Prevalence of long-acting reversible contraceptive uses and predictors among Ethiopian women over the past five years. A systematic review and meta-analysis

Dereje Lemma Dube (✉ lemma.dereje@yahoo.com)

Ambo university

Shimekit Yilma

Ambo University

Legese Chelkeba

Addis Ababa University

Systematic Review

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Abstract

Objective

LARCs are a type of long-acting reversible contraception that is both safe and cost-effective for women. The aim of this review was to determine the pooled prevalence of LARC users and associated factors among Ethiopian women over the last five years.

Study design

: We searched Pub Med, Scopus, Science Direct, Web of Science, and Google Scholar on data published between 2017 to February 2021. The I² index was used to measure heterogeneity between studies and subgroup analysis and leave one sensitivity analysis to determine possible causes of heterogeneity

Results

Among 440 studies identified, 75 were selected for a full review, and 27 met the inclusion criteria. Long-acting reversible contraceptives (LARCs) users were detected in 3,588 of the 12,741 women studied, yielding a 29% overall prevalence (95% CI: 13-20%). Previous use of LARC was associated with being four times ($P=0.001$, 95% CI 2.55-4.57) more likely to use LARCs, women with a positive attitude towards birth control ($P=0.001$, 95% CI 1.5-2.3), and good knowledge ($p=0.001$, 95% CI 1.16-1.98) were two times more likely to use LARC.

Conclusion

prevalence of LARC was low among Ethiopian women, and knowledge, attitude, and previous use of LARC affects its prevalence

Introduction

Higher maternal mortality, total fertility, and population growth rates, as well as an unmet need for family planning, were all indicators of significant population growth and reproductive health issues in Sub-Saharan Africa, including Ethiopia. There was a larger proportion of unmet family planning needs in several Sub-Saharan African nations, particularly for long-acting methods(1, 2). Simply by lowering the incidence of unwanted births, increasing contraceptive usage in poorer nations has reduced maternal mortality by 40% in the last 20 years (3). Increased contraceptive usage has decreased the maternal mortality ratio—the risk of maternal death per 100 000 live births—by around 26% in just over a decade by avoiding high-risk pregnancies, notably among women of high parities, and those that would have resulted in unsafe abortion.

Contraception has become an essential component in the lives of women of reproductive age since it avoids the depletion of maternal nutritional reserves and lowers the risk of anaemia caused by many pregnancies and deliveries(4).LARCs are a type of long-acting reversible contraception that is both safe and cost-effective for women who want to postpone or restrict their pregnancies but do not need daily user compliance. The intrauterine device (IUD) and hormonal implants are both convenient for users and successful in preventing

pregnancy.(5, 6). Long-acting reversible family planning methods offer women continuous protection for 3 to 12 years and are by far the most successful (99% or higher) and highly safe. They are also cost-effective for programs over time, may save governments a lot of money, and directly contribute to national and international health goals (7)and are the most effective (between 3 and 60 times more effective than short-acting methods during a year of average usage) and need little activity from the client (7). Despite these benefits, they are typically difficult to get for customers and are not as extensively utilized as other methods, particularly in Africa(8).Ethiopia's Federal Ministry of Health established a health-sector transformation strategy, promising to use LARC procedures 40 percent of the time by 2020(9).

To the best of our knowledge, the prevalence of LARC use among Ethiopian women over the last five years not reviewed and the result of this review might provide essential information for the governmental sector, policy maker, public health educator and clinicians. Therefore, this review aimed at presenting a comprehensive data on overall prevalence and predictors of LARC users among women in Ethiopia for the past five years.

