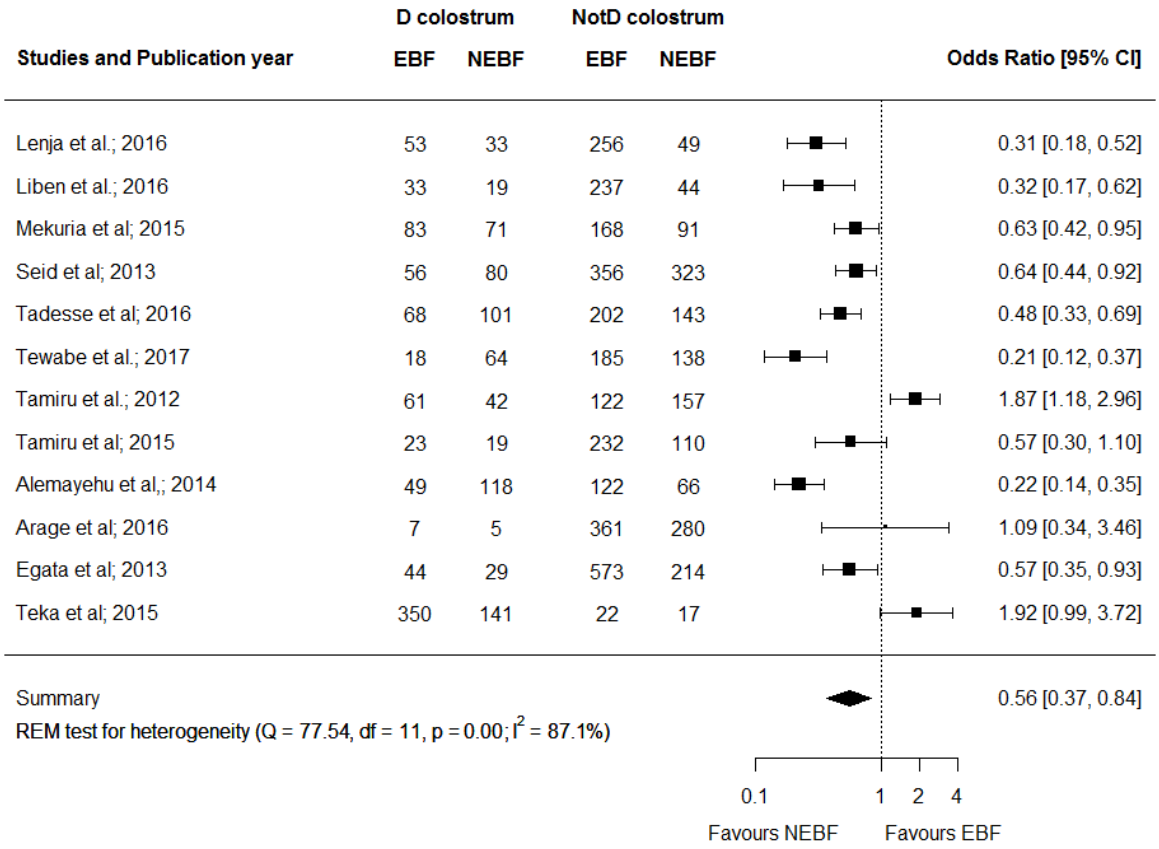

Figure 6: Forest plot of the unadjusted odds ratios with corresponding 95% CIs of studies on the association of discarding colostrum and EBF. The horizontal line represents the confidence interval, the box and its size in the middle of the horizontal line represent the weight of sample size. The polygon represents the pooled odds ratio. EBF = Exclusive breastfeeding; NEBF = Non-exclusive breastfeeding; REM = random-effects model; D = Discarding; NotD = Not discarding.

