

Utilization of Long Acting Reversible Contraceptive Methods and Associated Factors Among Female College Students in Debre Berhan Town, Ethiopia

Kalayu Birhane, Wintana Tsegaye, Ayelign Mulaw, Chala Nemomsa, Getaw Abebe, Gebeyaw Derese, Kalkidan Assefa, Wassie Negash

Department of Public Health, College of Health Science, Debre Berhan University, Debre Berhan, Ethiopia

Email address:

kalayu2002@gmail.com (K. Birhane)

To cite this article:

Kalayu Birhane, Wintana Tsegaye, Ayelign Mulaw, Chala Nemomsa, Getaw Abebe, Gebeyaw Derese, Kalkidan Assefa, Wassie Negash. Utilization of Long Acting Reversible Contraceptive Methods and Associated Factors Among Female College Students in Debre Berhan Town, Ethiopia. *Advances in Applied Sciences*. Vol. 1, No. 1, 2016, pp. 18-23. doi: 10.11648/j.aas.20160101.13

Received: June 13, 2016; **Accepted:** June 24, 2016; **Published:** July 21, 2016

Abstract: Now a day, Adolescent sexual activity, unintended pregnancy, unsafe abortion has become a major issue in Ethiopia. Low levels of use and high unmet need for LARC have led to high levels of unintended pregnancy in Ethiopia. Use of LARC methods are good options for youth to prevent unintended pregnancies and abortions and saves their lives but studies on determinants of LARC utilization among youth groups are limited in the study area. So, this study was aimed to assess the utilization and associated factors of LARC among female college students. An institutional based cross sectional study was conducted using self-administered questionnaire from 10-25 April, 2015 among 427 female college students in Debre Berhan town. Multistage sample technique was used to select the study participants. Binary logistic regression analysis was used to analyses predictors of LARC utilization. Three hundred fifty-eight (83.5%) of the students heard about LARCs. More than half (52.7%) and (43.3%) of the students had good knowledge and positive attitude respectively towards LARC. The overall utilization of LARCs was 23.4%. Source of information for contraceptives from health professionals [AOR 5.028 (95% CI 1.374, 18.353)] and knowledge about implants [AOR 3.325 (95% CI 1.028, 10.751)] were the main predictors of LARC utilization among female college students. Even though the level of knowledge and attitude of this study was satisfactory, the utilization of LARCs among college students was relatively low. Knowledge about implants and getting information from health professionals were the predictor factors of LARC. Promotion about the potential benefits of LARC methods should be made to increase the utilization among college students.

Keywords: Long Acting, Reversible Contraceptive, Utilization, Debre Berhan, Ethiopia

1. Introduction

Young people currently comprise a larger proportion of the world's population including in low and middle income countries (LMICs). These age consist of heterogeneous subgroups with different socioeconomic, parity, employment, marital and education statuses, and unique sexual and reproductive health (SRH) behaviors and family planning (FP) needs [1]. Unintended pregnancy among adolescents is a worldwide public health issue [2]. Unintended pregnancy is a risk factor for abortion, disruption of education, future unemployment and poor socio economic status. Preventing unintended pregnancies in youth is crucial, yet challenging.

Two-thirds of unsafe abortions occur among women between 15 and 30 years old, and almost 14 percent of unsafe abortions in developing countries occur among women 20 years or younger [3].

Many FP methods especially long-acting reversible contraception (LARC) methods being highly effective considered acceptable options for youth, especially for those who are unmarried or nulliparous [1] and using these LARC methods could prevent many of these causes by enabling women to have children at the right time [4]. LARC defined as a method that requires less than monthly administration includes IUDs, implants, and Depo provera [5]. LARCs have the highest continuation rates of all family planning methods and are more effective in actual use than short-acting methods

for preventing unintended or closely spaced pregnancy. LARCs are also highly cost-effective for programs [6].

Ethiopia has still high total fertility rates, maternal mortality and neonatal mortality globally and in Sub-Saharan Africa [7], [8]. Now a day, Adolescent sexual activity, unintended pregnancy, unsafe abortion has become a major issue in Ethiopia. As of 2014, an estimated 28% of all pregnancies in Ethiopia were unintended [7]. Low levels of contraceptive use have led to high levels of unintended pregnancy in Ethiopia [9]. According to the Ethiopian Mini Demographic and Health Survey (EMDHS), 2014, 31%, 5% and 1.1% of women use injectable, implants and IUCD at national level respectively [10]. Similarly, the unmet need for limiting was 9% in EDHS 2011 [8]. Identifying determinant factors in using LARC's helps in improving utilization of long acting reversible contraceptives among young women so that women have options and are able to receive the method of their choice is important in reducing unintended pregnancies and abortions and saves their lives [11] but studies on determinants of LARC utilization among youth groups are limited in Ethiopia, particularly also in the study area. So, this study aimed to assess the utilization of LARC and factors associated with use of LARC.

