Impact of Women's Empowerment and other Indicators on Antenatal Health Care Utilization in Egypt

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Abstract:

Pregnancy and childbirth and their consequences are still the leading causes of death and disease among women of reproductive age in developing countries. Women's relative lack of decision-making power and their unequal access to employment, finances, education, basic health care and other resources are considered to be the root causes of their ill-health and that of their children.

The main objective of this study is ***to examine the impact of women's empowerment indicators and other variables on number of antenatal care visits***. The data used in this study is EDHS 2005. ***Factor analysis technique*** is used to construct women's empowerment indicators, availability and quality of health services indicators. ***Zero-inflated Negative Binomial Regression*** is used to measure the net effect of different background characteristics, indicators of women's empowerment, and availability and quality of health services indicators on antenatal health care utilization.

The results indicate that wealth index is considered to be the most important determinant of receiving antenatal care. Additionally, the higher level of indicators of women's empowerment (control over finances, freedom of movement, and making daily decisions), the less likely the women have a zero visit. However, only freedom of movement from the indicators of women's empowerment increases the number of antenatal care visits. Accordingly, women's empowerment affects the decision to go to receive antenatal care but does not increase the number of antenatal care visits. Also, education made women receive antenatal care but did not increase the number of antenatal care visits. Accordingly, all possible efforts must be made to increase women's educational level. In addition, it is necessary to initiate programs to promote pregnant women to start receiving antenatal care early. More efforts should be made to educate and train providers of antenatal health care services to offer more quality services, and more programs and spots should be aired in different mass media to promote antenatal care.

1. Introduction

Pregnancy and childbirth and their consequences are still the leading causes of death, disease and disability among women of reproductive age in developing countries more than any other single health problem. Over 300 million women in the developing world currently suffer from short-term or long-term illness brought about by pregnancy and childbirth; 529,000 die each year (including 68,000 as a result of an unsafe abortion), leaving behind children who are more likely to die because they are motherless [21].

In Egypt, 9 percent of all maternal deaths occur during the first six months of pregnancy and a further 16 percent during the last three months [21]. Many of these deaths could have been avoided if the pregnant women had full antenatal care during pregnancy. Antenatal health care leads to safe delivery and healthy newborn child. Antenatal health care is very important not only for mothers but also for babies because healthier mothers have healthier babies.

The International Conference on Population and Development (ICPD, 1994) in Cairo emphasized that women should be empowered to practice control over their health and reproductive rights. This study argues that without improving the status of women and empowering them, their reproductive health will be at risk.

Therefore, this study is a step in the attempt to outline the impact of women's empowerment on antenatal health care utilization in Egypt. Furthermore, the findings may be a tool in hand for policy makers in implementing policies, which might raise the status of Egyptian women and improve the quality of antenatal health care services. This will make the women increase receiving antenatal health care and, in the end, maternal and child mortality will reduce.

Objectives of the Study

This study focuses mainly on examining the impact of women's empowerment on antenatal health care utilization. More specifically, the study will try to meet the following objectives:

1. Examining the levels and differentials of utilization of antenatal health care services.
2. Determining the patterns of women's empowerment indicators.
3. Investigating the impact of women's empowerment indicators (control over finances, decision making power and freedom of movement) on antenatal health care utilization.
4. Suggesting some policy implications to improve the antenatal health care services.

This study is divided into six sections. Following the introduction and objectives of the study, the data and the methodology used in the analysis are explained in the second section. The third section includes construction of indicators of women's empowerment and availability and quality of health services. The results of the study and discussion of these results are presented in sections four and five respectively. Finally, section six presents the conclusion of the study.

2. Data and Methodology

2.1 Data

This study depends on data derived from the Egypt Demographic and Health Survey (EDHS 2005). This survey was conducted on behalf of the Ministry of Health and Population [MOHP], and the National Population Council [NPC]. This survey included detailed information on fertility, family planning, infant and child mortality, maternal and child health and overall reproductive behavior. The EDHS 2005 covered a representative sample of 19,474 ever married women in the age group of 15-49 years. Only women aged 15-49 whose last birth was during the five-year period before the survey are included in the analysis. As a result, 9845 women is used to achieve the objectives of this study.

