International Journal of Contemporary Mathematical Sciences
Vol. 16, 2021, no. 1, 35 - 51
HIKARI Ltd, www.m-hikari.com
https://doi.org/10.12988/ijcms.2021.91468

Determinants of Discontinuation and Switching from Family Planning Methods: Applying to the Egyptian Demographic Health Survey Data 2014

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Abstract

The results of the Demographic Health Survey 2014 showed that around 30% of family planning users in Egypt stop using within 12 months of starting use. Side effects and health concerns are the reasons users most often cite for stopping using (11 percent). Four percent of users stop using due to method failure (i.e., they became pregnant while using the method), 6 percent stop using because they want to become pregnant, and 5 percent discontinue as a result of other fertility-related reasons including marital dissolution, infrequent sex, and the onset of menopause. Considering individual methods, the highest rate of discontinuation is observed for prolonged breastfeeding (44 percent), followed by the pill (42 percent) and injectable (38 percent). The IUD has the lowest discontinuation rate; 14 percent of IUD users stop using the method during the first 12 months of use.

The previous results of the Demographic Health Survey are used to perform some secondary analyzes. The study shows many results, the most important of which are that the high cost of the method is not the reason for discontinuation or switching to another method. The factors that reduce the probability of discontinuation of use for method-related reasons are: Women's education and the effectiveness of using the method.

The logistic regression method is also used to determine the most important determinants of discontinuation and switching from the use of family planning

methods. The results of the analysis reveal the significance of six variables and absence of two variables. The study also comes out with some recommendations; the most important of which is the necessity to manufacture the IUD locally in order to reduce the cost of its production.

Keywords: Discontinuation and Switching, Contraceptive, Demographic Health Survey (DHS), IUD

1. Research Problem

The data of the Egypt Demographic Health Survey 2014 indicated an increase in the percentage of women who discontinued practice within 12 months of the beginning of use and continued to rise throughout the referred period despite the efforts made to address the causes leading to it. As the percentage of women who discontinued practice during the first year, according to survey data, reaches 30% of the total number of family planning method users. By analyzing the reasons for stopping the use of family planning methods, it becomes clear that the desire to become pregnant was the most common reason mentioned for discontinuing use. Overall, 4 in 10 discontinuations during the five-year period before the 2014 EDHS occurred because the user wanted to have a child. This reason was the most frequently mentioned factor in discontinuations among IUD users (54 percent) and pill users (35 percent).

The real problem of the research is that the previous results clearly affect the possibility of success in achieving the national goals of family planning programs.

2. Research Objectives

The study mainly aims to achieve the following objectives;

- Identifying the characteristics of women who discontinued practice or switch to another method for other method related reasons.
- Identify the determinants of discontinuation/switching to another method.
- Suggesting practical policies and appropriate methods to try to reduce the levels of discontinuation.

3. The Theoretical Framework of the Study

Figure no. (1) below shows the theoretical framework of the study, through which it is possible to identify the factors affecting the discontinuation of using a certain method or switching to another method includes characteristics of women, type of service provider, the method used, nature of use, type of used method, cost of the used method and reproductive preferences.