2. Methodology

2.1. Study Design and Area

Institutional based cross section study was conducted from 10-25 April, 2015 in four Colleges found in Debre Berhan town. The town is one of the districts of Amhara Regional State and found 130 kilometers far away from Addis Ababa, the capital city of Ethiopia and 693 kilometers from Bahridar, the capital city of Amhara regional state. According to 2007 census the town has 94,829 total populations out of which 50,259 (53%) are female and 21,972 women of reproductive age groups. The town has one governmental and one private hospital, three health centers, 17 private clinics, one University, three governmental and one private colleges and three high schools.

2.2. Data Collection Procedure

Self-administered structured questionnaire constitute information on socio-demographic variables, reproductive history, knowledge, attitude and utilization of LARC were distributed. The questionnaires were adapted from different studies considering the local situation of the study area [12], [13]. The questionnaire was initially prepared in English then translated in to local language, Amharic, by language expert. To check whether the translation was consistent with the English version the questionnaire was back translated to English by another language expert. Before the actual data collection, the questionnaire was pre tested outside of the study area, Debre Berhan University, among 20 students. After the pretest, some modifications on the questionnaire and estimation of the time needed to fill the questionnaire were made.

2.3. Sample Size and Sampling Procedure

Sample size was calculated using single population proportion by open Epi software using the following assumptions; 3688 number of female college students in Debre Berhan town, a 95% confidence interval, 5% precision, 26.9% prevalence for current use of LARC in Amhara regional state [7], 1.5 design effect and 5% of the sample size used to compensate for non-response.

A multi-stage sampling technique was used to select the study participant. The sample size was allocated to each colleges using probability proportionate to the number of students then four departments from Polytechnic and Victory College, three departments from Teacher and Training College and two departments from Health Science College were selected by simple random sampling technique using lottery method. Students of the selected departments were also selected proportion to size in each department to share the sample size by simple random sampling technique from each section/level using computer method from the list of students.

2.4. Measurement

Participant's knowledge was measured by the total number of correct answers to 7 items on knowledge with a minimum score of 0 and maximum of 7. A knowledge score was calculated for each participant based on the number of questions correctly answered in the knowledge section. A score of 1 was assigned to every correct answer and a score of zero to incorrect responses.

Knowledge questions was scored and pulled together and the mean score was computed to determine the overall knowledge of the participants. Participants scored above the mean were considered as having good knowledge and below average as having poor knowledge.

Similarly, participant's attitude was measured by the total number of 10 items with a minimum score of 0 and maximum of 10. A score of 1 was assigned to every correct answer and a score of zero to incorrect responses.

Attitude questions was scored and pulled together and the mean score was computed to determine the overall attitude of the participants. Participants scored above the mean were considered as having positive attitude and below average as having negative attitude. LARC utilization was determine from binary outcome variable (Yes, No).

2.5. Data Analysis

Data was entered, cleaning using Epi info 3.5.4 then exported to SPSS version 20 in for statistical analyses. Descriptive analysis for summary statistics was conducted for the independent variables. The outcome variable was current use of LARC methods which was a binary categorical variable (yes, no). The independent variables with a $p \leq 0.2$ were included in the multivariate binary logistic regression model to identify the independent predictors of use of LARC.

2.6. Ethical Clearance

Ethical approval to conduct this study was obtained from Debre Berhan University College of Health Science, Research and Ethics Committee. Permission to conduct the study in each College was secured from the respective Colleges of Debre Berhan Town. Verbal informed consent was obtained from each study, students after clear explanation about the purpose of the study.

3. Result

3.1. Socio-demographic Characteristics of the Study Participants

A total of four hundred twenty-seven (427) students were responded to the questionnaires making a response rate of 96.8%. The age of study participant was between 17 and 24 years with the mean (\pm SD) age of 20.5 ± 1.8 years. Almost all of the students 404(94.6%) were orthodox Christian by religion and more than three quarter of the students were also single in marital status (Table 1).