Methods

Search strategy and Reporting

We conducted a search for all peer-reviewed published articles on prevalence of LARCs use and predictors among Ethiopian women using PubMed, Science Direct, Scopus, Web of Science, and Google Scholar databases from December 2017 to May 2021. A combination of Medical Subject Headings or key search terms included: LARC AND Ethiopia AND prevalence, modern contraceptives AND Ethiopia, LARC AND Ethiopia AND associated factors, LARC AND risk factors AND Ethiopia, LARC AND associated factors AND Ethiopia, LARC AND Ethiopia AND risk factors OR associated factors to find relevant original papers in Pub Med, we employed medical topic headings (Mesh words). Three authors (DL, SHY, and LCH) conducted the review and the most relevant papers were chosen based on established inclusion and exclusion criteria. The final author double-checked the consistency of the search method, research selection, and inclusion and exclusion criteria. These systematic reviews and meta-analyses followed the PRISMA 20 (Preferred Reporting Items for Systematic Reviews and Meta-analysis) standard(10).

INCLUSION AND EXCLUSION CRITERIA

Original Ethiopian researches were included in this comprehensive review and meta-analysis, but comments, editorials, case reports, and reviews were not. Articles were considered if they calculated the proportion/prevalence and/or risk factors/ associated factors or determinants of LARC among women in Ethiopia over the past five years, omitting those published papers didn't determine prevalence or proportion of LARC or if the language of publication wasn't English or if the publication was before 2017.

DATA EXTRACTION

Data abstraction was conducted by two writers (DL, SHY) utilizing an excel spread sheet form. Using inclusion criteria, these authors separately assessed titles, abstracts, full-text publications, and abstracted data. Discrepancies between the two authors who largely abstracted the data were arbitrated by the third author (LCH). The following parameters were extracted from each study: the name of first author, year of publication, regions, study settings and design, age, the type of study, risk factors or associated factors, the number of

women who participated in the study, the number of women used LARC, the prevalence/proportion of women used LARC, number and percentage of women used Implanon, IUCD, and Jadelle.

STATISTICAL ANALYSIS

We used forest plots to estimate the pooled impact size and effect of each review, as well as their confidence intervals, to provide a visual overview of the data (CI). A random-effect model was used in this meta-analysis due to the anticipated heterogeneity. To indicate statistical heterogeneity among studies, the p value, Cochrane test (Q-test), and I^2 were employed, with p-values of 0.05 and I^2 values of 0, 25, 50, and 75 percent indicating no, low, moderate, and high heterogeneity, respectively. We used Egger's regression test as well as visual assessment for plot symmetry to conduct a quantitative analysis of the possibility of publication bias. We also performed subgroup analyses based on types of LARC and regional states of the country. We also did sensitivity test by leave-one sensitivity analysis utilizing sample size, study setting, and study area as covariates, as well as determining variables linked to LARC usage. All mentioned p-values were two-sided and statistically significant when $p < 0.05$.

Results

Literature identification and Descriptions of studies

Two hundred duplicates were discovered after examining the titles and abstracts of the 440 papers found. We also excluded 80 studies because they failed to mention LARC in Ethiopia. A total of 160 studies were evaluated based on their themes and abstracts; with 60 being removed since they were presented in mixed method (includes all modern contraception). Finally, the full text of the remaining 75 publications was downloaded and extensively checked to confirm that they complied with all of the criteria for inclusion. We also eliminated 35 articles because they were published before 2017, ten publications because they didn't reflect the prevalence of LARC, and three publications because they reported the rationale for implanon early termination. Finally, twenty-seven studies met the review's inclusion criteria (11-37) (Figure1).

Fourteen studies were conducted at health facilities (11, 12, 14, 15, 20, 22, 23, 26, 29-31, 34, 35, 37), while thirteen studies were conducted at the community level (13, 16-19, 21, 24, 25, 27, 28, 32, 33, 36) and all of the studies were cross sectional in design (11-37). The studies included our review were published between 2017 and 2021 (11-37).