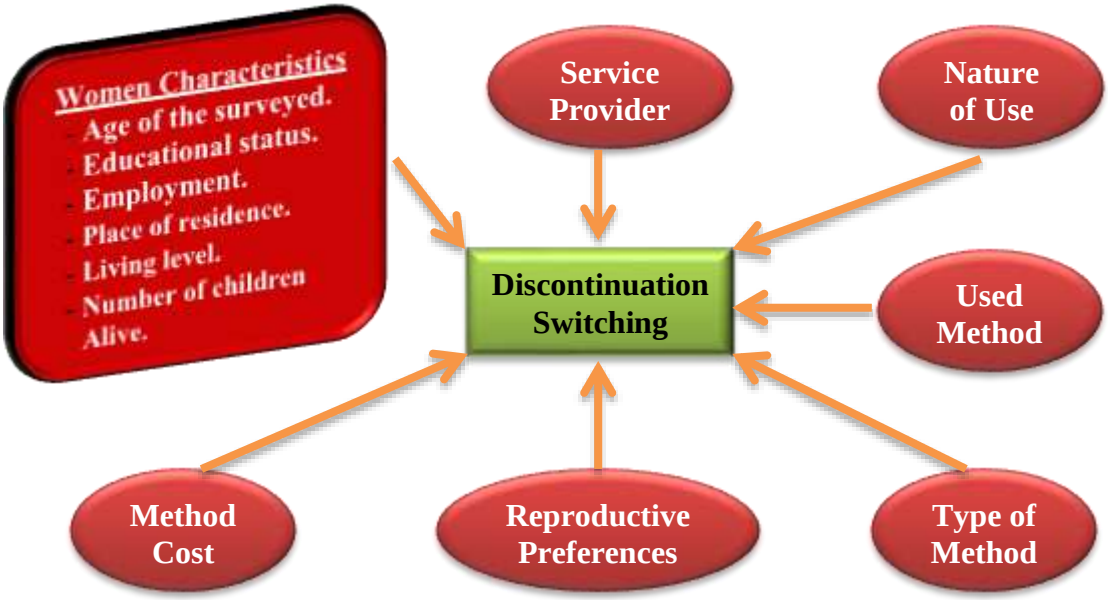

Figure (1): The Theoretical Framework of the Study

4. Research Methodology

The study will depend on the use of descriptive analysis and the χ^2 test to study the relationship between descriptive variables, in addition to the use of logistic regression analysis. Where the descriptive analysis shows the following:

- The relationship between the two methods of which transferred and transferred to it.
- The relationship between the method that is discontinued and the reasons for this discontinuation.
- Analyzing the direction and reasons for discontinuation or shifting according to the characteristics of women and the source of the method.

5. Discontinuation and Switching from Family Planning Methods

This study is based on an in-depth view of analyzing and identifying levels, trends, and causes of discontinuation and shifting from use on the one hand, as well as clarifying the differences between discontinuation rates for methods-specific reasons according to different characteristics, whether demographic, economic, or social characteristics on the other hand.

5.1. Level, Trends and Causes of Discontinuation and Switching of Use:

In this section, we will deal with the levels of discontinuation for each method and the trends of that during the past ten years and the reasons for this discontinuation or switching. We will also deal with the average duration of conti-

nuous use of each method and the currents switch from one method to another.

5.1.1. Levels and Trends of Discontinuation and Switching between Methods:-

The data of EDHS 2014 show that about 30% of women who use family planning methods have stopped using the method for reasons related to the method during the first year of use. As shown in table (1) below, this percentage tends to decrease, as it was 25.3% in 2000, then 22.4 % in 2005, and it continued to decline until it reached 18% in 2008 and finally 16% in 2014. Reasons related to the method includes the failure of the method (Became pregnant while using), side effects/health concerns, wanted a more effective method, lack of access/too far, cost too much and the doctor opinion.

In order to confirm the trend of the previous percentage of decline during the previous three survey years, the χ^2 test is performed which confirmed the existence of a trend to decline, as the test statistic reached 27.46 with a significant degree of 0.0000, and the odds ratio was 2.0 in 2000 and decreased to 0.75 in 2005 and continued to decline to reach 0.41 in 2014.

Table (1): The Trend of Discontinuation Rates during 12 Months of Use for Reasons Related to the Method, for the Total Number of Users According to the Type of Method

Method	2000	2005	2008	2014
Pill	**41.0**	**31.8**	**22.7**	**22.6**
IUD	**11.1**	**10.8**	**7.2**	**8.8**
Injectable	**44.8**	**32.3**	**23.3**	**23.7**
Breastfeeding	**39.8**	**41.6**	**31.6**	**38.9**
Other[1]	**47.5**	**28.3**	**17.6**	**10.3**
All methods	**25.3**	**22.4**	**18.0**	**16.0**

Source: Demographic Health Survey Reports.

[1]Includes female sterilization, implants, male condom, diaphragm/foam/jelly, withdrawal and periodic abstinence

As for the discontinuation rates during the five years of use for reasons related to the method, it is clear from table (2) and figure (2) that half of those who stopped using the method during the five years prior to the search, and that this percentage is fixed in the past ten years, it was 59.8% in 2000, 56.6% in 2005, it increased to 57.1% in 2008 and then decreased to 51% in 2014.

Table (2): The Trend of Discontinuation Rates during the Five Years Preceding the Survey, for Reasons Specific to the Method, for the Total Number of Discontinued Women According to the Type of Method

Method	2000	2005	2008	2014
Pill	**59.1**	**56.6**	**48.3**	**43.3**
IUD	**50.0**	**46.5**	**44.4**	**33.4**
Injectable	**72.7**	**67.8**	**60.6**	**51**
Breastfeeding	**62.4**	**89.4**	**76.3**	**80.3**
Other	**61.0**	**56.0**	**52.6**	**50.4**
All methods	**59.8**	**56.6**	**57.1**	**51.0**

Source: Demographic Health Survey Reports.