Table 1. Socio demographic characteristics of female college students in Debre Berhan town, Ethiopia 2015.

Variables	Category	Frequency	Percent
Age	<20	118	27.6
	20-24	309	72.4
	Total	427	100
Religion	Orthodox	404	94.6
	Protestant	14	3.3
	Muslim	9	2.1
	Total	427	100
Residence	Urban	211	49.4
	Rural	216	50.6
	Total	427	100
College	Private	124	29.0
	Government	303	71.0
	Total	427	100
Year of study	1 st year	147	34.4
	2 nd year	59	13.8
	3 rd year	221	51.8
	Total	427	100
Monthly pocket money	\leq 500 birr	338	79.2
	\geq 501 birr	89	20.8
	Total	427	100
Marital status	Single	328	6.8
	Not married but have sexual partner	51	11.9
	Married	38	8.9
	Divorce/Separated	10	2.3
	Total	427	100

3.2. Reproductive and Sexual History

Of the study Students, one hundred eleven (26%) of them were sexually active and 12 (2.8%) had history of pregnancy with the mean (\pm SD) age at first pregnancy 18.9 ± 1.9 years. 6 of the pregnancies were unintended and 4 of them were ended with abortion. Majority of the Students (89.9%) want to have children in the future up to 2 children.

3.3. Knowledge and Attitude Towards Long Acting Reversible Contraceptive Methods

More than three quarter of the students 365 (85.5%) and 358 (83.5%) have heard about modern contraceptive and LARC respectively. The most common known modern contraceptives among the students were injectable, implants and IUCD. The main sources of information were 190 (53.1%) from health professionals followed by 119 (33.2%) from mass media. Among the students 42.2%, and 70% were aware about the duration of protection for IUCD and implants respectively. Similarly, 68% and 71.2% of the students were also aware that IUCD and implants results immediate pregnancy after their removal respectively. Majority of the students (85.5%) knew that they can get long acting reversible contraceptives from government health facilities but 6.7% didn't know where to get LARC methods. Generally, 225 (52.7%) of the students had good knowledge about long acting reversible contraceptive methods. Two hundred seventy-two (63.7%) and 248 (58.1%) of the students had good knowledge about IUCD, and implants respectively.

Concerning the attitude 279 (65.3%) of the students believe that using implants doesn't restrict from normal routine activities and 295 (69.1%) of the student also believe using IUCD doesn't restrict sexual intercourse. Additionally, 190 (44.5%) of the students perceived insertion and removal of implants is not highly painful. Generally, nearly half (43.3%) of the students had positive attitude towards LARC. 157 (36.8%) and 173 (40.5%) of the students also had positive attitude towards IUCD and implants respectively.

3.4. Utilization of Long Acting Reversible Contraceptive Methods Among Female College Students in Debre Berhan Town

Out of the sexually active students 58 (52.3%) and 46 (41.4%) had history of modern contraceptive and LARC utilization respectively. from those who have used LARC in the past, 54.3% and 2.2% used implant and IUCD respectively. Out of the total sexually active students 26 (23.4%) were using LARC and 85 (76.6%) were not using LARC during the study period (Figure 1). Twenty-three of them were using implants. The main reasons cited by the study students for not using LARC were fear of side effect 53.3%, followed by lack of knowledge about the methods 38% (Figure 2).

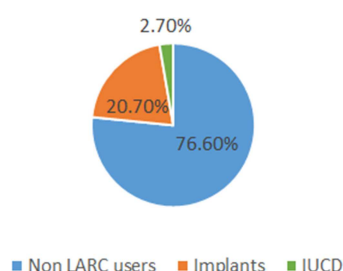
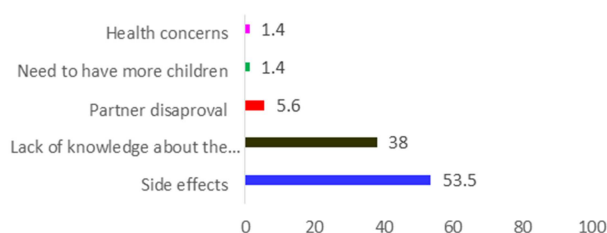


Figure 1. Utilization of LARC's by the sexually active female college students in Debre Berhan Town, Ethiopia, 2015.



N. B: Some students may give more than one answer

Figure 2. Reason for not using LARC among female college students in Debre Berhan town, Ethiopia, 2015.

