

# Factors Influencing the Choice between IUD and Implant among Long-Acting Reversible Contraceptive (LARCs) Users in Burkina Faso

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## Abstract

**Background:** Long-acting and reversible contraceptive methods hold great potential as solutions to address the unmet need for contraception and the significant discontinuation rates, especially in sub-Saharan Africa. Among these methods, the Implant has gained popularity in sub-Saharan Africa, whereas the utilization of Intrauterine Devices (IUDs) has remained comparatively low, particularly in Burkina Faso. This study aims to evaluate the shifts in IUD and Implant usage from 2010 to 2020 and to pinpoint the factors influencing the choice of IUDs among LARCs users in Burkina Faso. **Data and Methods:** We conducted an analysis using data from Burkina Faso, drawn from the 2010 Demographic and Health Survey (DHS) and the 2020 PMA Phase 1 data. The 2010 DHS garnered responses from 17,087 women aged 15 - 49, achieving a response rate of 98.4%. The 2020 PMA data collected responses from 6590 women aged 15 - 49, with a response rate of 95.8%. The final sample of Long-Acting Reversible Contraceptives (LARCs) users consisted of 1502 women, including 576 women from the 2010 survey and 926 women from the 2020 survey. **Results:** The study demonstrates an expansion of IUD usage to include socioeconomically disadvantaged segments among LARC users. However, higher levels of education, older age, and decisions influenced by healthcare providers are correlated with the preference for IUDs over Implants. The choice of IUDs is also connected to a comprehensive understanding of contraceptive methods, suggesting potential biases in the counseling process. **Conclusion:** Facilitating the broader adoption of IUDs among disadvantaged groups could be achieved by improving the accessibility of IUD products and services in rural areas. Nevertheless, there should be focused initiatives to enhance access to removal services, as this factor could dissuade specific users. Further efforts are required to train healthcare pro-

viders, aiming to mitigate biases in delivering Long-Acting Reversible Contraceptives (LARCs). Providers should provide impartial counseling, irrespective of the selected type of LARC.

## Keywords

Modern Contraceptives, Long-Acting Reversible Contraceptives (LARCs), Contraception, Family Planning, Autonomy, Burkina Faso

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## 1. Background

Sub-Saharan Africa boasts the highest population growth rate globally. In this region, a staggering 52 million women who wish to avoid pregnancy do not employ modern contraceptives [1]. On a global scale, IUDs stand as the leading nonpermanent method of contraception, and they have the potential to be the first-line contraceptive choice for women without contraindications [2]. Despite recent advancements in modern contraceptive use, this region continues to lag. Specifically, Sub-Saharan Africa exhibits the lowest prevalence of modern contraception (18%) and the highest rate of unmet contraception needs (24%) [3].

Numerous African nations are characterized by the rise of long-acting reversible contraceptives (LARCs), especially Implants. Recent developments indicate a rapid surge in the use of contraceptive implants and IUDs across much of sub-Saharan Africa [4] [5]. This inclination towards LARCs stems from their effectiveness and user-friendly nature, positioning them advantageously over short-term contraceptives. Unlike most short-term methods, LARCs require minimal effort post-insertion without the need for consistent daily administration.

There are two primary types of IUDs: hormonal and non-hormonal. The hormonal IUD contains the progestin levonorgestrel (LNG), which is released daily to thicken cervical mucus and prevent pregnancy. The main side effects of this method are irregular bleeding and spotting. On the other hand, the non-hormonal IUD contains copper, which releases ions into the uterus acting as a spermicide. For the Copper IUD, the main side effect is heavy bleeding during periods. The Implant contains the hormone etonogestrel, which functions by inhibiting ovulation. The primary side effect here is changing in bleeding patterns, including irregular bleeding and spotting [6].

Multiple factors influence LARC promotion. On the supply side, despite potentially higher initial costs, IUDs have been demonstrated to be the most cost-effective reversible contraceptive [7] [8]. Another recent study examining contraceptive cost-effectiveness concluded that the ENG implant is the most cost-effective compared to other long-term or short-term reversible methods [9]. Initial delays in implant adoption primarily resulted from its historically high cost [5]. However, reduced prices, increased supply, and widespread adoption of high-impact practices have led to a rapid increase in implant prevalence in sub-Saharan African countries [5]. Although implant prevalence is significant in sev-

eral countries, the prevalence of IUDs remains low in the region [5].