2.2 Methodology

This study depends on three methodologies, namely; the descriptive analysis, the factor analysis and the zero-inflated negative binomial regression analysis.

First: Descriptive Analysis

Descriptive analysis is used to investigate the significance of the relationship between the number of antenatal health care visits and different background characteristics, indicators of women's empowerment, and availability and quality of health services indicators.

Second: Factor Analysis

Factor analysis technique is applied to develop women's empowerment indicators and to construct the availability and quality of health services indicators.

Third: Zero-inflated negative binomial regression Analysis

In order to have a more insight statistical analysis, zero-inflated negative binomial regression is used to measure the net effect of different background characteristics, indicators of women's empowerment, and availability and quality of health services indicators on antenatal health care utilization.

The response variable of this study is the number of antenatal care visits. It is a count variable, accordingly, when modeling a count variable, there are several available models to choose: Poisson, negative binomial, zero-inflated Poisson, and zero-inflated negative binomial models.

It is necessary to answer question "How is the outcome variable of this study distributed?". The answer of this question can indicate whether a Poisson or negative binomial distribution is more appropriate for the data of this study. The Poisson distribution is characterized by equal mean and variance. If the sample mean and sample variance of the outcome variable are equal, a Poisson model may be appropriate. If the variance of the response variable exceeds the mean by a great deal, a negative binomial model may be appropriate.

Sometimes when analyzing a response variable (i.e. it is a count variable), the number of zeros may seem excessive. When analyzing a dataset with an excessive number of outcome zeros, a zero-inflated model should be considered.

The data of this study are over-dispersed (the variance of the number of antenatal care visits is greater than the mean) and the number of zeros is excessive. Therefore, the zero-inflated negative binomial regression is used.

The zero-inflated negative binomial (ZINB) regression generates two separate models and then combines them. First, a logit model is generated for the certain zero cases predicting whether or not a woman would be in this group. Then, a negative binomial model is generated predicting the counts for those women who do not have zeros in their outcome variable. Finally, the two models are combined. However, both models should be specified: first the count model, then the model predicting the certain zeros [19], since there is interest in predicting the existence of excess zeros, (i.e., the probability that a woman will have zero visit) in addition to predicting the number of antenatal visits.

3. Construction of Women's Empowerment Indicators and Availability and Quality of Health Services Indicators

This study uses the factor analysis technique to develop women's empowerment indicators and to construct the availability and quality of health services indicators in order to measure the net effect of indicators of women's empowerment and availability and quality of health services indicators on antenatal health care utilization by using zero-inflated negative binomial regression.

3.1 Indicators of Women's Empowerment

The 2005 EDHS collected information on direct measures of women's empowerment. Questions were asked on women's participation in specific household decisions, contraceptive use decision and her health care decision. Four options were offered to each question in the survey: 1) respondent alone, 2) respondent and husband jointly, 3) husband alone, 4) someone else. Categories 1 and 2 were merged to be "1" and this means that woman participates in decision, as well as 3 and 4 to be "0" and this means that woman does not participate in decision.

The variables included in the factor analysis technique to construct women's empowerment indicators are the participation of women in making decision about major household purchases, daily household purchases, her health care, visits her family or relatives, how her husband's earnings and her money are used and using contraception. In addition, there are some other variables are included in the factor analysis which represent whether it is a big problem for the women or not a big problem to go to the doctor alone or even to get a permission to go to the doctor. Moreover, some variables are included in the factor analysis (e.g. work status and use of contraception) since the variables regarding the decision about the use of contraception and how woman's salary used depend on the inclusion of these two variables.

Using principal component analysis on women's empowerment variables, four factors are extracted and they explain about 68 percent of the total variations among the data. Rotated factor loadings for these factors are shown at appendix. Table (1)

shows the Eigen values of factor analysis applied to women's empowerment variables and total variance explained.