Discussion

This study examined the associations of TIBF and EBF with colostrum discarding, maternal/caregiver's age and infant age. To our knowledge, this is the first systematic review and meta-analyses in this topic to-date in Ethiopia. This meta-analysis uncovered colostrum discarding was significantly associated with TIBF but not maternal/caregiver's age. On the other hand, colostrum discarding and infant age was found to be significantly associated with EBF but not maternal/caregiver's age.

We found that colostrum discarding was significantly associated with TIBF. Mothers who discard colostrum had 62% significantly lower chance of initiating breastfeeding within one hour compared to mothers who feed colostrum to their child. This may be explained by the attempt of discard colostrum to get white milk may take time which therefore results in a delayed initiation of breastfeeding.

In the present meta-analysis, we found a statistically significant association between EBF and infant age. This finding confirmed our hypothesis and consistent with a large body of evidence showing that increased infant age is negatively associated with exclusive breastfeeding.[18, 20, 23, 24, 79, 80] This may be due to the fact that giving traditional post-partum care and support is common in Ethiopia immediately after birth which may create opportunity for the mother to exclusively breastfeed the child. Since, this traditional post-partum care and support decreases as the age of the infant increases, it may lead the mother to work outside. This may therefore force the mother to stop EBF. Evidenced worldwide also agreed on the point that presence of social support is associated with better breastfeeding outcome.[81-83] Another possible reason is the workload and short maternity leave in Ethiopia, which is only two months post-partum until recently, may influence the mother to withdraw EBF early. This hypothesis was supported by our previous meta-analyses whereby maternal employment significantly lower EBF and other studies.[83, 84] Moreover, this could also be related to the short birth interval in Ethiopia.

We noted that colostrum discarding significantly associated with EBF. The finding was in line with studies conducted in Nepal [85] and Laos.[86] This may be due to the fact that discarding colostrum leading to pre-lacteal feeding. In agreement with recent studies,[87-92] maternal/caregiver's age was not significantly associated with either EBF or TIBF. This is against our hypothesis and disproves the notion that older mothers have better breastfeeding

experience than young mothers that helps them to practice optimal TIBF and EBF. However, there is robust evidence that supported all reproductive age group mothers can maintain optimal TIBF and EBF equally.[24, 84, 93] Therefore, the discrepancy may be due to the following reasons: (1) most studies used maternal age rather than age at first birth; (2) different studies have used different age categories; and (3) breastfeeding is not age dependent or can be confounded by innate maternal behavior.

This meta-analyses study has several implications. It provided evidence on breastfeeding practice and its associated factors in an Ethiopian context, which can be useful for cross-country / cross-cultural comparison and for breastfeeding improvement initiative in Ethiopia. The present study provides an overview of up-to-date evidence for nutritionist and public health professionals. The findings also indicate emphasis should be given for all age group of mothers/caregivers during breastfeeding intervention. Furthermore, this study points out colostrum discarding and associated believes should be considered during designing breastfeeding interventions.

The association was estimated in large sample size and recent and nationally representative studies were included. In addition, this systematic review and meta-analysis was conducted based on a registered and published protocol, and guidelines for the Meta-analysis of Observational Studies in Epidemiology (MOOSE) was strictly followed. This study has also several limitations. First, some studies were excluded because of the difference in age category. Second, almost all included studies were observational which hinder causality inference. Third, even though we have used broad search strategies, the possibility of missing relevant studies cannot be fully exempted. Fourth, based on the conventional methods of statistical testing, a few analyses suffer from high levels of between-study heterogeneity. The course of heterogeneity was carefully explored and may be due to difference of study area; therefore, the result should be interpreted with caution.

In conclusion, colostrum discarding was a possible barrier for both TIBF and EBF. Additionally, increased infant age were found to be a risk factor for non EBF. However, maternal/caregiver's age was not a determinant factor for both TIBF and EBF. Interventions targeted on increasing the rate of TIBF and EBF should give special focus on colostrum discarding and associated beliefs. In addition, future research should be required to identify other factors affecting duration of EBF in Ethiopia. Further investigation is also required to assess the effect of age at first birth.

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