

Trends of Fertility in Ethiopia, Systematic Review

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Abstract

Background Fertility is the actual childbearing performance of a population. When there is no significant migration, at any level of mortality, changes in fertility cause variations in the rate of natural increase and exert a powerful influence on the age structure. The global population increased from 2.6 billion in 1950 to 7.6 billion in 2017 and the Ethiopian population become 100 million. Therefore, this review was aimed to assess the trends of fertility in the regions and administrative cities of Ethiopia in the last 5 decades.

Methods: both quantitative and qualitative study design were considered for the review. The PubMed databases, and Gray literatures (Google scholar, organizations' research works, Academia, and Research get) were used as source of data for searching. The JBI critical appraisal tool were used to assess the quality of papers after including for review by abstract and title.

Results: on initial searching 8503 papers were identified from PubMed databases. Of these papers only 28 studies for quantitative and 15 for qualitative analysis were selected based on JBI critical appraisal checklist. The rate of fertility in Ethiopia decrease radically from 8.1 in 1965 to 4.0 in 2016. The mean fertility rate with standard variation for both urban and rural Ethiopia is (6.03 + 1.3) in the last 51 years.

Conclusions and recommendations: The fertility rate of Ethiopia become declined since the starting of contraceptive utilization even though it is not similar across the different regions. Some of the regions like Afar and Somalia become more fecundate irrespective of the country growth and development and others like Amhara region had the highest decline in fertility. The minister of health should explore the causes of high fertility in Afar and Somalia regions.

Ethics and dissemination: The review is based on published data, and ethical approval did not require. Trial Registration: The protocol has been published in the PROSPERO with an ID of CRD42019128889 Keywords: Trends, Fertility, Ethiopia, Systematic Review, and Amhara Region

Background

The global population increased from 2.6 billion in 1950 to 7.6 billion in 2017. Much of this increment was high in south Asia and sub-Saharan Africa in relative to the proportion of the global population (1). The total population of Ethiopia was close to 100 million, which is the second most populous country in Africa. The Ethiopian population is characterized by a high fertility rate (2). Of the total population, 44.4% was under the age of 15 years (3). The total fertility rate is the average number of children a woman would have by the end of her childbearing years if she bore children at the current age-specific fertility rate (4). Therefore, fertility refers to the actual childbearing performance of a population. It is a major explanatory force in population dynamics and a major counteracting force to population attrition through mortality. When there is no significant migration, at any level of mortality, changes in fertility cause variations in the rate of natural increase and exert a powerful influence on the age structure (5, 6). The Ethiopian population in July 1990 was estimated as 51.0 million and the utilization of contraceptive among all women aged 15-49 was 4.0%, but on currently married women was 4.3%, on ever married women was 4.4% and all women currently exposed was 5.0%. Like that of high fertility rate the crude death rate were also high, which was about 18.00 per 1000 population, and the rate of growth of the population was around 3.0 percent per annum (7). USAID, 2014 reports showed that the estimated TFR of Amhara region will be decreases from 5.1 children per woman in 2007 (2005, EDHS) to 2.9 by 2037. This projection is referred to as the low socioeconomic development scenario or slow fertility decline. The second scenario assumes that fertility decreases from 5.1 children per woman in 2007 to 2.3 by 2037. This projection is referred to as the high socioeconomic development scenario or fast fertility decline (8). Amhara had achieved a higher contraceptive utilization than all regions of Ethiopia. In this region 33 percent of married women aged 15-49 years were using a modern contraceptive method in 2011, which was higher than the national average of 27 percent. In addition, 22 percent of married women had an unmet need for family planning (9). Even if, the TFR is decreasing curiously, particularly in Amhara region, the CSA and ORC Macro (2001) showed a marked decline in the percentage of women currently married, from 72% in 1990 to 64% in 2000. This proportion remained almost the same in 2005 (10). Therefore, reviewing literatures, databases, and reports

about trends of fertility in Ethiopia might showed the progress of contraceptive utilization, and indicated the experienced challenges and implemented strategies to decrease fertility rate in Ethiopia.

Methods

Objective

This systematic review was aimed to determine the trends of fertility across the different regions and administrative cities of Ethiopia.

Research question

For this review, the question was developed in considering **CoCoPop**. mnemonics. The review question is “How was and is going trends of fertility in Ethiopia across the different regions?”