Table (1): Factor analysis results for women's empowerment variables, 2005

Factors	Eigen values	Percent of variance explained	Cumulative percent of variance
1	2.659	24.169	24.169
2	1.885	17.135	41.304
3	1.791	16.282	57.586
4	1.156	10.507	68.093

The results of the factor analysis show that the first factor includes five variables that explain women's empowerment in making decision, namely; decision making about major household purchases, visits her family or relatives, her health care, daily household purchases, and how her husband's earnings is used. This factor explains about 24 percent of the variation and it represents "Making daily decisions".

The second factor involves two variables, work status and making decision about how her money is used. This factor explains about 17 percent of the variation and it represents "Control over finances".

The third factor includes two variables, current contraceptive method and making decision about contraceptive use. This factor explains about 16 percent of the variation and it represents "Decision about contraceptive use".

The last factor includes two variables, getting permission to go to doctor and going to doctor alone. This factor explains about 11 percent of the total variation and it represents "Freedom of movement".

3.2 Availability of Health Services

In 2005 EDHS, women were asked to mention if there is a big problem or not on some issues related to the availability of health services. These issues are about the distance to the health facility, having to take transport, and availability of female health provider. Using these variables, the indicators of availability of health services are constructed using factor analysis technique. One factor is extracted and this factor explains about 63 percent of the total variations among the data and it represents "The availability of health services".

3.3 Quality of Health Services

In 2005 EDHS, women who reported that they received antenatal care, tetanus toxoid injections, or other medical care unrelated to the pregnancy were asked whether they were weighed, their blood pressure measured, and urine and blood samples taken during any of the visits they made to a medical provider during their pregnancy. These women were also asked whether they had been told about the signs of pregnancy complications. Finally, women were also asked whether they were given or had bought iron tablets or syrup. Iron supplementation during pregnancy is recommended to prevent iron deficiency anemia, which is a common problem among pregnant women [DHS 2005]. Through these variables, factor analysis technique is

used also to construct the indicators of quality of health services. Table (2) shows the Eigen values of factor analysis applied to quality of health services variables and total variance explained. Two factors are extracted and they explain about 64 percent of the total variations among the data. Rotated factor loadings for these factors are shown at appendix.

Table (2): Factor analysis results for quality of health services variables, 2005

Factors	Eigen values	Percent of variance explained	Cumulative percent of variance
1	2.753	45.890	45.890
2	1.065	17.757	63.647

The results of the factor analysis show that the first factor includes the following four variables: blood and urine sample taken, blood pressure measured, and woman was weighted. This factor explains about 46 percent of the variation and it represents "Content of antenatal care".

The second factor includes the following two variables: woman was told about the signs of pregnancy complications and given or bought any iron tablets or syrup. This factor explains about 18 percent of the variation and it represents "Treatment with complications".

4. Results

4.1 Descriptive Analysis

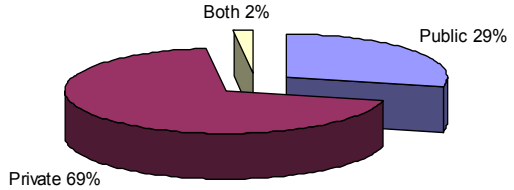
Before starting to deeply analyze the data and to investigate the main determinants affect receiving antenatal health care, a descriptive statistics of the variables used in the analysis are displayed.

4.1.1 Antenatal care utilization

Antenatal care is very important for pregnant women. Early and regular checkups by trained medical providers are very necessary in assessing the physical status of women during pregnancy. The results indicated that pregnant women received antenatal care from a medical provider for 71 percent of the last births in the five-year period before the survey. Less than one percent reporting that they had received antenatal care from a trained nurse or midwife. However, almost 29 percent of women did not receive antenatal health care during their pregnancy.

Women who received antenatal health care were asked about the place where they received this antenatal care. Most of women did not receive antenatal care in public medical facilities. Figure (1) shows that 69 percent of antenatal health care services was provided by private sector while 29 percent was provided by public sector provider.