To confirm the previous result, a χ^2 test is also performed which was found to be significant with a significant degree 0.11 and test statistic equals 6.17 and the odds ratio is 1.8 in 2005 and decreased to 1.95 in 2008 and 0.81 in 2014.

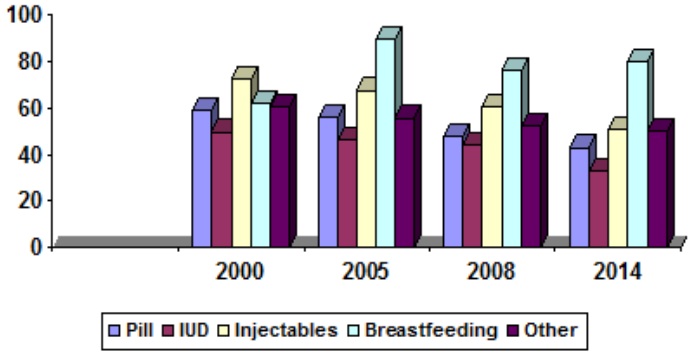

Figure (2): The Discontinuation during the Five Years Preceding the Survey, for Reasons Specific to the Method, for the Total Number of Discontinued Women According to the Type of Method

5.1.2. Reasons of Discontinuation:-

Looking at table (3), we find that the percentage of episodes discontinued during the first year of use is about 30.1%, 8.1% of them switch to another method, and 11.8% stop for desire to become pregnant or other fertility related reasons**.**

Table (3): Percentage of Episodes Discontinued within 12 Months after Beginning Use, By Reason for Discontinuation and Percentage who switched to Another Method, DHS Egypt 2014

Method	Reason for Discontinuation				Any reason	Switched to another method
	Desire to become pregnant and other fertility related reasons	Method failure and wanted more effective method	Side effects/ Health reasons and other method related reasons	Other reasons		
Pill	18.4	10.6	12.0	0.7	41.5	8.9
IUD	5.3	1.2	7.6	0.1	14.3	4.6
Injectable	13.6	2.2	21.5	0.4	37.9	11.3
Breastfeeding	4.7	29.0	9.9	0.9	44.3	21.3
Other	6.1	5.5	4.8	1.3	17.7	7.2
All methods	11.8	6.4	11.6	0.4	30.1	8.1

Source: Demographic Health Survey Egypt 2014.

And using the χ^2 test to study the relationship between the types of methods and the reasons for discontinuation, the results obtained indicate that the test statistic is 502. 6 with a significant degree of 0.01, and the odds ratio is 1.88. This

means that there is a significant relationship between the type of method and the reasons for discontinuation.

From the previous table (3) it is clear that; the percentage of episodes discontinued within 12 months after beginning use represents 30.1% of the total number of users, 18% of them discontinued because of the method, 11.8% because of the desire to become pregnant and other fertility related reasons, and 0.4% for other reasons.

The reasons for the method are divided into two main reasons, the first is the side effects, health reasons and other method related reasons, and the highest percentage of discontinuation 21.5% is due to injectable, followed by the pill 12.0%, then the breastfeeding 9.9%, and the other methods are the lowest rate of discontinuation 4.8%. The second reason is the method failure and wanted more effective method, as the breastfeeding occupied the highest rate 29.0%, followed by the pill of the 10.6%, and the lowest rate of discontinuation due to the method failure is the IUD 1.2%.

The following table (4) shows the percent distribution of all discontinuations in the five-year period prior to the survey by the main reason for discontinuing according to the specific method. The desire to become pregnant was the most common reason mentioned for discontinuing use. Overall, 4 in 10 discontinuations during the five-year period before the 2014 EDHS occurred because the user wanted to have a child. This reason is the most frequently mentioned factor in discontinuations among IUD users 53.7% and pill users 35.4% percent.

Around one-quarter of all discontinuations in the five-year period before the survey were due to side effects or health concerns. Side effects/health concerns were the most common reason for discontinuations among injectable users, and they were the second most common cause of discontinuation among IUD and pill users. In general, 11.2% percent of discontinuations were the result of method failure; i.e., the woman became pregnant while using a method. Women using breastfeeding were most likely to report method failure 25.9% as the reason they stopped using the method.

As the previous table shows that also program-related factors such as cost or access were rarely cited as a main reason for discontinuing use of contraception.