Table 2. Predictors of long acting reversible contraceptive use among female college students in Debre Berhan town, Ethiopia, 2015.

Characteristics		Utilization of LARC		AOR (95%CI)	COR (95%CI)
		Yes (%)	No (%)		
Source of information from health Professionals	Yes	20 (37)	34 (63)	3.632 (1.301-10.140)	5.021 (1.374-18.353)
	No	6 (10.5)	51 (89.5)	1	1
Source of information from educational institutions	Yes	8 (19.5)	33 (80.5)	2.121 (0.790-5.694)	1.091 (0.333-3.569)
	No	18 (25.7)	52 (73.3)	1	1
Monthly pocket money	<100	1 (9.1)	10 (90.9)	1	1
	100-500	15 (23.1)	50 (76.9)	3.000 (0.355-25.373)	0.918 (0.086-9.828)
	501-1000	7 (25.9)	20 (74.1)	3.500 (0.377-32.503)	1.487 (0.134-16.536)
	>1000	3 (37.5)	5 (62.5)	6.000 (0.490-73.452)	3.136 (0.213-46.215)
Knowledge about implants	Good	20 (30.3)	46 (69.7)	2.826 (1.032-7.737)	3.325 (1.028-10.751)
	Poor	6 (13.3)	39 (86.7)	1	1
Attitude towards LARC	Positive	7 (16.7)	35 (83.3)	1.900 (0.722-5.003)	2.440 (0.713-7.901)
	Negative	19 (27.5)	50 (72.5)	1	1

4. Discussion

This study was aimed to assess the utilization of long acting reversible contraceptive methods and associated factors among female college students in Debre Berhan Town. The current utilization of LARC among sexually active students in this study was 23.4% which is consistent with the study conducted in Mexico among adolescents [14] and study conducted in Nigeria among female undergraduate university students [15] but higher than the Amhara regional state result of Ethiopia Mini Demographic and Health Survey (EMDHS) [7] and the studies conducted in Arba Minch, Mekelle, Nigeria and Uganda [11, 14–16] which were conducted among all women of reproductive age groups. The reason for this might be due to the difference in educational

3.5. Determinant Factors of LARC Utilization

All sociodemographic characteristics, reproductive history, knowledge and attitude about LARC were assessed for the presence of association with utilization of long acting reversible contraceptive. Source of information from health professionals' educational institutions, monthly pocket money, knowledge about implants and attitude about LARC were shown an association in bivariate binary logistic regression analysis. But after controlling for confounding variables source of information from health professionals [AOR 5.021 (95% CI 1.374, 18.353)] and knowledge about implants [AOR 3.325 (95% CI 1.028, 10.751)] were remained significantly associated with current use of LARC.

Students who have heard about modern contraceptive from health professionals were 5 times more likely to use LARC as compare to those who did not used health professionals as source of information and students who have good knowledge about implants were 3.3 times more likely to use LARC as compare to those who have poor knowledge about implants (Table 2).

status of the study students. The study participants of this study were college students, so that they might have better access to different sources of information about contraceptives methods than women's of reproductive age groups and the students of other studies who were lower educational status. The other reason might be also age level. The age level of the current study was younger than the other studies. Being young age and on process of education might push to use LARC than the old age women. A study conducted in Ethiopia on uptake of implants (implanon) was shown that implanon acceptors were younger age groups and had more years of education [19]. This is also supported by the study conducted in Malawi which revealed primary educated women were 1.28 times more likely to use LARC methods when compared to uneducated women and women with secondary education. Women with higher education

were also 1.32 times more likely to use LARC methods when compared to uneducated women and women with primary education [20].

The most commonly used method among the sexually active LARC users was implants which is 23 out of 26 women's (88.5%) were implants users. This is higher than the studies conducted in Mekelle (15) and inconsistent with study conducted in Nigeria. In a study conducted in Nigeria the most commonly used LARC was IUCD. The reasons for this difference might be due to availability of the implants methods in each Health posts at the kebele level in Ethiopia and getting training the Health Extension Workers (HEWs) on insertion of implanon atleast one per health post [21] but according Ethiopian family planning guideline HEWs couldn't give IUCD service at health post rather they referred to health center [22]. This might be also the reason for the low utilization of IUCD in the current study. Of the sexually active students 76.6% didn't use LARC during the study period. The main reasons cited by the students for not using the long acting reversible contraceptive methods were fear of side effects and lack of knowledge about LARC's. This is consistent with the studies conducted in Mekelle [13], [16]. This is also supported by a qualitative study conducted in Scotland which reveal a lack of in-depth knowledge about LARC and the opinion that LARC methods were for older women were cited as barriers to the use of LARC [23].