Figure (1): Percentage distribution of place of antenatal care



According to WHO, the pregnant woman is considered to have received regular antenatal care if she mentioned that she had made at least four visits to a trained medical provider. Women received regular antenatal care for 61 percent of last births in the five years period before the survey, while there is 39 percent of women did not receive regular antenatal care or did not receive any antenatal care during pregnancy.

In the following, the relationship between number of antenatal health care visits and different variables is displayed. In addition, chi-square test is used to determine the significance of the relation between the number of antenatal health care and these different variables.

i.Antenatal Care Utilization according to Background Characteristics

Table (3) presents the percentage of antenatal care utilization according to women's background characteristics. The results indicate that there is a significant relationship between place of residence and number of antenatal care visits. Mothers live in urban areas received regular antenatal care for 77 percent of births compared 51 percent among women live in rural areas. Also, there is a significant relationship between region and number of antenatal care visits, where 82 percent of mothers live in urban Lower Egypt received regular antenatal care, while only 40 percent of women live in rural Upper Egypt received regular antenatal care.

There is a significant relationship between both woman's education and husband's education and number of antenatal care visits. Data of Table (3) shows that 88 percent of women with university education or higher received regular antenatal care compared to only 39 percent of women who have never attended school. Moreover, women whose their husbands university education or higher are more than twice as likely as women whose their husbands have never attended school to have received regular antenatal care.

Table (3): Percentage of antenatal care utilization according to women's background characteristics

Items		Number of ANC visits		Total	
		Less than 4	4 or more	%	N
*Place of Residence**	Urban	22.9	77.1	100	3722
	Rural	48.6	51.4	100	6055
*Region**	Urban governorates	19.4	80.6	100	1450
	Urban Lower Egypt	17.6	82.4	100	978
	Rural Lower Egypt	37.4	62.6	100	3067
	Urban Upper Egypt	30.9	69.1	100	1222
	Rural Upper Egypt	60.3	39.7	100	2941
	Frontier governorates	39	61	100	118
*Current Age**	15-19	36.9	63.1	100	377
	20-24	37.7	62.3	100	2277
	25-29	36.8	63.2	100	3077
	30-34	38.5	61.5	100	2093
	35-39	42.1	57.9	100	1302
	40-44	46.9	53.1	100	537
	45-49	55.7	44.3	100	115
*Work status**					
Not working for cash		40.4	59.6	100	8484
Working for cash		28.4	71.6	100	1291

Table (3): Continued

Items		Number of ANC visits		Total	
		Less than 4	4 or more	%	N
*Educational attainment**					
No education		61.2	38.8	100	2968
Incomplete primary		47.6	52.4	100	872
Complete primary		46.7	53.3	100	390
Incomplete secondary		38.9	61.1	100	1088
Complete secondary		24.4	75.6	100	3414
Higher		12.5	87.5	100	1046
*Watching Television**					
No		60.9	39.1	100	343
Yes		38	62	100	9419
*Listening to Radio**					
No		49.7	50.3	100	1938
Yes		36.1	63.9	100	7828
*Reading Newspaper**					
No		49.1	50.9	100	6130
Yes		21.2	78.8	100	3596
*Wealth index**	Poorest	66.8	33.2	100	1911
	Poorer	52.3	47.7	100	1971
	Middle	38.5	61.5	100	2104
	Richer	23.4	76.6	100	2061
	Richest	11.3	88.7	100	1730
*Husband's educational attainment**					
No education		59.2	40.8	100	1761
Incomplete primary		47.5	52.5	100	1216
Complete primary		42.9	57.1	100	538
Incomplete secondary		42.3	57.7	100	1239
Complete secondary		32.1	67.9	100	3531
Higher		18.9	81.1	100	1474

* Significant at level 1%

Exposure to the media increases significantly the number of antenatal care visits. For example, 39 percent of women who do not watch television received regular antenatal health care for their last births, while this percentage increased to 62 percent among women who watch television.