The study subjects in twenty-four investigations were women of reproductive age ((11, 13-16, 18-33, 35-37), three were about postpartum women (12, 28, 34), one study was about HIV/AIDS-positive women of reproductive age (20), and one study was about female health professionals of reproductive age (15). The average age of study participants was ranged from 25 (33) to 36 (37) years old, with a range of 15-49 years (17, 19). Six studies were done in the Oromia region (12, 19, 23, 24, 29, 31), nine studies in the Amhara region (13-15, 17, 20, 21, 26, 35, 37) and nine studies in SNNP region (16, 18, 19, 22, 27, 28, 33, 34, 36), and one study each in the Afar region (11), Harari region (30), and Addis Ababa city administration (32). Sample size of included studies ranges from 262 (27) to 731 (36) and prevalence of LARC users among Ethiopian women over the last five years ranges from 12.6% (21) to 53.2% (12). Twenty-four studies (13-15, 17, 19-37) report IUCD and implanon prevalence, with just

one study reporting Jadelle prevalence in addition to IUCD and implanon(12) . Twenty-six studies were carried out in urban (11-34, 36, 37),while only one study was carried out in rural areas(35) (Table1).

Table1. Characteristics of studies included in systematic review and meta-analysis

Author	Year of publication	Region	Study design and setting Facility based cross sectional Community based cross sectional Facility based cross sectional Community based cross sectional	Study Subject	Age (mean/ range)	Sample size(N)	Sample size(n)	Prevalence of LARC(%)
Tebeje (31)	2017	Oromia	Facility based cross sectional Community based cross sectional	Women of reproductive age	15-49	422	97	22.9
Mesfin (28)	2021	SNNP	Facility based cross sectional	Post partum women	28.2	416	94	22.6
Shiferaw (30)	2017	Harar	Facility based cross sectional	Women of reproductive age	26.7	402	153	38
Wariyo (12)	2019	Oromia	Facility based cross sectional	Post partum women	27	393	209	53.2
Woldu (34)	2020	SNNP	Facility based cross sectional Community based cross sectional	Post partum women Women of reproductive age	27	381	139	36.5
Biza(17)	2017	Amhara	Facility based cross sectional	Women of reproductive age	15-49	381	111	29.1
Gujo(22)	2021	SNNP	Cross sectional Community based cross sectional	Women of reproductive age	27.1	376	142	37.8
Halil(25)	2020	SNNP	Facility based cross sectional	Women of reproductive age	28.8	528	97	18.3
Mohammad(29)	2017	Oromia	sectional		25.91	644	180	27.9
Fekadu (19)	2017	Oromia	Community based	Women of reproductive	15-49	693	210	30.3

Participant ID	Year	Region	Facility based cross sectional	Women of reproductive age				
Asteray (14)	2019	Amhara	Facility based cross sectional	Women of reproductive age	26	359	66	18.4
Abdu(11)	2019	Afar	Community based cross sectional	Women of reproductive age	26.71	524	175	33.4
Asirat (27)	2017	SNNP	Facility based cross sectional	Women of reproductive age	30.4	262	66	25.2
Mariam (26)	2018	Amhara	Facility based cross sectional	Women of reproductive age	25.9	614	207	33.7
Hibstu (23)	2020	Oromia	Facility based cross sectional	Women of reproductive age	27.4	361	121	33.5
Zenebe (37)	2017	Amhara	Community based cross sectional	Women of reproductive age	25.91	644	180	27.9
Dereje (16)	2019	SNNP	Community based cross sectional	Women of reproductive age	30	561	164	29.2
Samson (18)	2020	SNNP	Community based cross sectional	Women of reproductive age		346	134	38.7
Aklilu (33)	2020	SNNP	Community based cross sectional	Women of reproductive age	25	660	145	22
Getahun (21)	2018	Amhara	Facility based cross sectional	Women of reproductive age	27.8	730	92	12.6
Gelagay (20)	2018	Amhara	Facility based cross sectional	Women of reproductive age those on ART	31.59	505	138	27.3