By using the χ^2 test, it is clear that there is a significant relationship between the main reasons of discontinuation and the method used. The test statistic is 1422.1 with a significant degree of 0.000, and the odds ratio is 1.13.

5.1.3. The Difference in the Duration of Use between the Different Methods:-

The duration of use varies between the different methods, depending on the nature of the method, the purpose of its use, and the tolerance of the woman used for it. To clarify this, the percent distribution of uses according to the method and the duration of use is extracted as shown in table (5), the average duration of use for each method is also calculated.

Table (4): Percent Distribution of Discontinuations of Contraceptive Methods in the Five Years Preceding the Survey by Main Reason Stated for Discontinuation, According to Specific Method, Egypt 2014

Method / Reasons for Discontinuation	Pill	IUD	Injectable	Breastfeeding	Other[1]	All Methods
Method Failure (Became pregnant while using)	17.9	5.9	3.6	25.9	16.0	11.2
Wanted to become pregnant	35.4	53.7	26.1	13.3	29.9	39.6
Husband disapproved	0.6	0.3	0.7	0.0	4.0	0.6
Wanted a more effective method	4.7	0.1	1.0	30.7	7.8	3.4
Side effects/health concerns	19.2	26.8	45.0	1.4	24.1	26.0
Lack of access/too far	0.3	0.0	0.3	0.1	1.4	0.2
Cost too much	0.2	0.0	0.1	0.0	0.4	0.1
Inconvenient to use	1.3	0.6	1.0	22.3	1.6	1.8
Up to God/fatalistic	0.3	0.0	0.3	0.1	0.0	0.2
Difficult to get pregnant/ menopausal	0.7	0.9	1.4	0.0	1.4	0.9
Infrequent sex/husband away	14.4	3.1	10.2	1.5	4.4	8.8
Marital dissolution/separation	0.7	2.1	1.5	0.0	1.8	1.4
Other	0.3	0.4	0.5	2.8	0.2	0.5
Missing	4.0	6.0	8.3	1.9	6.9	5.5
Total	100.00	100.00	100.00	100.00	100.00	100.00
Number of discontinuations	5417	5009	2387	493	331	13636

Source: Demographic Health Survey Egypt 2014.

Table (5): The Percent Distribution of the Previous Uses that Ended During the Five Years Preceding the Survey, by Method, and the Period of Continuous Use, Egypt 2014

Duration of Use in Years / Method	1	2	3	4	Total	Average Duration of Use in Months
Pill	37.00	26.00	13.00	24.00	100.00	16.00
IUD	22.00	24.00	14.00	40.00	100.00	25.00
Injectable	27.00	29.00	16.00	28.00	100.00	19.00
Breastfeeding	72.80	27.00	00.20	0.00	100.00	13.00
Other	22.00	36.00	13.00	29.00	100.00	11.00
Total	29.00	24.00	10.00	37.00	100.00	17.00

It appears from the previous table that the percentage of uses during the fourth year of use is about 37% of the total uses that ended during the five years preceding the survey, and this percentage varies from one method to another, while it is only 40% for the IUD, up to 29% for other and about 28% for injectable and 24% for pill.

The table also shows that the rate of discontinuation from one year to less than two years is about 29%, and this percentage reaches about 73% for breastfeeding, 37% for pill, 27% for injectable, and 22% for other. From the last column in the table, which represents the average duration of use in months, it is

found that the IUD has the highest period of use (25 months), followed by the injectable (19 months), then the pill (16 months), and the last is breastfeeding and other methods, both of which (13 months, 11 months) respectively.

It is clear that there is a relationship between the duration of use in years and the method used as shown by χ^2 test, whose test statistic is 659.3 with degrees of freedom equals 12 and a significant degree of 0.0000.

5.1.4. Currents Shift between Methods:-

To analyze the switching currents between methods, the percent distribution of married women is extracted according to the current method and the previous method used (Table 6). The table shows that the largest percentage of switching currents is the use of the IUD, which 39% of the pill users switch to the use of the IUD, and that 33% of the injectable users, 40% of the other method users, and 32% of the breastfeeding users switch to the IUD.

This means that most users have switched to use the IUD, and this is due to the high efficiency of use that is characterized by the IUD from other methods, as well as the availability of many types of it, in addition to the fact that it does not contain hormones that cause side effects.