There is a significant relationship between both women's work status and wealth index and receiving regular antenatal care. Table (3) shows that 60 percent of women who do not work for cash received regular antenatal care, while this percentage increased to 72 percent among women who work for cash. Moreover, only 33 percent of women who are in the poorest quintile received regular antenatal care, while this percentage increased to 89 percent among women who are in the richest quintile.

ii. Antenatal Care Utilization according to Women's Empowerment Variables

WHO report stated that "tackling the low status of women, violence against women and lack of employment rights for pregnant women is vital in helping to build societies that support pregnant women" [22]. This confirms the importance of women's empowerment on increasing antenatal health care utilization. Table (4) presents the percentage of antenatal health care utilization by variables of women's empowerment.

The results indicate that there is a significant relationship between variables of control over finances and number of antenatal care. Women who participate in decision related to how their earnings spent are more likely to receive regular antenatal care than women who do not participate in this decision. Slightly less than three quarters (74 percent) of women who participate in decision related to how their earnings spent received regular care, while this percentage decreased to 58 percent among women who do not participate in this decision.

Table (4): Percentage of antenatal care utilization by women's empowerment

Items	Number of ANC visits		Total	
	Less than 4	4 or more	%	N
Control over finances				
Who decide how woman's earnings spent*				
Not Participate	41.7	58.3	100	72
Participate	26.4	73.6	100	1120
Freedom of movement				
Getting permission to go to health unit*				
Big Problem	46.8	53.2	100	1237
No Problem	37.7	62.3	100	8534
Going to health unit alone*				
Big Problem	42.8	57.2	100	2975
No problem	37.1	62.9	100	6798
Decision for contraceptive use				
Who has final say (use contraception)*				
Not Participate	44.7	55.3	100	255
Participate	35.7	64.3	100	5975
Making daily decisions				
Who has final say (own health care)*				
Not Participate	49.7	50.3	100	2074
Participate	35.7	64.3	100	7517
Who has final say (purchases for daily needs)*				
Not Participate	48.2	51.8	100	2011
Participate	36.2	63.8	100	7575
Who has final say (large purchases)*				
Not Participate	45.5	54.5	100	4583
Participate	32.5	67.5	100	5004
Who has final say (visits to family)*				
Not Participate	44.8	55.2	100	2719
Participate	36.3	63.7	100	6864
Who decide how husband's earnings spent*				
Not Participate	50.1	49.9	100	2944
Participate	33.5	66.5	100	6596

* Significant at level 1%

Table (4) shows that there is a significant relationship between variables of freedom of movement and number of antenatal care. More than half of women (53 percent) who cannot go to the health unit without permission received regular antenatal care while this percentage increased to 62 percent among women who can go to the health unit without permission.

Additionally, there is a significant relationship between variables of decision making power and number of antenatal care. Women who participate in decisions related to use contraception, own health care, purchases for daily needs, large purchases, husband's earnings spent and visits to family or relatives are more than women who do not

participate in these decisions to have received regular antenatal care. Table (4) shows that slightly more than half of women who do not participate in decisions making received regular antenatal care while more than two thirds of women who participate in these decisions received regular antenatal care.

iii.Antenatal Care Utilization according to Availability and Quality of Services

WHO report stated that "There is some way to go to provide at least four care contacts during each pregnancy, starting early enough to ensure that effective interventions are used. Women need providers who are skilled enough to offer care that linked into a health care system that has continuity with childbirth care. The barriers to extending coverage are twofold. First, in some areas no services are offered, implying the need for outreach or services that can be physically accessed. Second, services are often not responsive enough, complaints of unhelpful and rude health personnel, unexpected and unfair costs. The question should not be why do women not accept the service that we offer? but why do we not offer a service that women will accept?" [22]. Accordingly, the quality and the availability of health services is very important to attract women to receive antenatal care. Table (5) presents the percentage of antenatal care utilization by availability and quality of health services.