Inclusion and exclusion criteria

Researches which are similar in title, context, and design but poor in quality based on JBI criteria were excluded when the reviewers agree to reject the paper by putting clear reason for exclusion.

Search strategy: The search strategy was implemented in two stages. Three of the investigators were independently search electronic database from PubMed for published studies. Two of the investigators were search gray literatures that have Research and Trials Registers, thesis or dissertations, organizations websites, and reports using the following logic grid (*Table 1*).

Table 1: The logic grid or search strategies used in searching researches on considering CoCoPop mnemonics

Condition	Context	Population
Fertility	Third world country, developing country	Women
No of Children	Low income country, horn of Africa	Reproductive age group women
Fecundity	Eastern Africa, Gulf of Aden	Women aged 15-49 years
	Ethiopia, Amhara region	
	Oromia region, Afar region	
	Gambella region, Tigray region	
	Benishangul-gumz region, Dire-Dawa administrator	
	Harari region, SNNP	
	Somalia region, Addis Ababa administrator	

The refined search strategy using advanced “MeSH” terms in PubMed were (Fertility or Number of Children or Fecundity) and (Third world country or Low income country or Developing Country or Horn of Africa or Eastern Africa or Gulf of Aden or Ethiopia or Amhara region or Oromia region or Afar region or Somalia region or Gambella region or SNNP or Tigray region or Benishangul-gumz region or Harari region or Addis Ababa administrator or Dire-dawa administrator) and (Women or Reproductive age group women or Women aged 15-49 years).

A manual search for additional relevant studies using references from retrieved articles were performed by all of the 5 investigators. The search strategy was restricted to human studies with only English language. Literatures were downloaded to Endnote version 7 to maintain and manage citations, duplications and facilitate the review process.

Outcome measures: The primary outcome is trends of fertility. The trends of fertility controlled by contraceptive utilization. This review showed the degree of decrement in fertility from 1965 to 2016. The secondary outcome is

population growth, which is directly affected by birth, migration and death. From these factors birth takes the major role in influencing population positively or negatively.

Data extraction, analysis and presentation

The data extracted from PubMed and gray literatures is presented using PRISMA checklist. The papers included for review are 28 for quantitative and 15 for qualitative write up. Most of the data expressed in narration, but a simple mathematical analysis is also done using Microsoft excel 2016. Therefore, the result is presented in table, graph, mean and standard deviation but due to considerable degree of heterogeneity, meta-analysis was not performed instead narrative writing is computed. The search was done before April 27/2019 (*Figure 1*).

Fig 1. The PRISMA flow chart indicating the literatures that are included and excluded researches

Table 2a: The qualitative studies included for systematic review of fertility rate in different regions of Ethiopia, from 1965-2016

S.no	Author	Year	Setting	Region	Title	Journal/organization/publisher
1	Getu D. et al		Rural and Urban	Amhara	Estimation of the total fertility rates and proximate determinants of fertility in North and South Gondar zones	Ethiopian Journal of Health and Development
2	Dawit Getnet A.	2015	Rural and Urban	National	Determinants of fertility in Ethiopia	African Health Sciences Journal
3	Patrizia F. et al	2001	Rural and Urban	National	Fertility and family change in Ethiopia	Central Statistical Authority
4	Abate M., and Morgan, S.	1986	Rural	National	Childlessness in Rural Ethiopia	Population and Development Review
5	Yohannes Kinfu	1993	Rural and Urban	National	Fertility trend in Ethiopia: an application of 'own-children' method	University of Ghana
6	CSA	1991	Rural and Urban	National	The 1990 Family and Fertility Survey	Addis Ababa
7	CSA	2013	Rural and Urban	National	Inter-Censual Population Survey	Addis Ababa
8	EDHS		Urban and rural		Berlin institute for population and development	
9	Teklu et al.				Components of Fertility Change in Ethiopia	
10	CSA	2014	Urban and rural		Mini DHS	
13	CSA	2012	Urban and Rural		Analytic Report on the 2012 Urban Employment/Unemployment Survey	Federal Democratic Republic of Ethiopia.
14	Prof Christopher J L Murray	2018	Urban and rural	World	Population and fertility by age and sex for 195 countries and territories,	Lancet
15	Solomon S. et al.	2015	Urban and Rural	National	Trends in contraceptive use and distribution of births with demographic risk factors in Ethiopia:	Global Health Action,