IUD provision demands more skilled provider intervention compared to Implant insertion. Implant insertion is often deemed easier and has been successfully conducted by frontline providers in certain sub-Saharan African countries [5]. In contrast, IUD insertion is perceived as more challenging, potentially resulting in limited availability of IUD-related services in remote and rural areas. Additionally, IUD insertion is more time-consuming compared to the Implant [10], potentially adding to the method's overall cost. Access to method supply and related services, including out-of-stock situations, equipment availability, counseling, follow-up services, and side effect treatment, can influence method access. In certain regions, insertion may be more accessible than removal, potentially hindering the method's reputation [11].

Providers serve as vital links between contraceptive supply and demand through counseling and method provision. Provider perceptions can influence contraceptive use based on women's characteristics [12]. If sociodemographic factors like age, marital status, and number of children can impact the choice of LARCs over short-term methods [13], other misconceptions, lack of information, and concerns about side effects can impede IUD usage [14] [15]. In Burkina Faso, modern contraceptive prevalence has increased over the years, particularly after the adoption of a free contraceptive policy in 2019. Research on factors influencing the choice between LARCs and short-term methods has been conducted, but little is known about factors distinguishing IUD from Implant use, especially in a sub-Saharan context. This study seeks to understand IUD prevalence trends among LARC users between 2010 and 2020 and the factors influencing IUD choice in 2020 in Burkina Faso.

## 2. Data and Methods

### 2.1. Data

We conducted an analysis using data from Burkina Faso obtained from the 2010 Demographic and Health Survey (DHS) and the PMA Phase 1 data. The 2010 DHS was conducted between May and December 2010 across 574 enumeration areas. Data collection garnered responses from 17,087 women aged 15 - 49 years, achieving a response rate of 98.4%. The DHS program obtained approval from the ICF Institutional Review Board (IRB) and the National Ethics Committee of Burkina Faso. The 2020 PMA data were collected from 167 enumeration areas selected through a multi-stage stratified cluster design, further stratified by urban or rural residents. Between December 2019 and February 2020, 6590 women aged 15 - 49 were interviewed, resulting in a response rate of 95.8%. The PMA Phase 1 survey received approval from the National Ethics Committee of Burkina Faso. The family planning data collected in the 2020 PMA2020 survey and the 2010 DHS are comparable since they obtained almost identical indicators, aligning with the implementation of both surveys [5]. Among all the women aged 15 to 49 surveyed in these two surveys, our analyses specifically encompassed Long-Acting Reversible Contraceptives (LARC) users. Our focus was di-

rected toward highlighting the propensity of a woman to choose one type of LARC over another. LARC users are identified as individuals employing Implants or IUDs. By utilizing this inclusion criterion, we attained a sample size of 1502 women, comprising 576 women from the 2010 survey and 926 women from the 2020 survey.

## 2.2. Variables

We examine a series of variables to investigate the factors influencing the choice of each LARC. Firstly, we consider a set of socioeconomic variables, including place of residence (urban, rural), educational level (no education, primary, secondary, or higher), and standard of living (categorized as poor, medium, or rich). Next, we analyze socio-demographic variables such as age (grouped into three categories: 15 - 24 years old, 25 - 39 years old, and 40 - 49 years old), parity (grouped into three categories: no children, one to three children, four children or more), and marital status (in a union or not in a union). Additionally, we incorporate two variables concerning method information and the decision-maker for the current contraceptive. The first variable assesses the level of method information and is derived from three questions regarding awareness of other methods, side effects, and steps to take in case of side effects. These three items demonstrate good internal consistency with a Cronbach's alpha of 0.79. They were recoded into binary values (0 and 1), summed, and then further recoded into terciles. The second variable pertains to the ultimate decision-maker for the chosen method. We reorganized the original categories into three new ones: 1 = Woman alone; 2 = Provider alone/Woman and provider; 3 = Partner alone/Woman and partner/Other.

## 2.3. Analyzes

We employed descriptive analysis to illustrate the distribution of these two long-acting and reversible contraceptives based on our independent variables. This approach also enabled us to examine the trend between the two-time points using a 95% confidence interval. In the second section of the paper, we employed multivariate logistic regression to evaluate the influence of individual characteristics on the selection of IUDs among LARC users in 2020. The dependent variable was recoded as follows: 0 = Use of Implant; 1 = Use of IUD. This portion of the study facilitated the assessment of the Odds Ratio for choosing an IUD among women who opted for long-term contraceptive methods.