In this study 52.7% and 43.3% of the students had good knowledge and positive attitude towards LARC methods. Regarding the IUCD method, even though majority of the students had good knowledge but more than half had negative attitude and low utilization. The reason might be due to misconception and due to requirement of examination which is uncomfortable to some women. This is supported by a study in Australia, one focused group participants quoted "I've heard they try not to give [IUDs] to younger women". Healthcare professionals also reported that the need for a vaginal examination was a deterrent to many young women [24]. The negative attitude and low utilization towards IUCD among young women needs further investigations.

Results of regression analysis showed that source of information from health professionals [AOR 5.021 (95% CI 1.374, 18.353)] and knowledge about implants [AOR 3.325 (95% CI 1.028, 10.751)] were the predictor factors of current utilization of long acting reversible contraceptive methods among college students in Debre Berhan Town. Unlike the current study, studies conducted in Mekelle, Debre Markos, and Arba Minch indicated that educational level, age, occupation, and attitude were the predictor factors with utilization of long acting reversible contraceptive methods. Students who use source of information for contraceptives from health professionals were 5 times more likely use LARC as compared to those who didn't used health professionals as source of information. This might be related to the fact that health professionals are more likely to dispel any myths and misconceptions that usually come from friends or community, who would have had negative experiences with the utilization of LARC [20]. Students who

had good knowledge about implants were 3.3 times more likely use LARC as compare to those who have poor knowledge about implants. This might be because of students who have good knowledge about implants are more likely balance the benefits and disadvantages and also decide easily to use the method.

Focused on young females rather than only on adult married females be the strength of this study but it has some limitations; due to the nature of the cross sectional study design temporality between the current utilization of LRC and independent factors couldn't assure. Since this study was included only young women pursuing college studies. It may not be representative of young females of Debre Berhan. This study was based on the self-report of the Students, it difficult to guarantee that the Students provided honest answers to questions

5. Conclusion

Even though the level of knowledge and attitude in this study was satisfactory, the utilization of long acting reversible contraceptive among college students was relatively low. In addition to this there was great difference in utilization of the specific methods of long acting reversible contraceptive with very low utilization in IUCD method. Getting information from health professionals and having good knowledge about implants were the predictor factors for the utilization of long acting reversible contraceptive methods among college students. The findings have implications for family planning programs to critically address ways to increase use of long acting reversible contraceptives methods among youth groups. Government and non-government organizations should have made special strategy for youth college students to increase their utilization of modern contraceptive, particularly the long acting reversible contraceptive methods by focusing on increasing youth's knowledge and attitude about safety, advantage and disadvantage, effectiveness, and side effects of long-acting reversible contraceptive methods. Health care provider's capacity should be strengthened to promote and delivered long acting reversible contraceptive methods to youth. Moreover, further study should be done to produce better evidence focusing on the service providers, service delivering institutions and to identify factors influencing the utilization of long acting reversible contraceptive methods.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contributions

WT, KA, AM, CN GA and GD were involved in the design of study, data collection and analysis. KB, WT and WN were involved in design of the study, analysis of the data, preparing the draft and critically reviewing the manuscript. All authors read and approved the final manuscript.

Acknowledgment

We gratefully acknowledge to Debre Berhan Health Science College, Poly Technic College, Victory College, and Teacher Education College as well as our study participant their cooperation and assistance.