Table 2b: The quantitative studies included for systematic review of fertility rate in different regions of Ethiopia, 1965-2016

Author	Year	Area setup	Region	TFR	Range of TFR
CSO	1965	Rural	All regions	5.95	5.7-6.2
Tesfagiorgis	1967	Urban	Addis Ababa	5.7	5.1-6.3
Hailemariam	1970	Urban and rural	All region	5.2	
CSO	1970	urban	All urban region	5.65	5.5-5.8
CSO	1970	Rural	All rural region	4.6	4.5-4.7
CSO	1978	Rural	all rural region	7.75	6.8-8.7
CSO	1978	Urban	Addis Ababa	6	5.9-6.1
CSO	1978	Urban	all urban regions of Ethiopia	7.2	6.3-8.1
CSO	1984	all urban and rural	All urban and rural	7.5	
Hailemariam	1984	all urban and rural	All urban and rural	5.85	5.3-6.4
CSA	1984	rural	all rural	8.1	
CSA	1984	Urban	Addis Ababa	4	
CSA	1984	Urban	all urban regions of Ethiopia	6.3	
CSA	1990	Urban	Addis Ababa	4.6	
CSA	1990	Urban	all urban regions of Ethiopia	5.8	5.5-6.1
CSA	1990	Rural	All rural regions of Ethiopia	7.95	7.6-8.3
CSA	1990	Urban and rural	All urban and rural	7.65	7.3-8.0
Hailemariam	1990	Urban and rural	All urban and rural	7.7	
FFS	1990	Urban and rural	All regions of Ethiopia	7.5	
Abdulahi and Strong	1994	Urban and rural	All regions of Ethiopia	7	
Abdulahi and Strong	1994	rural	all rural region of Ethiopia	7.2	
Abdulahi and Strong	1994	Urban	all urban regions of Ethiopia	4.5	
EDHS	2000	Urban and rural	All regions of Ethiopia	5.9	
EDHS	2005	Urban and rural	All regions of Ethiopia	5.4	

EDHS	2011	Urban and rural	All regions of Ethiopia	4.8	
EPHA, Alemayehu	2012	Urban and rural	All regions of Ethiopia	4.6	
EDHS	2014	Urban and rural	All regions of Ethiopia	4.1	
EDHS	2016	Urban and rural	All regions of Ethiopia	4.6	

Presentation And Reporting Of Results

The qualitative evidences about fertility in Ethiopia

Ethiopia is often regarded as promising demographic role models since 1970 in reducing the high fertility rates of seven births per woman to below the current average rate for Sub-Saharan Africa, 4.9. But in 2011, Ethiopia reduce the number of births per woman to 4.8 which is lower than the stands of Sub-Saharan Africa (11). The Ethiopian Family and Fertility Survey conducted in 1990 by the Central Statistical Authority showed that only 8 percent of all Ethiopian reproductive age group women had ever used any method of contraception (12). The 2012 Inter-Censal Population Survey showed that the national average fertility rate has decreased from 6.2 percent in 2007 to 4.6 percent in 2012 (3). A research in 2009, in two Gondar zones reported the total fertility rate was 5.3 and the mean number of children ever born to older women (45-49 years) was computed as 6.5 (13). A study in 2015 reported that Addis Ababa had very low fertility but other regions mainly, Oromia, Somali, and SNNP had high total fertility rates. In addition, high fertility was observed in rural areas than urban areas. Religion also reported as having influence on the status of fertility that Muslim respondents had more children as compared to traditional religion, being in lower grade and being economically poor contribute for having more kids (14). Women without any education and women with secondary or higher education had on average 5.8 children, and 1.6 children respectively (11). The female literacy rate in each region was also documented as 80% in Addis Ababa, 76.5% in SNNP, in Harari 74.5%, 72.6% in Oromia, 71% in Tigray and Gambella, in Benishangul-Gumuz 66.3%, in Amhara 65.5%, in Dire dawa 64.6%, in Afar 53.2% and 47% in Somalia (15). In between 2000 and 2011, fertility rates in Somali, Afar, and Benishangul-Gumuz regions increased by 39%, 14%, and 4% respectively (16). Whereas in Amhara region and in Addis Ababa dropped by 24% and 17%, in SNNP and Tigray dropped by 13% respectively (17). The total fertility was increased from 1970s both in rural and urban areas. The TFR in the rural areas had increased from 4.3 in the 1970s to 8.1 in 1984 but it was constant till 1994 and revealed slight decline thereafter. The TFR in 1998 was 7.2 according to Nutrition and Health Survey data (18). Improvement in the health status of women mainly the decrement in sexually transmitted diseases, decreasing in still births and a reduction in the duration of breastfeeding were the possible reasons for a fertility to rise in 1970s (19).