## 3. Results

### 3.1. Trend in IUD Usage among LARCs Users

**Table 1** displays the proportion of IUD users across various categories of independent variables for both the DHS 2010 and PMA 2020 surveys. For each category, we present the prevalence, along with the corresponding 95% confidence interval and non-weighted frequency. The overall prevalence of IUD users increased

**Table 1.** Sample characteristics and part of IUD usage among LARCs users in 2010 and 2020.

	<i>DHS 2010</i>			<i>PMA 2020</i>		
	Prevalence of IUD	95% CI	Frequency	Prevalence of IUD	95% CI	Frequency
<b><i>Place of residence</i></b>						
Urban	14.62	[9.00 - 22.87]	280	15.94	[12.99 - 19.41]	546
Rural	1.71	[0.80 - 3.59]	296	6.83	[3.95 - 11.58]	380
<b><i>Wealth</i></b>						
Lowest tercile	0.98	[0.29 - 3.26]	192	8.23	[4.43 - 14.81]	176
Middle tercile	1.56	[0.51 - 4.71]	192	6.95	[2.83 - 16.09]	203
Highest tercile	18.69	[11.72 - 28.46]	192	11.81	[8.58 - 16.03]	547
<b><i>Education</i></b>						
No formal education	2.34	[1.08 - 4.98]	354	6.66	[3.75 - 11.57]	442
Primary	12.83	[7.54 - 20.97]	121	12.98	[8.31 - 19.70]	206
secondary or high	19.35	[8.67 - 37.76]	101	12.61	[9.08 - 17.24]	278
<b><i>Age group</i></b>						
15 - 24	4.86	[1.57 - 14.09]	104	3.23	[1.03 - 9.72]	250
25 - 39	7.50	[4.14 - 13.22]	352	10.22	[6.96 - 14.78]	498
40 - 49	9.25	[4.12 - 19.46]	120	13.11	[6.26 - 25.44]	178
<b><i>Parity</i></b>						
Less than 3 children	7.92	[4.09 - 14.79]	178	6.68	[3.83 - 11.40]	382
3 to 4 children	7.28	[3.44 - 14.74]	173	11.38	[6.95 - 18.07]	268
5 or more children	7.11	[3.91 - 12.60]	225	9.39	[4.99 - 16.98]	276
<b><i>Marital status</i></b>						
Single	14.60	[4.71 - 37.15]	31	9.83	[4.35 - 20.70]	135
Live with partner	7.04	[4.34 - 11.22]	545	8.91	[6.20 - 12.63]	791
<b><i>Final method decision maker</i></b>						
Woman alone				6.37	[4.23 - 9.49]	637
With provider				18.51	[10.53 - 30.48]	122
With a partner or other				11.92	[6.70 - 20.33]	167
<b><i>Level of method information</i></b>						
Low	7.32	[2.75 - 18.07]	74	1.05	[0.41 - 2.67]	150
Middle	10.34	[4.73 - 21.15]	110	10.84	[6.38 - 17.82]	313
High	6.47	[4.03 - 10.24]	392	10.99	[7.12 - 16.57]	463
<b><i>Total</i></b>	<b>7.40</b>	<b>[4.76 - 11.34]</b>	<b>576</b>	<b>8.99</b>	<b>[6.45 - 12.40]</b>	<b>926</b>

Notes: The analysis includes only LARCs users; proportions are weighted but frequencies are not weighted; data are from the women's 2010 Demographic and Health Survey and the 2020 PMA Phase 1 data.

from DHS 2010 (7.40%) to PMA 2020 (8.99%). However, this increase is not statistically significant within the 95% confidence interval.

In both the DHS 2010 and PMA 2020 surveys, the prevalence of IUD usage was generally higher in urban areas compared to rural areas. Notably, in rural areas, the increase was significant, rising from 1.71% (95% CI = [0.80 - 3.59]) in 2010 to 6.83% (95% CI = [3.95 - 11.58]) in 2020. Conversely, urban areas saw only a slight increase from 14.62% in 2010 to 15.94% in 2020. Despite this increase, the proportion of IUD usage remains lower in 2020.