Teshome (32)	2018	Addis Ababa	Community based cross sectional Facility based cross sectional	Women of reproductive age Women of reproductive age	31.2	469	81	17.3
Alemu (35)	2021	Amhara	Community based cross sectional	Women of reproductive age	30.1	356	112	32.3
Yemaneh(36)	2017	SNNP	Community based cross sectional	Women of reproductive age	26.6	731	145	19.8
Asigedew(13)	2017	Amhara	Community based cross sectional	Women of reproductive age	31.69	499	174	34.9
Liknaw (15)	2019	Amhara	Facility based cross sectional Community based cross sectional	Women of reproductive age ,female health professional Women of reproductive age	27.4	392	89	22.7
Abebe (24)	2017	Oromia	Community based cross sectional	Women of reproductive age	30.5	419	139	33.2

Pooled prevalence estimate and heterogeneity

The prevalence of LARC among women in Ethiopia for the last five years was reported in twenty -seven (27) studies including 12,741 women. As shown in **Figure 2**, among the 3,588 women used LARC, the pooled prevalence was estimated to be 29% (95 % CI 26-32%). The prevalence estimate differed significantly between studies ($X^2 = 505.29$, $P=0.001$, $I^2 = 94.85\%$)

Subgroup analysis based on the type of LARC

1. Pooled estimates of prevalence of Implanon among Ethiopian women for the last five years

The prevalence of Implanon among women in Ethiopia for the last five years was reported in twenty-six (26) studies including 11,871 women. As shown in **Figure 3**, 3,588 women used LARC and the pooled prevalence of Implanon was estimated to be 23% (95 % CI 20-26%). The prevalence estimate differed significantly between studies ($X^2 = 337.79$, $P=0.001$, $I^2 = 92.6\%$).

2. Pooled estimates of prevalence of IUCD among Ethiopian women for the last five years

In Ethiopia, the prevalence of IUCD among women in Ethiopia for the last five years was reported in twenty -six (26) studies including 11,871 women. As shown in Figure 4, among the 3,588 women used LARC, the pooled prevalence of IUCD was estimated to be 5% (95 % CI 4-7%). The prevalence estimate differed significantly between studies ($X^2 = 506.36$, $P=0.001$, $I^2 = 95.26\%$).

Subgroup analysis

LARC users were detected in 33 % (95 % CI 26-41%) of Oromia, 28% (95 % 23-33) of SNNP region, and 27 % (95 % CI 21-33 %) of Amhara region. We looked at sample sizes of ≤ 400 and >400 since we assumed sample size may be a source of the considerable heterogeneity we identified in our study, and we found that sample size was not a major driver of heterogeneity ($p=0.001$). Between 2017 and 2018, the estimated pooled prevalence of LARC users was 28% (95 % CI 23-32%), and between 2019 and 2021, the estimated pooled prevalence of LARC users was 30% (95 % CI 25-36%), with no major source of heterogeneity. We also ran an analysis to see if the source of heterogeneity was related to the study setting, and we found that the study setting had no bearing on the cause of heterogeneity ($P=0.001$)(Table2).

Table2. Sub group analysis of the prevalence of LARC users among Ethiopian women for the last five years, 2021

Variables	Variable categories	Included studies	Pre valence (95% CI)	I^2	P Values
Study setting	Community	13	25(21-30)	94.48	0.001
	Facility	14	32(28-36)	92.75	0.001
Region	Oromia	6	33(26-41)	94.84	0.001
	Amhara	9	27(21-33)	95.48	0.001
	SNNP	9	28(23-33)	92.89	0.001
	Afar	1	33(29-38)	-	-
	Harari	1	38(33-43)	-	-
	Addis Ababa	1	17(14-21)	-	-
Sample size	>400	16	26(23-30)	94.49	0.00
	≤ 400	11	33(27-38)	93.69	0.00
Year of publication	2017-2018	14	28(23-32)	94.73	0.00
	2019-2021	13	30(25-36)	94.99	0.00

Year of publication ($p = 0.83$), regional state ($p = 0.58$), sample size ($p = 0.85$), and study setting ($P=0.1$) did not exhibit any statistically significant association with prevalence of LARC usage in the previous five years in a univariate meta-regression (Table3).