The other analysis reported as the TFR was 5.5 children per woman during the early 1970s and increased to 7.2 children per woman within 5-9 years, that was in 1984 (20). But in the latter year, the TFR decrease radically, and the decrement in fertility rates is largely due to the dissemination of contraceptives throughout the country. According to DHS of 2014, awareness of contraceptive methods between 2000 and 2014 has grown steadily among women and particularly among married women, 97% of whom report awareness (17). The government was the major provider of modern contraceptives. In which, 87% of users obtaining their family planning method from the state, health centers, and health extension workers (17).

The quantitative evidences about fertility in Ethiopia

The prevalence of modern contraceptive utilization in 2011 across the different regions were had a hug difference. The prevalence of utilization in Addis Ababa was 56.3%, 24.7% in SNNP, in Harari 31.5%, 24.9% in

Oromia, 21.2% in Tigray and 33.2% in Gambella, in Benishangul-Gumuz 26.3%, in Amhara 33.0%, in Dire-Dawa 31.7%, in Afar 9.1% and 3.8% in Somalia (21). The fertility of Ethiopia decreases radically from 8.1 in 1965 to 4.0 in 2016. The mean fertility rate with standard variation for both urban and rural Ethiopia is ($x \pm Sd$) 6.03 ± 1.3 for the last 51 years. According to EDHS report the maximum decline is recorded in Amhara region. In contrary Afar and Somalia had increased fertility rate in 2016 by 0.6 and 1.5 children per woman respectively (Table3)

Some of the previous large surveys like FFS, which was done before 2000 lack specificity to the area or region. In addition, earlier national survey like CSO, CSA and FFS had poor quality in design, or data collection. Therefore, for comparing the trends of fertility in Ethiopia across the regions and town administrators were not used. Because of methodological superior quality, only EDHS used to present figurative data. According to the 5 DHS data of Ethiopia, fertility is decreased by 1.5 from 2000 as a baseline and 2016 as current reference. Amhara, south nations and nationalities and Tigray took the first top three levels in decreasing the number of births in 2016 respectively. The mean and median fertility rate in both rural and urban was 6 and 5.9 respectively but the urban and rural median fertility rate was 5.7 and 7.5 with mean of 5.5 and 6.9 respectively. whereas the overall fertility rate in Ethiopia was $X \pm sd$ (6 ± 1.8) mean and standard deviation.

The minimum and maximum fertility rate was 4.1 and 7.7 respectively irrespective of residences. The fertility rate of Ethiopia across the 9 regions and two administrative cities is quite different according to all the previous EDHS absolute difference in 2000 and 2016. The rate of fertility in Ethiopia decrease from 2000 to 2014 consistently but there is a slight increment from 2014, 4.1 child per woman to 2016, 4.6 child per woman. The increment was also recorded in all regions and Addis Ababa except Amhara region and Dire-Dawa. The fertility rate was decreased by 0.1 and 0.3 children per woman in Amhara region and Dire-Dawa respectively (Fig 2, Fig 3, and Table 3)