IUD usage proportions were lower in the lowest wealth tercile and higher in the highest wealth tercile in both surveys. However, noteworthy is the increase in IUD usage across all wealth terciles in the 2020 PMA Phase 1 data compared to the 2010 DHS data. This increase was significant for the lower tercile only. In 2020, there were no significant differences in IUD use across wealth categories.

Variation in the proportion of IUD users was observed across different levels of education. In both surveys, individuals with secondary and higher education exhibited the highest prevalence of IUD usage, while those with no formal education had the lowest prevalence. In 2010, women with no formal education had a significantly lower prevalence of IUD usage compared to those with primary or secondary education. However, this difference was not significant in 2020.

The prevalence of IUD usage tended to increase with age in 2010, although these differences were not statistically significant. At PMA 2020, the prevalence was significantly lower for the 15 - 24 age group compared to the age groups of 25 - 39 and 40 - 49. In 2010, the prevalence of IUD usage was comparable among women with different parity levels. However, in 2020 data, the prevalence was significantly lower for women with less than 3 children compared to women with other levels of parity. For the 2020 survey, the prevalence increased across the two categories of women with 3 to 4 children and five children or more. The prevalence of IUD usage varied based on marital status. In both surveys, single individuals tended to have a higher prevalence of IUD usage compared to those living with a partner. Nevertheless, the two categories were significantly different in 2010 but not in 2020.

Furthermore, the prevalence of IUD usage was three times higher among individuals who decided with the help of providers compared to those who decided on the method alone. In 2010, there were no significant differences by level of method information, but women with a middle level of information were more likely to use IUDs. Additionally, a significant decrease in IUD prevalence was observed among women with low levels of information. In 2020, the prevalence of IUD usage varies based on the level of method information, with women having a low level of information exhibiting a significantly lower prevalence of IUD use compared to those with higher levels of information.

### **3.2. Factors Linked to IUD Utilization among LARC Users in 2020**

In this study, we aimed to identify the variables associated with IUD use in Burkina Faso in 2020. **Table 2** presents the odds ratios (OR) depicting the relationship

**Table 2.** Odds ratios of IUD usage among LARC users in Burkina Faso in 2020.

	Non-adjusted effects		Adjusted effects	
	OR	95% CI	OR	95% CI
<b><i>Place of residence</i></b>				
Urban	1		1	
Rural	0.39 ***	[0.20 - 0.75]	0.46 *	[0.21 - 1.03]
<b><i>Household wealth</i></b>				
Low	1		1	
Middle	0.83	[0.25 - 2.76]	0.8	[0.21 - 3.10]
High	1.49	[0.74 - 3.01]	0.55	[0.19 - 1.62]
<b><i>Education</i></b>				
No formal education	1		1	
Primary	2.09 *	[0.97 - 4.49]	2.65 **	[1.23 - 5.72]
Secondary+	2.02 *	[0.95 - 4.29]	2.94 ***	[1.50 - 5.77]
<b><i>Age group</i></b>				
15 - 24	1		1	
25 - 39	3.41 *	[0.90 - 12.88]	4.55 ***	[1.60 - 12.89]
40 - 49	4.52 *	[0.84 - 24.21]	7.48 **	[1.56 - 35.92]
<b><i>Parity</i></b>				
0 - 2 children	1		1	
3 - 4 children	1.79	[0.81 - 3.96]	1.25	[0.64 - 2.45]
5 children or more	1.45	[0.49 - 4.25]	1.08	[0.42 - 2.76]
<b><i>Marital status</i></b>				
Married	1		1	
Not married	1.11	[0.40 - 3.08]	1.41	[0.52 - 3.87]
<b><i>Method decision maker</i></b>				
Woman alone	1		1	
Provider/Woman with the provider	3.34 ***	[1.61 - 6.91]	5.04 ***	[2.40 - 10.59]
Partner/Woman with partner/Other	1.99 **	[1.02 - 3.88]	2.42 **	[1.21 - 4.83]
<b><i>Level of method info</i></b>				
Low	1		1	
Middle	11.45 ***	[3.91 - 33.50]	11.45 ***	[3.62 - 36.23]
High	11.62 ***	[3.83 - 35.26]	11.33 ***	[3.29 - 39.03]

Notes: The analysis includes only LARCs users. Data are from the women's 2010 Demographic and Health Survey and the 2020 PMA Phase 1 data; \*\*\* p < 0.01, \*\* p < 0.05, \* p < 0.1.

between socio-demographic variables and IUD use among LARC users. The non-adjusted effects reveal the raw association between each factor and the outcome, while the adjusted effects account for potential confounding variables. We consider significance at the 5% threshold.