Table3. Univariate meta-regression of factors related to heterogeneity of prevalence of LARC users among Ethiopian women over the last five years

Variables	β coefficient	95% CI	P values
Regional states	2.8418	-0.7-13.2	0.576
Study setting	-25.49	-56.5-5.5	0.103
Sample size	-4.39	-50.89-42.11	0.847
Year of publication	-1.21	-12-9.99	0.826

Leave out one sensitivity analysis

By systematically removing each study from the pooled prevalence of LARC users among Ethiopian women over the previous five years, a leave-one analysis was performed to assess the influence of each study on the pooled prevalence of LARC users among Ethiopian women over the last five years. The omitted studies had no significant impact on the projected prevalence of LARC users among Ethiopian women during the last five years, according to the findings (Table4).

Table4.leave out one analysis of the prevalence of LARC users among Ethiopian women for the last five years, 2021

Study omitted	Estimated pool prevalence with 95% CI	Study omitted	Estimated pool prevalence with 95% CI
Wariyo (2019)	28(25-30)	Zenebe (2017)	29 (26-31)
Tebeje (2017)	29(26-32)	Dereje (2019)	29 (26-32)
Shiferaw (2017)	29 (26-31)	Samson (2020)	29 (26-32)
Woldu (2020)	29 (26-31)	Aklilu (2020)	29 (26-32)
Biza (2017)	29 (26-32)	Getahun (2018)	29 (27-32)
Gujo (2021)	29 (26-31)	Gelagay (2018)	29 (26-32)
Halil(2020)	29 (27-31)	Teshome (2018)	29 (27-32)
Mohammad (2017)	29 (26-32)	Alemu (2021)	29 (27-32)
Fekadu (2017)	29 (26-32)	Yemaneh (2017)	29 (26-32)
Asteray (2019)	29 (26-32)	Asigedew (2017)	29 (26-31)
Abdu (2019)	29 (26-31)	Liknaw (2019)	29 (26-32)
Asirat (2017)	29 (26-32)	Abebe (2017)	29 (26-31)
Mariam (2018)	29 (26-31)	Hibstu (2020)	29 (26-31)

Publication bias assessment

The visual assessment of the asymmetry of the funnel plot revealed the presence of publication bias, which was statistically confirmed by Egger's regression test ($\beta = 16.45$, 95% CI 10.86–22.04) $p = 0.001$) (Figure 5).

Factors associated with LARC use

As shown in the Table 5, a summary of the data collected to determine the associated variables among LARC users among Ethiopian women during the previous five years. When compared to poor knowledge and a negative attitude, having good knowledge($p=0.001$,95% CI 1.16-1.98) and a positive attitude($p=0.001$,95 percent CI 1.5-2.3) were approximately two times more likely to use LARC over the past five years . When compared to those who had never used LARC before, former users were approximately four times ($P=0.001$, 3.56, 95% CI 2.55-

4.57) more likely to utilize it again. Age of women 25-34 less likely to use LARC than those aged below 25 or above 35 years (P=0.001, 95% CI 0.24-0.65). Occupation, discussion with husband, health provider counselling, parity, and educational level, while being included in many articles, had no association with LARC usage in the past five years in our review (Table5).

Table5. Analysis of factors associated with use of LARC among Ethiopian women for the last five years, 2021

Factors	Comparison group	Number of studies	OR (95%)	P values	heterogeneity				Publication bias (Egg's test) P values
					Q value	df	I ²	P values	
Parity	≥ 5 vs <5	5	1.09 (0.4-1.8)	0.669	2.36	4	0	0.002	0.137
Knowled-ge	Good knowledge vs poor knowledge	11	1.6 (1.16-1.98)	0.001	16.54	10	39.6	0.085	0.001
Attitude	Positive vs negative	10	1.9(1.5-2.3)	0.001	12.36	9	35.3	0.136	0.001
Previous use of LARC	Yes vs No	5	3.56(2.55-4.57)	0.001	5.25	4	23.7	0.263	0.161
Health provider counselling	Yes vs No	8	1.18(0.85-1.5)		21.52	7	67.5	0.003	0.002
Educational level	Diploma and above vs others*	9	1.94(0.98-2.8)		4.85	8	0	0.773	0.039
Age	25-34 years vs others**	8	0.44 (0.26-0.65)	0.005	20.6	7	65.1	0.005	0.005
Discussion with husband	Yes vs No	8	0.93 (0.58-1.28)		25.41	7	72.4	0.001	0.009
Occupation	Governmental employee vs others***	9	1.22 (0.8-1.65)	0.204	10.96	8	27	0.201	0.033