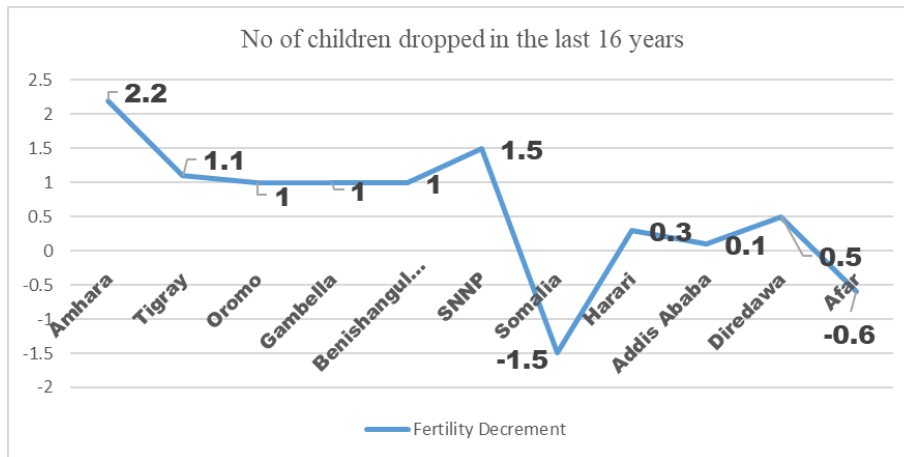


Fig 2: The rate of Decrement in Fertility rate in 2016 using 2000 as Baseline data (2000-2016) in the 9 regions and 2 administrator cities of Ethiopia.

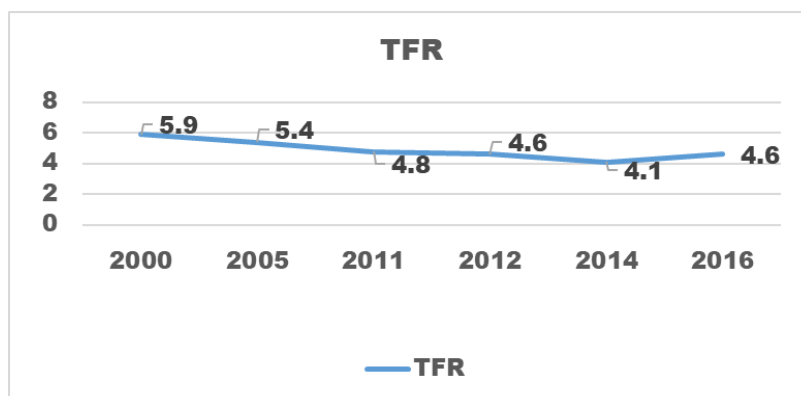


Fig 3: The total fertility rate of Ethiopia from 2000 to 2016 using 5 DHS data and the 2012's EPHI survey

Discussion

This review emphasis mainly on EDHS data for discussion, conclusion and recommendation than other survey and studies because of better methodology and its representatives in study variables and study population. Because, the aim of this review was to investigate fertility rate among reproductive age group women in the different regional state of Ethiopia. But other studies are also considered in the narrative synthesis.

The rate of decrement in TFR in Ethiopia was 4.8, which is below the sub-Saharan stands, 4.9 (11). The mean, variance, minimum and maximum TFR in the last 51 years was 6, 1.8, 4.1 and 7.7 respectively in Ethiopia. But the fertility rate didn't continue its decrement smoothly in each regional state even in the urbanized city, Addis Ababa except Amhara region. The total fertility rate in Dire-Diwa was decreased by 0.5 children per woman in 2016 but according to 2000 and 2005 as well as 2011 and 2014 EDHS data, there was no change in fertility. According to the 2000 to 2016 EDHS, the TFR decreased continually in Amhara region and the decrement was 0.1 children per woman but in Tigray TFR was increased by 0.2, Oromia by 1.0, Gambella by 0.5, Harari by 0.9, South nations and nationalities of People by 0.1, Afar by 0.3, Somalia by 0.8, Addis Ababa by 0.1, and the national TFR was raised by 0.5 children per woman in comparing 2016 EDHS data with 2014 (2014-2016). This was because of high contraceptive prevalence utilization rate than many other regions of Ethiopia. According to CSF and ICF (9), 33 percent of married women aged 15-49 years were using a modern contraceptive method in 2011, which was higher than the country average of contraceptive prevalence utilization rate, 27%. This level of utilization put the region as the second contraceptive utilizer next to Addis Ababa 56.3% and Gambella, 33.2%. But the overall decrement in TFR in Addis Ababa and Gambella was 0.1 and 1 respectively. These contradicts with the higher 2.2 children drop in Amhara region. The prevalence of contraceptive utilization is not as such unique than others. The literacy rate of females in Amhara region was also among the least (15). Therefore, the reviewers recommended a primary study in Amhara region on the fertility and factors of fertility in considering contraceptive utilization.

In Fact, fertility rate is a vital developmental factor, which is associated with growth of community economy (22, 23) and have an impact on child and maternal health (24, 25). Unfortunately, this review testified the opposite of this literature.