The rural residence is significantly linked to a decreased likelihood of opting for an IUD, showing an OR of 0.39 (95% CI: [0.20 - 0.75]) in the non-adjusted model. However, the OR of 0.46 (95% CI: [0.21 - 1.03]) is not statistically significant in the adjusted model. In the adjusted model, the odds of choosing an IUD are higher among women with primary education compared to those with no formal education, displaying an OR of 2.65 (95% CI: [1.23 - 5.72]). Similarly, women with secondary education or higher exhibit a similar trend, with an OR of 2.94 (95% CI: [1.50 - 5.77]). Additionally, the adjusted model indicates that women aged 40 - 49 have significantly higher odds of IUD use compared to women aged 15 - 24, displaying an OR of 7.48 (95% CI: [1.56 - 35.92]), while those aged 25 - 39 have significantly higher odds of using IUDs, with an OR of 4.55 (95% CI: [1.60 - 12.89]).

Moreover, women are five times more likely to opt for an IUD when the decision is made by a provider or with the provider's assistance. They are also twice as likely to choose an IUD when their partner is involved in the method decision process, with an OR of 2.42 (95% CI: [1.21 - 4.83]). The level of method information is also significantly linked to the choice of IUD. LARC users possessing a moderate to high level of method information were significantly eleven times more likely to select an IUD compared to those with lesser knowledge about contraceptive methods.

Overall, the decade has seen a wider adoption of IUDs among less privileged groups (rural, impoverished, and less educated women), resulting in no significant disparities based on place of residence, parity, marital status, or household wealth. However, in 2020, significant differences persist based on education level, age groups, provider-mediated choices, and method information.

#### 4. Discussion

The presented results in the tables offer valuable insights into the prevalence and factors associated with the utilization of Implants and intrauterine devices (IUDs) in Burkina Faso, by comparing data from the DHS 2010 and PMA 2020 surveys.

The overall prevalence of IUD usage experienced a slight increase from DHS 2010 (7.40%) to PMA 2020 (8.99%). However, this increase did not achieve statistical significance based on the 95% confidence interval. This modest rate of increase over a decade could potentially account for the relatively lower prevalence of IUD usage in Burkina Faso compared to other countries. Much of this increase was observed among underprivileged segments. In both surveys, urban areas exhibited a higher prevalence of IUD usage compared to rural areas. Notably, the substantial rise in IUD usage in rural areas between DHS 2010 and PMA 2020 indicates a promising shift towards more equitable IUD access, which is an



encouraging development. This shift could potentially be attributed to efforts aimed at enhancing access to LARCs, potentially through training of medical personnel. This is particularly important since IUD insertion requires skilled providers, which can sometimes be scarce in rural settings. Mobile clinics may have also played a role in improving access.

The study also found that the prevalence of IUD usage was higher among individuals in the higher wealth tercile in both surveys. While this implies disparities in access in 2010, it is significant that the prevalence of IUD usage increased across all wealth terciles, indicating a positive shift in access among various socioeconomic categories. This change is possibly attributed to increased IUD access through subsidized pricing and the adoption of the contraceptive free access policy.

Variations in IUD usage based on education levels were observed. In both surveys, individuals with secondary and higher education displayed a higher prevalence of IUD usage, while those with no formal education had the lowest prevalence. The significance of the differences between education levels in PMA 2020 may indicate that IUD usage continues to be associated with a higher level of education, potentially reflecting better mastery of method information.

Although the proportion of IUD usage among LARC users was highest among women aged 35 - 49 in both surveys, a noteworthy decrease was observed in the 15 - 24 age group in PMA 2020 compared to DHS 2010. This suggests a need for targeted efforts to promote IUD uptake among younger women. Additionally, the higher odds of IUD use among women aged 40 - 49 and 25 - 39 compared to those aged 15 - 24 highlight the role of age-related factors in IUD adoption. This trend might also be influenced by providers whose perceptions could impact the method choice, possibly rooted in provider bias regarding age eligibility. This reason has been also found as adverse perceptions that hampered IUD uptake [16].