Table (6): Percent Distribution of Married Women According to the Current and Previous Method, Egypt 2014

Current Method / Previous Method	Pill	IUD	Injectable	Breastfeeding	Other	Total
Pill	**35.00**	**39.00**	**19.00**	**3.00**	**4.00**	**100.00**
IUD	**20.00**	**64.00**	**7.00**	**2.00**	**7.00**	**100.00**
Injectable	**24.00**	**33.00**	**32.00**	**1.00**	**10.00**	**100.00**
Breastfeeding	**34.00**	**32.00**	**24.00**	**1.00**	**9.00**	**100.00**
Other	**31.00**	**40.00**	**6.00**	**21.00**	**2.00**	**100.00**
Total	**23.00**	**49.00**	**18.00**	**1.00**	**9.00**	**100.00**

And through the χ^2 test with a degree of freedom equals 16, it is evident that there is a significant relationship between the previous method and the current method (transferred to it), with a test statistic of 1107.4 and a significant degree of 0.0000.

5.2. Different Rates of Discontinuation for Reasons Related to the Method between the Background Characteristics:

In this section, the differences between discontinuation rates for reasons related to the method will be explained according to the different characteristics, whether they are demographic characteristics (age of the surveyed and the number of her living children), economic characteristics (work status and standard of living) or social characteristics (educational level of the respondent and place of residence).

In order to clarify the difference between the characteristics (demographic, social, and economic) about discontinuation, the discontinuation rates for reasons related to the method is calculated to the total discontinuation for each method separately and for each characteristic separately for all uses that started and discontinued during the five years preceding the research.

Table (7) below shows that the percentage of discontinuation for reasons related to the method is highest for breastfeeding, reaching 91.7%, because the nature of this method necessitates discontinuation after the end of the intensive feeding period for the child, followed by injectable and other methods, where the percentage of discontinuation of their use for reasons related to the method reached to 67.2% and 60.4%, respectively, the discontinuation use of these two methods may be due to the possibility that they contain hormones that lead to side effects or discomfort for that method and then ultimately lead to discontinuation of its use. The pill come in the next place of discontinuation for reasons related to the method, as its percentage reaches 57.1%, this may be due to its low effectiveness, which leads to the failure of the method, or to a switch to another, more effective method.

Finally, the IUD recorded the lowest rate of discontinuation for reasons related to the method (44.5%), this may be due to the inefficiency of the IUD for the woman, so she stops it, changes its type to another type, or switch to another method.

5.2.1. The Difference in Discontinuation Rates between Demographic Factors:-

The discontinuation rates for reasons related to the method varies with the age of the respondent, in general, the discontinuation rates are highest for the age group more than 35 years for all methods (pill, IUD, injectable and breastfeeding) except other methods. This may be due to the fact that women of older ages have used methods for longer periods, which makes their need for comfort from the methods necessary. For the same reason, the discontinuation rates for reasons related to the method are also increasing with the increase in the number of children alive.

5.2.2. The Difference in Discontinuation Rates between Social Factors:-

The relationship between discontinuation rates for reasons related to the method and the social level of the respondent varies from one method to another, where it is noted that the discontinuation rates are high with the decrease in the educational level for pill, IUD and the breastfeeding. As for the injectable and other methods, it is noted that the discontinuation rates increased with the increase in the educational level.

As shown in table (7) preceding, the discontinuation rates of pill, injectable and other methods for reasons related to the method increase with the rise in the social level and residence in urban areas and Lower Egypt than in Rural areas and Upper Egypt, and vice versa for users of the IUD and breastfeeding.

Table (7): Discontinuation Rates for Reasons Related to the Method According to Background Characteristics and the Method, Egypt 2014

Background Characteristics \ Method	Pill	IUD	Injectable	Breastfeeding	Other
Age of the surveyed:					
less than 25	58.5	40.7	71.6	87.7	70.7
25–34	53.8	35.6	62.5	91.0	52.7
more than 35	61.2	67.9	73.8	97.7	62.3
Number of living children:					
1–2	57.4	38.8	67.3	91.9	66.1
3–4	56.4	50.5	65.8	93.0	57.6
more than 5	67.5	72	70.8	68.1	66.3
Education:					
no education	58.9	49.4	68.0	93.6	54.5
primary	62.0	51.1	67.4	92.4	63.2
secondary	57.3	42.7	71.6	92.5	60.7
higher	55.7	39.8	87.7	88.9	57.1
Place of residence:					
urban governorates	65.5	52.6	81.7	84.8	78.4
lower Egypt	56.2	38.9	73.4	95.3	40.0
upper Egypt	59.7	40.4	66.4	91.1	45.2
frontier governorates[1]	55.3	57.6	65.4	93.8	54.2
Work status:					
working for cash	61.4	47.5	66.9	91.9	68.6
not working	57.8	47.4	69.9	92.8	58.3
Wealth index:					
very poor	61.0	57.9	63.7	92.7	66.7
poor	62.4	53.7	68.8	93.0	50.0
moderate	57.8	40.1	71.2	93.6	47.8
rich	62.5	46.5	70.7	89.2	59.5
very rich	53.9	45.8	76.7	96.0	63.9
Total	57.1	44.5	67.2	91.7	60.4