The highest decrement in fertility is recorded in Amhara region even greater than the national plans (8) but the 2016 EDHS reported 46% of Amharan under five children were stunted, which is attributable for the highest prevalence of Stunting in Ethiopia followed by Benishangul-Gumuz and Afar. These regions have high fertility rate than Amharan mothers. A paper was presented that the major ethnicity, Hausa and Ibo women have higher fertility than those from the minority ethnic groups (26). This evidence found from Nigerian was also in contrary with Ethiopian, this systematic review. In this systematic review the fertility rate in major ethnic group is less than the whole minority ethnicities. This might be because of extensive and politically focused contraceptive administration in the dominant ethnicity, Amhara region (8) and ignorance of the minority for contraceptive distribution and awareness creation.

Women without formal education had a total fertility rate of up to 6 children (27), while for women with 12 years of schooling the fertility is less than 2 children (28). The review showed that the fertility rate is higher in rural area than urban areas. This is in line with other studies (29, 13). The difference is also considerable because of the socioeconomic development, the increase of education, employment opportunities, and the improvement of Health services in Urban areas which contributes for low fertility rate.

The USAIDS estimation was to decrease fertility from 5.1 children per woman in 2007 to 2.3 by 2037 and this projection is referred as the high socioeconomic development scenario or fast fertility decline (8). According to 2016 EDHS data, the total fertility of the region is 3.7 and this affirms that the high socio-demographic projection of USAIDS might not be difficult to be come true in 2037 that is needed to decrease 1.4 children per woman in the next 21 years because 2.2 children per woman were decreased in only 16 years if the achievement was free of political interest and intentional influence of health professionals.

Conclusions

The decrement in fertility rate in Ethiopia is achieved effectively in relative to sub-Saharan fertility stands. On the narrative review, education and economic status are explained as contributor for fertility. But the degree of association with each factor are not measured. Of the 9 regions, the rate of decrement in fertility was achieved in Amara region earlier than others but the socio-demographic status of the region was not improved as such. For example, the female literacy rate in Amhara region holds the 8th rank but in fertility, it is the first in decrement. This unique, continuous and earlier achievement in decrement of fertility in only Amhara region cause to conclude that much of the country's contraceptive methods distribute toward Amhara region. This means, family planning utilization principles in Ethiopia was not ethically fair. Therefore, the Minister of Health and Amhara regional health Bureau need to assess the mode of family planning administration in Amhara region like type of consent received from women. Because, it is a matter of genetic continuity. In addition, the minister of health should distribute contraceptives in all regions fairly. In contrary Afar and Somalia had abrupt increment in TFR in 2016. Therefore, the minister of health also obligated to assess the factors for high fertility in some of the regions and should fill the gap either by increasing awareness about the contraceptive utilization or else based on evidences.

Limitation Of The Review

The databases used is only PubMed due to inaccessibility of other sources and it might affect the accuracy of the review. Due to the heterogenic nature of the title, lack of samples size, and other extracts meta-analysis was not computed. Therefore, there is no statistically pooled result rather the review is presented with central tendency and variance, which may not be statistically significant to conclude the total fertility. This study seems to be politically biased but we assured that we are stick to the data and written evidences. Although many gossips are existed in legend within Amhara region regarding fertility and contraceptive utilization, we didn't consider it.

Acronyms

EPHI/A-Ethiopian Public Health Institute/Association, EDHS-Ethiopian Demographic Health Survey, MeSh-Medical Subjects Heading, TFR - Total Fertility Rate, USAIDS -United States of America International Developments, JBI - Joanna Briggs Institute, CoCoPo - Condition Context and Population. CSA-Central Statistical Agency, CSO- Central Statistical Office, PRISMA - Preferred Reporting Items for Systematic Reviews and Meta-Analyses, FFS - Fertility and Family Survey.

Declarations

Ethics approval

The current study is based on published data, and thus ethical approval did not require. This systematic review is expected to serve as a base in evaluating the trends of fertility in Ethiopia beside the catastrophic politics in the last 29 years.

Consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and material

The raw material supporting the conclusions of this research are include as part the review in Table 2a and 2b.

Competing interests

The authors declare that they have no any conflicting of interests.

Funding

Not applicable

Authors' contributions

MW, BB, and AM – write the protocol. MW, BB, AB and AM - search electronic database. AB and AM - search gray literatures. MW, BB and AM write the result. AB, AM, MW -apprise the papers using JBI checklist.