While the prevalence of IUD usage was comparable among women with different parity levels in 2010, a significant decrease was observed in prevalence for women with less than 3 children in PMA 2020. This shift could indicate changing patterns in IUD usage. The increase in prevalence among women with 3 to 4 children and five or more children suggests a growing acceptance of IUDs as a contraceptive option, regardless of the number of children. Marital status did not exhibit significant differences in IUD usage among unmarried and married individuals in both surveys, indicating a relatively equal distribution of IUD usage irrespective of marital status.

The study revealed that provider involvement in the decision-making process was associated with a higher likelihood of IUD selection. This finding aligns with concerns raised by some scholars regarding provider-driven choices, which can sometimes be biased toward LARCs. Providers may present LARCs more prominently due to their advantages, potentially influencing the method selection. This tendency could be particularly relevant for achieving certain targets related to

IUD usage. This trend tends to confirm that the prevalence of IUDs may have been driven by health system strategies as in China where it constitutes 60% of the method mix [17].

Notably, provider bias could also extend to decisions based on women's age, which is closely related to parity. A recent study in Burkina Faso indicated that provider bias, specifically concerning women with high parity, was prevalent [12]. This could explain the observed trends. Similar concerns were reported in Egypt, where provider apprehensions affected IUD availability [17] [18]. While these dynamics could be true in Burkina Faso, they may be especially pronounced for young women, for whom providers might be less inclined to recommend LARCs. Additionally, IUD users were more informed compared to Implant users, suggesting that women opting for IUDs might have received more comprehensive counseling or had a higher level of awareness regarding side effects. In that same line, some scholars think that providers may pressure women to adopt methods they do not fully know the mechanism [19] [20], and then put effort to explain more what it is. This underscores the importance of refining the counseling process.

These results are subject to certain limitations due to the cross-sectional nature of the two surveys. This limitation prevents us from determining the direction of the relationships between the two factors in certain cases. Specifically, the connection between the type of LARCs used and the level of information about the methods may be bidirectional. Well-informed women might be inclined to select a specific method, or the counseling may be influenced by the chosen method. Despite these limitations, the study highlights the influence of provider involvement and information levels on IUD usage among LARC users in Burkina Faso. The observed trends call for targeted efforts to promote IUD adoption among specific demographic groups and reinforce unbiased counseling practices.

## 5. Conclusions

The study offers valuable insights into the utilization of IUDs in Burkina Faso by comparing data from the DHS 2010 and PMA 2020 surveys. However, it is important to acknowledge some limitations stemming from the cross-sectional nature of the survey, which precludes the establishment of causal relationships. Nevertheless, the study yields promising findings concerning the trends and factors influencing the proportion of IUD use among LARCs.

The decade witnessed a slight increase in the overall prevalence of IUD usage. Particularly noteworthy is the positive shift observed in rural areas, the lower socioeconomic tercile, and among women with no formal education, indicating a more widespread adoption of IUDs within underprivileged segments. The study also highlights evolving usage patterns based on parity and marital status, underscoring the significance of accurate contraceptive method information in promoting IUD uptake.

Efforts aimed at enhancing IUD adoption should prioritize improving accessibility for women with lower education levels and younger age groups, who are still underutilizing IUDs compared to other demographics categories. Additionally, addressing provider bias linked to method information and decision-making processes is crucial to ensure equitable access to method information regardless of the chosen contraceptive method. It is imperative to train providers to avoid both under-provision of IUDs to younger women and potential over-provision to older women.

### Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

### Declaration

We utilized secondary data from the 2010 Burkina DHS and PMA Phase 1. The DHS program obtained approval from the ICF Institutional Review Board (IRB) and the National Ethics Committee of Burkina Faso, while the PMA Phase 1 survey received approval from the National Ethics Committee of Burkina Faso. All data are available on these programs' respective websites.

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## **Abbreviations and Acronyms**

DHS: Demographic and Health Survey

OR: Odds Ratio

INSD: Institut National de la Statistique et de la Démographie

LARC: Long-Acting and Reversible Contraceptive

PMA: Performance Monitoring for Action