[1]Does not include North and South Sinai governorates.

5.2.3. The Difference in Discontinuation Rates between Economic Factors:-

The relationship between the economic level and the discontinuation rates for reasons related to the method varies according to the method used. As it has been proven that the relationship between discontinuation rates and the economic level (determined based on the respondent's labor) is positive in the case of pill and other methods, and negative relationship in the case of injectable and breastfeeding, while the relationship is null in the case of the IUD. In general, the discontinuation rates for reasons related to the method increase in the case of low standard of living for pill, IUD and other methods, while it decreases in the case of an increase in the standard of living, for both injectable and breastfeeding.

6. Determinants of Discontinuation and Switching from Family Planning Use:

And now we turn to the answer to the question: What are the most important personal and demographic characteristics that distinguish between women, who have discontinued and switched from using family planning methods in Egypt? To answer this question, this is done by testing the hypothesis that:

"There is a statistically significant effect of independent variables (personal and demographic characteristics) on the dependent variable (discontinuation and switching) of the use of family planning methods in Egypt.

To test this hypothesis, a logistic regression method is used to show the effect of the independent variables (age - education - place of residence - work status - number of living children - wealth level - type of method previously used - duration of previous use of the method without interruption per month) on the descriptive dependent variable with two sides (1 for discontinued women, 0 for switched women).

6.1. Definition and Importance of the Logistic Regression Model:

The logistic linear regression model is one of the most important models used to formulate the discriminant function; this model is suitable for many uses. In general the Logistic regression is used to analyze the relationship between what happened in the past and what might happen in the future. Suppose that $x_1, x_2, x_3, ..., x_p$ represent the number of explanatory variables in the model, the response variable (y_i) also indicates the probability of a particular event (θ). The Logistic regression model arises when there is a relationship between the probability (θ) and explanatory variables x_i where $i = 1, 2, 3, ..., p$, this relationship can be represented by the following linear model;

$$\theta_k = \beta_0 + \beta_1 x_{1k} + \beta_2 x_{2k} + ... + \beta_p x_{pk} \qquad (1)$$

From the previous equation we find that the left side is finite $(0 < \theta_k < 1)$ while the right side is infinite which forces us to use the logit transform, then the previous equation becomes as follows;

$$P_r(Y_k = 1/X) = \frac{\exp(\beta' X)}{1 + \exp(\beta' X)} = P_r(X) \qquad (2)$$

The logit transform, which is the basis of this model, is defined as;

$$g(X) = \ell n\left(\frac{P_r(X)}{1 - P_r(X)}\right) = (\beta' X) \qquad (3)$$

This transformation has many characteristics necessary for the shape of linear regression where it has the following advantages;

1- The logit value $g(X)$ is linear in the parameters $\beta' = \{\beta_0, \beta_1, ..., \beta_p\}$.

2- Using this transform indicates that the values of g (x) are a continuous function.

3- For each right-hand value $(-\infty, \infty)$ there is only one corresponding value of $P_r(X)$ which is limited by the period $(0,1)$.

6.2. The Assumptions of the Logistic Linear Regression Model:

The logistic linear regression model has the following assumptions;

1) The response variable is a binary or multiple descriptive variable, the conditional prediction of this variable $E(y/x)$ is a variable limited by the period $(0,1)$ but the explanatory variables can be continuous or discrete, binary or multiple, also all variables are assumed to be measured without any errors.

2) There is a functional relationship between the response variable and the explanatory variables take the form of equation (2).

3) The expected value of random error equals zero $E(u_k = 0)$, the variance of the random error is constant and equals $(P_r(X)[1-P_r(X)])$, the random error (u_k) follows the binomial distribution with a probability determined by the conditional mean.

4) There is no correlation between random errors (error independence).

5) There is no correlation between random error and explanatory variables.