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Protocol and registration

The protocols for this review have been published in the PROSPERO International Prospective Register of systematic reviews (<http://www.crd.york.ac.uk/PROSPERO>), registration number: PROSPERO CRD42019128889

The critical appraisal checklist was “The Joanna Briggs Institute critical appraisal tools for use in JBI systematic reviews checklist for prevalence studies available at

<http://joannabriggs.org/research/critical-appraisal-tools.html>”

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Tables

Due to technical limitations, tables are only available as a download in the supplemental files section

Figures

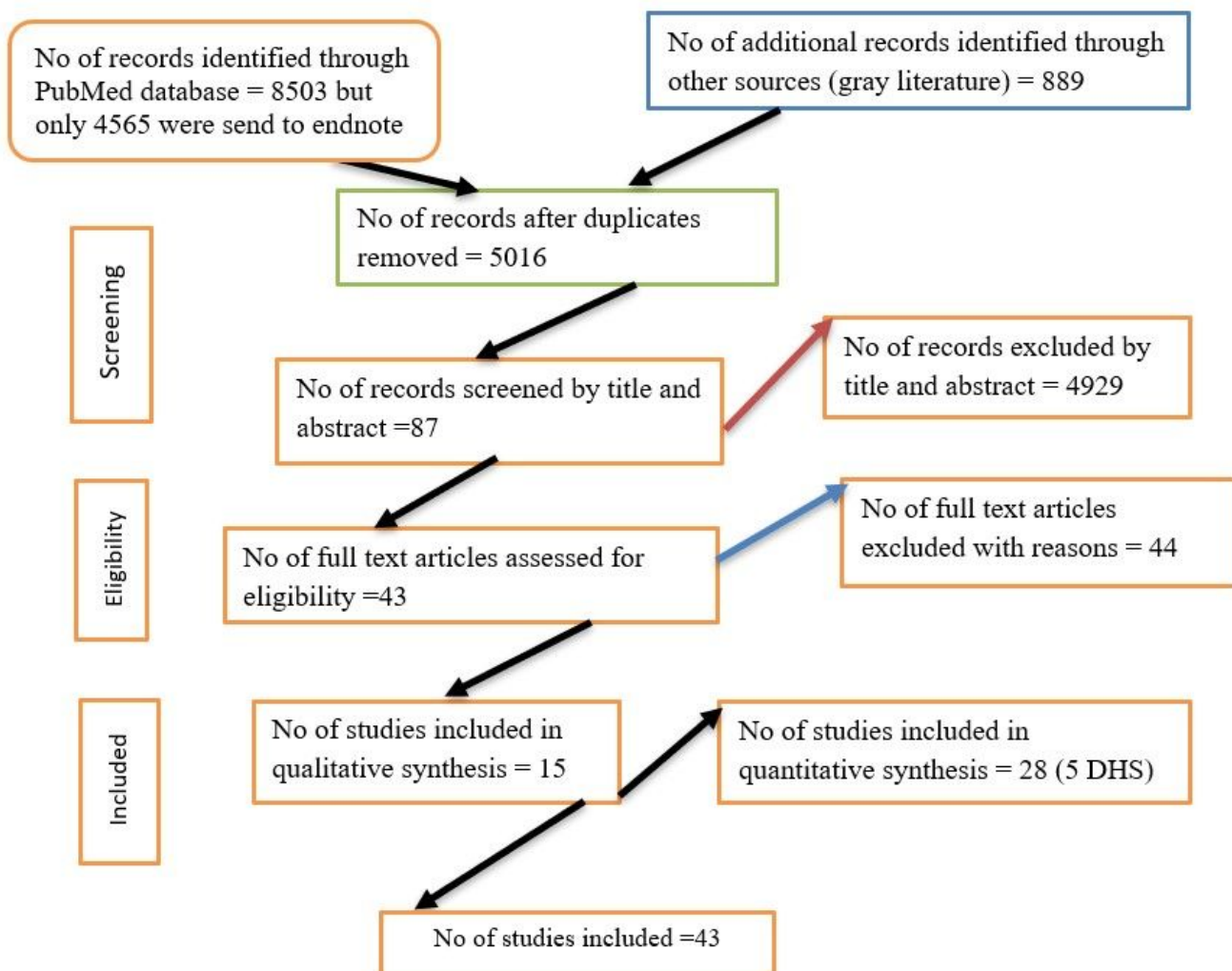


Figure 1

The PRISMA flow chart indicating the literatures that are included and excluded researches