References

- [1] Health Communication Capacity Collaborative, “Barriers to LARC Uptake Among Youth,” 2014.
- [2] C. Oranganje, M. Mm, H. Eko, E. Esu, A. Meremikwu, and E. Je, “Interventions for preventing unintended pregnancies among adolescents (Review),” *Cochrane Libr.*, no. 1, 2010.
- [3] D. Mesce, “Unsafe Abortion, facts and figures,” 2005.
- [4] World Health Organization, “Unsafe abortion: Global and regional estimates of the incidence of unsafe abortion and associated mortality in 2003,” 5th edition, 2007.
- [5] The American College of Obstetrician and Gynecologists, “Long-Acting Reversible Contraception (LARC),” 2016.
- [6] P. MacDonald, “Approaches for expanding choice and access to long-acting reversible contraceptives and permanent methods of family planning.”
- [7] C. S. Agency, “Ethiopia Mini Demographic and Health Survey 2014,” Addis Ababa, Ethiopia, 2014.
- [8] Central Statistical Agency and ICF International, “Ethiopia Demographic and Health Survey 2011,” Addis Ababa, Ethiopia and Calverton Maryland, USA, 2012.
- [9] Guttmacher Institute, “Benefits of Meeting the Contraceptive Needs of Ethiopian Women,” 2010.
- [10] World Health Organization, “Trends in Maternal Mortality : 1990 to 2013: Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Division,” Geneva, 2014.
- [11] R. Smith, L. Ashford, J. Gribble, and D. Clifton, “Family Planning saves lives, fourth edition,” Washington, DC, USA, 2009.
- [12] R. Anguzu, R. Tweheyo, J. N. Sekandi, V. Zalwango, C. Muhumuza, S. Tusiime, and D. Serwadda, “Knowledge and attitudes towards use of long acting reversible contraceptives among women of reproductive age in Lubaga division, Kampala district, Uganda,” *BMC Res. Notes*, vol. 7, no. 1, pp. 1–9, 2014.
- [13] M. Alemayehu, T. Belachew, and T. Tilahun, “Factors associated with utilization of long acting and permanent contraceptive methods among married women of reproductive age in Mekelle town, Tigray region, north Ethiopia,” *BMC Pregnancy Childbirth*, vol. 12, no. 1, p. 6, 2012.
- [14] B. S. Zafiro and A. M. I. Rodriguez, “Adolescents and Long-Acting Reversible Contraception : Lessons from Mexico,” *Matern. Child Health J.*, 2016.
- [15] A. O. I. Fabamwo adetokunbo Olusegun, Wright Kikelomo Ololade, “Knowledge and practice among students,” *Res. J. Med. Sci.*, vol. 6, no. 4, pp. 181–186, 2012.
- [16] H. Gebremichael, F. Haile, A. Dessie, A. Birhane, M. Alemayehu, and H. Yebyo, “Acceptance of long acting contraceptive methods and associated factors among women in Mekelle city, Northern Ethiopia,” *Sci. J. Public Heal.*, vol. 2, no. 4, pp. 349–355, 2014.
- [17] Y. W. Mohammed Amin Abdrahman, Shegaw Getinet, Nadew Kemaw, Tamrat Kansa, Zeru Getachew, Desta Hailu, “Long Acting Contraceptive Method Utilization and Associated Factors among Reproductive Age Women in Arba Minch Town, Ethiopia,” *Greener J. Epidemiol. Public Heal.*, vol. 2, no. 1, pp. 023–031.
- [18] S. W. Gudaynhe, D. T. Zegeye, T. Asmamaw, and G. D. Kibret, “Factors Affecting the use of Long-Acting Reversible Contraceptive Methods among Married Women in Debre Markos Town, Northwest Ethiopia 2013,” *Glob. J. Med. Res.*, vol. 14, no. 5, 2014.
- [19] M. Asnake, E. G. Henry, Y. Tilahun, and E. Oliveras, “Addressing unmet need for long-acting family planning in Ethiopia : Uptake of single-rod progestogen contraceptive implants (Implanon) and characteristics of users,” *Int. J. Gynecol. Obstet.*, vol. 123, no. October 2009, pp. e 29–e 32, 2013.
- [20] Violet Nyambo, “Factors influencing long acting reversible contraceptive use in Malawi,” Witwatersrand, 2013.
- [21] Federal Democratic Republic of Ethiopia Ministry of Health, “A Situation Analysis of Family Planning in Ethiopia, June 2011.”
- [22] Federal Democratic Republic of Ethiopia Ministry of Health, “National guideline for family planning services in Ethiopia,” 2011.
- [23] E. Okpo, L. Allerton, and S. Brechin, “‘But you can’t reverse a hysterectomy!’ Perceptions of long acting reversible contraception (LARC) among young women aged 16 - 24 years : a qualitative study,” *Public Health*, vol. 128, no. 10, pp. 934–939, 2014.
- [24] C. C. Garrett, L. A. Keogh, A. Kavanagh, J. Tomnay, and J. S. Hocking, “Understanding the low uptake of long acting reversible contraception by young women in Australia : a qualitative study,” *BMC Womens. Health*, vol. 15, no. 72, pp. 1–10, 2015.