6) There is no correlation between explanatory variables themselves, where the variables which have a complete correlation between them must be deleted.

6.3. Application on Data:

In logistic regression, it is not as important to estimate parameters as they are used to calculate the probability of a response variable which is considered here (discontinuation or switching) as a descriptive response variable. Using a stepwise regression method, the results showed a statistically significant regression model at 5% level by using the statistical package programs of SPSS22.

The following section shows a summary of the results obtained. Based on the study framework, 8 explanatory variables are introduced in the model which appears in table (8) below;

Table (8): Explanatory Variables of the Study

Number	Code	Variable Name
1	A	Age.
2	E	Education.
3	PR	Place of Residence.
4	WS	Work Status.
5	NLC	Number of Living Children.
6	WL	Wealth Level.
7	TMPU	Type of Method Previously Used.
8	DPU	Duration of Previous Use of the Method Without Interruption Per Month.

The best model is chosen which it's significant is (probability of error) (0.000), also the efficiency of the correct division of the model is 88.9% which is considered a high and good percentage exceeding the minimum division efficiency of 73%. Six explanatory variables are entered into the model represented in (A, E, PR, NLC, WL, DPU).

The following table (9) shows the quality measures of logistic regression model which is considered one of the most important outputs of logistic regression analysis. These values or indicators show the importance of the explanatory variables and how they interpret the changes that occur to the response variable.

Table (9): Quality Measures of Logistic Regression Model

χ^2	Degrees of freedom	Significance	Similarity of the determination coefficient	The Correct Division Ratio
5415.8	**6**	**0.000**	**0.831**	**%85.9**

From the previous table it is clear that the similarity of the determination coefficient has reached 0.831. Thus, the ability of explanatory variables to explain any change in the response variable by 83.1% is a good explanation. Also, as can be seen from the table, the value of the χ^2 (5415.8) with a degree of freedom (6) with a significant value of (0.000) which is less than the allowable error level, therefore, we reject the null hypothesis and accept the alternative hypothesis that is; at least there is a variable with a coefficient not equal to zero. The efficiency of the correct division rate was 85.9%, so the model in general is good as its significance is less than the allowable error level.

The following table (10) shows the Wald's test for goodness of fit for the parameters of the logistic regression model and its significance.

Table (10): The Parameters of the Logistic Regression Model and Their Significance

Variable Code	Estimation	S.td Error	Wald Test	D.f.	Sig.	Odds Ratio
DPU	**2.714**	**0.302**	**57.981**	**1**	**0.001**	**15.353**
A	**-0.525**	**0.150**	**114.309**	**1**	**0.000**	**0.489**
NLC	**1.726**	**0.012**	**1143.704**	**1**	**0.000**	**6.124**
PR	**-0.198**	**0.118**	**30.901**	**1**	**0.000**	**0.927**
E	**0.174**	**0.007**	**22.166**	**1**	**0.000**	**1.315**
WL	**0.135**	**0.132**	**23.217**	**1**	**0.000**	**1.337**
Constant	**-1.767**	**0.144**	**101.712**	**1**	**0.002**	**0.318**

It is clear from the previous table (10) that;

- Six explanatory variables entered to the model and two exited (WS, TMPU) and do not prove their significance.
- The significance of all coefficients of the variables under study. Thus, we accept the hypothesis that there is a significant effect is statistically significant for the six variables that proved to be significant on the discontinuation or switching.

- The odds ratio for discontinuation according to age decreases by 0.4 compared to the reference category (35 years and over), that is, it has a positive relationship with age, and the variable of "duration of previous use of the method without interruption per month" recorded about seventeen times. Whereas, the odds ratio for the variable of "number of living children" increased by about six times, it also decreased for the place of residence variable by about 0.1.

According to the results of the previous table (10), the equation of the estimated logistic regression model is;

$$\log odds = -1.767 + 2.714(DPU) - 0.525(A) + 1.726(NLC) - 0.198(PR) + 0.174(E) + 0.135(WL) \quad (4)$$

The following table (11) shows the results of the goodness of fit test for the residuals of the entire logistic model.

Table (11): The Goodness of Fit Test for the Residuals of the Logistic Regression Model

χ^2	Degrees of freedom	Significance
9.377	**7**	**0.305**

From the previous table we note that, the value of χ^2 is (9.377) and the significance is equal to (0.305), this leads to acceptance of the null hypothesis that is; there are no statistically significant differences between actual and estimated values, this confirms the goodness of fit of the entire model.