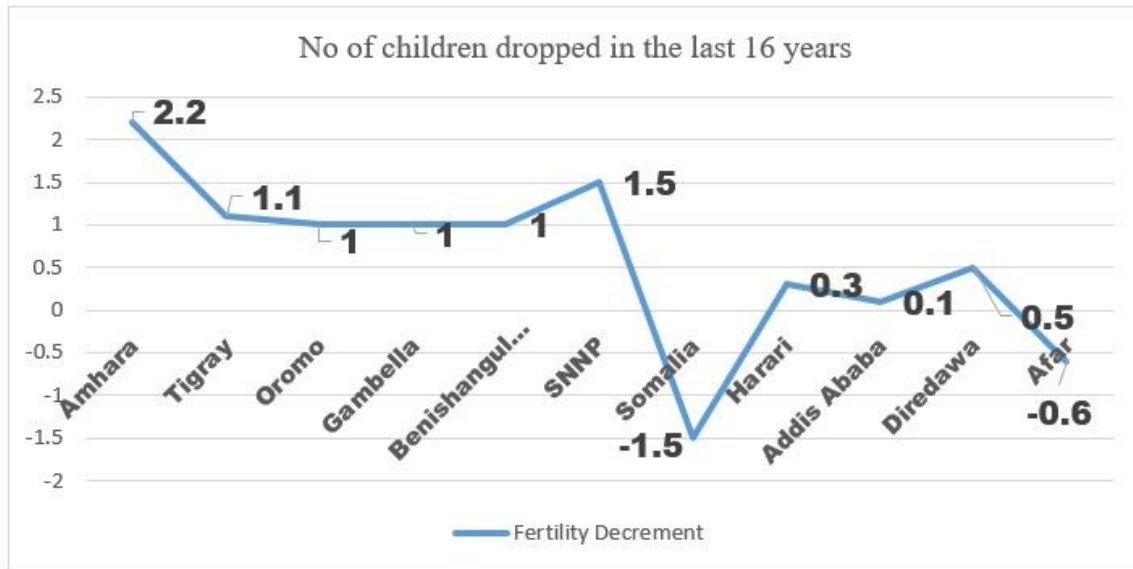


Figure 2

The rate of Decrement in Fertility rate in 2016 using 2000 as Baseline data (2000-2016) in the 9 regions and 2 administrator cities of Ethiopia.

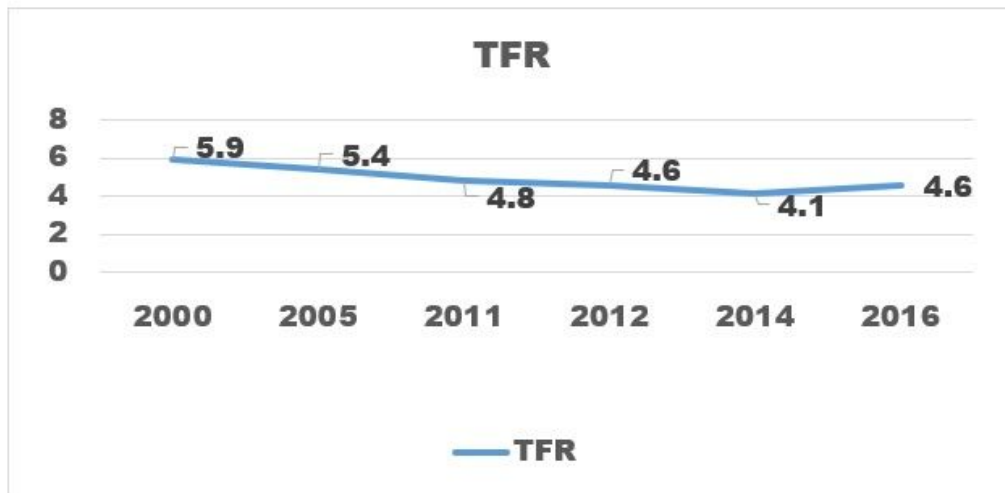


Figure 3

The total fertility rate of Ethiopia from 2000 to 2016 using 5 DHS data and the 2012's EPHI survey

Supplementary Files

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

- [PRISMAChecklist.doc](#)
- [Table1.docx](#)
- [Table3.docx](#)
- [Table2.docx](#)
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