Others* -cannot read and write, primary education, secondary education

Others**-age below 24 or above 35

Others***- housewives, students, merchants, private employee, daily labourer

Discussion

In Ethiopia, the prevalence of LARC and associated factors among Ethiopian women over the last five years has only been studied in modest and fragmented ways thus far. As a result, this is the first meta-analysis of its kind to describe the overall prevalence of LARC and associated factors among Ethiopian women in the previous five years. FMOH vowed to raise LARC use prevalence to 40%; however our review revealed that just 29% of women utilized it, much below the country's target. The reason might be overestimation and ambition, less trained human power on the provider of LARC, availability of instruments at rural health centres and many more but far higher than the EDHS 2019 which said, prevalence of Implanon and IUCD was 9% and 2%, respectively(38). Reason being the study conducted in both rural and urban of Ethiopia while in our review all studies conducted at urban areas, EDHS conducted in all regions of Ethiopia while in our review, studies were conducted in some regions of Ethiopia and also the study period was different for both studies.

Study conducted at Kampala district, Uganda among women of reproductive age revealed the prevalence of LARC was 31.7% which was similar to our findings while study conducted in Nigeria tertiary hospital showed the prevalence of LARC users were 65.6% from which 75% used implanon which was far from our result and the difference might be the study conducted at tertiary hospital and the overall prevalence of usage of modern contraceptives in the country. In our review we found that having good knowledge, positive attitude and previous use of LARC has been associated with use of LARC over the past five years. Study conducted in Nigeria (39) showed previous use of LARC, positive attitude and good knowledge significantly associated with use of LARC. Different studies conducted in Kenya(40), Nepal(41), Pakistan(42) showed previous use of LARCs, good knowledge and positive attitude associated with use of LARC among women of reproductive age

Strength and Limitations

The investigators used extensive and comprehensive search strategies from multiple databases. Published, unpublished studies and grey literature were included. Detailed search was done in order to avoid duplication of similar study elsewhere. We got high heterogeneity and we assessed the possible of the cause by leave one sensitivity analysis and subgroup analysis. In our review we tried to determine the associated factors for LARC users. Although the literature search was systematic and assessed all related studies within the desired scope, it is possible that relevant publications, e.g. publications reported in non-English language and local languages must have been missed. This may affect the finding's inclusiveness. This study doesn't include any findings (studies) from Benishangul-gumuz, Somalia and Tigray Region. This may affect the generalization of this study but still, the study will be applicable to all parts of Ethiopia.

Declarations

Acknowledgments

Not applicable.

Declaration of conflict of interests

The authors declared that they have no conflicts of interest for this work

Ethics Approval

Not applicable

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Informed consent

Not applicable

Data availability

all relevant data are available within the paper.

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Figures

Fig1. PRISMA flow diagram for study selection

Figure 1

See image above for figure legend.

Figure 2: Forest plot showing pooled prevalence of LARC among women in Ethiopia for the last five years, 2021

Figure 2

See image above for figure legend.

Figure 3: Forest plot showing pooled prevalence of Implanon among women in Ethiopia the last five years, 2021

Figure 3

See image above for figure legend.

Figure 4: Forest plot showing pooled prevalence of IUCD among women in Ethiopia for the last five years, 2021

Figure 4

See image above for figure legend.

Figure 5: **Assessment of Publication bias**

Figure 5

See image above for figure legend.