To test the strength of the proposed model, the ROC curve (Receiver Operating Characteristic) is drawn, where the area under the ROC curve reflects the quality of the classification between the two groups, so the larger this area, the better, as shown in figure (3) below.

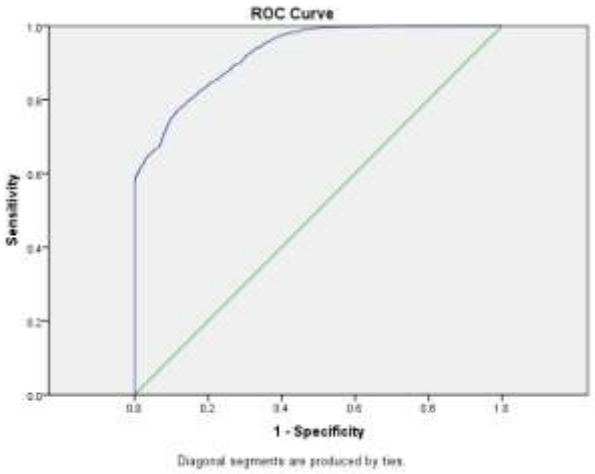

Figure (3): Area under the ROC Curve of the Logistic Model Sensitivity

We can see from the previous figure (3) that the area under the ROC curve is 0.915 and this means that the logistic regression is classified in a more signifi-

cant and better than chance. The following table (12) shows the area under the rocker curve. From this area, the sensitivity of the model can be measured in classification.

Table (12): Area under the ROC Curve

Area	S.td Error	Significance	95% Confidence Interval	
			Lower Limit	Upper Limit
0.915	**0.003**	**0.001**	**0.914**	**0.931**

The above table shows that the area under the rock curve was 0.915 approximately with a confidence level 95% and a confidence interval ranging between 0.914 and 0.931. This percentage is considered very high, besides it is significant as the test significant is 0.001, which leads us to reject the null hypothesis and accept the alternative hypothesis is that the area of the curve differs from 0.5.

From the foregoing, we conclude that the logistic regression model demonstrated the existence of a significant difference between women, who have discontinued and switched from using family planning methods in Egypt, which is clearly distinguished according to the six explanatory variables that entered the model. We can now use the previous logistic regression model to estimate the probability of switching or discontinuation of family planning methods according to the background characteristics as shown in table (13).

Table (13): Estimating the Average Probability of Switching from the Use of Family Planning Methods to the Significant Variables

Age groups	Average Pr.	Number of living children	Average Pr.	Education level	Average Pr.	Wealth index	Average Pr.	Place of residence	Average Pr.
less than 25	**0.581**	**1–2**	**0.634**	**primary and less**	**0.788**	**poor**	**0.848**	**Urban**	**0.824**
25–34	**0.621**	**3–4**	**0.992**	**secondary**	**0.791**	**moderate**	**0.788**	**Rural**	**0.801**
more than 35	**0.782**	**more than 5**	**0.914**	**higher**	**0.859**	**rich**	**0.599**	**Upper**	**0.729**

The previous table is useful for officials and decision-makers in predicting trends of discontinuation and switching from the use of family planning methods during the coming periods.

7. Conclusion and Recommendations:

After extensive study, to discontinuation the use of family planning methods for reasons other than the desire to have children and its determinants, we can draw the following points:

- The high cost for family planning methods is not the main reason for discontinuation or switching to another method.
- The other methods and breastfeeding were distinguished by the shortest period of use, reaching 11 and 13 months for each, respectively, and it increased to 16 months for pill and 19 months for injectable. As for the IUD, it is distinguished by the longest period of use (25 months).
- Among the most important factors that increase the probability of discontinuation use for reasons not related to childbearing is the increase in the number of live children, female workers with paid remuneration, and the containment of the method on hormones.
- Among the most important factors that reduce the probability of discontinuation for reasons related to the method are; Women's education and the effectiveness of using the method.

The study also comes out with many recommendations, the most important of which are:

- The necessity to manufacture the IUD locally in order to reduce the cost of its production so that it can be used for a period of more than 3 years.
- Spreading the use of the IUD and increasing awareness of it in the media, as well as training doctors on its composition and extraction in order to increase the effectiveness of its use and reduce its problems.
- Women should be instructed to use the IUD and educate them that the spacing period between births is not less than 4 years.
- The need to inform women about the advantages of the IUD as it will not affect their reproductive capacity, as it does not contain hormones.

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Received: April 1, 2021; Published: April 28, 2021