Table (5): Percentage of ANC utilization by availability and quality of services

Items	Number of ANC visits		Total	
	Less than 4	4 or more	%	N
Availability of services				
Distance to health facility*				
Big problem	44	56	100	1639
No problem	37.8	62.2	100	8135
Having to take transport*				
Big problem	43.1	56.9	100	1779
No problem	37.9	62.1	100	7994
No female health provider*				
Big problem	45.2	54.8	100	4030
No problem	34.4	65.6	100	5742
Quality of services				
During pregnancy – weighed*				
No	63.8	36.2	100	1069
Yes	30.1	69.9	100	7989
During pregnancy - blood pressure taken*				
No	72	28	100	1282
Yes	27.8	72.2	100	7774
During pregnancy - urine sample taken*				
No	61	39	100	2436
Yes	24.2	75.8	100	6621
During pregnancy - blood sample taken*				
No	57.5	42.3	100	2399
Yes	25.5	74.5	100	6658
Told about pregnancy complications*				
No	39.7	60.3	100	6113
Yes	22.3	77.7	100	2937
During pregnancy, given iron tablets/syrup*				
No	56.4	43.6	100	4590
Yes	23.2	76.8	100	5185

* Significant at level 1%

The results indicate that there is a significant relationship between variables of availability of services and number of antenatal care visits. Table (5) shows that women who have problem at distance to health facility, having to take transport and no female health provider are less likely to have received regular antenatal care than women who do not have any problem (almost 56 percent vs. 62 percent).

There is a significant relationship between variables of quality of services and number of antenatal care visits. Data of Table (5) shows that women who had services such as weighed, blood pressure measured, urine sample taken, blood sample taken, told about pregnancy complications, and given iron tablets/syrup are more likely to receive regular antenatal care than women who did not have these services. For example, only 28 percent among women who their blood pressure was not measured received regular antenatal care, while this percentage increased to 72 percent among women who their blood pressure was measured.

4.2 Zero Inflated Negative Binomial Regression

The zero-inflated negative binomial is used to examine the impact of women's background characteristics, indicators of women's empowerment, and indicators of availability and quality of health services on number of antenatal health care visits. Accordingly, the most important determinants of number of antenatal care visits could be specified.

4.2.1 Impact of Women's Background Characteristics on Number of Antenatal Care Visits

The objective of this subsection is to study the impact of women's background characteristics on number of antenatal care visits using zero-inflated negative binomial regression.

The explanatory variables in the model are women's age, education, work status, exposure to a terminated pregnancy, exposure to mass media (watching television, reading newspaper and listening radio), husband's education, relationship between spouses, wealth index, place of residence and region. All categorical independent variables are recoded into set of binary variables, takes the value one if the category exist and the value zero if the category does not exist.

The coefficients of the output of the ZINBR are interpreted as follow: the expected number of antenatal care visits changes by exp (coefficient) for each unit increase in the corresponding predictor while holding all other variables in the model constant. Inflation equation refers to the logistic model which predicts whether or not a woman takes the value zero (did not receive antenatal care). The Vuong test will compare the zero-inflated negative binomial to the standard negative binomial model [19], in order to ensure that the assumption of the excessive zeros is validated and the zero-inflated negative binomial regression is the best model fit the data. Table (6) shows the significant variables of zero-inflated negative binomial regression model for examining the impact of women's background characteristics on the number of antenatal care visits.

As shown in Table (6), the higher level of wealth index, the higher predicted number of antenatal care visits. The expected number of antenatal care visits for woman in the richest quintile is 1.43 times the expected number of antenatal care

visits for woman in the poorest quintile. Also, the expected number of antenatal care visits for woman in the richer quintile is 1.28 times the expected number of antenatal care visits for woman in the poorest quintile.

It can be noticed that place of residence and region have significant impact on the number of antenatal care visits. Table (6) shows that the expected number of antenatal care visits for woman from urban areas is 1.31 times the expected number of antenatal care visits for woman from rural areas while holding all other variables in the model constant. Additionally, the expected number of antenatal care visits for woman from urban Lower or Upper Egypt is less than the expected number of antenatal care visits for woman from urban governorates. However, the expected number of antenatal care visits for woman from the frontier governorates is more than the expected number of antenatal care visits for woman from urban governorates.

The findings of this study show that the current age of women has a negative significant impact on the number of antenatal care visits. Increasing the current age of women by one year will decrease the expected number of antenatal care visits by almost one visit.

Table (6): Results of ZINB regression for examining the impact of the women's background characteristics on number of antenatal visits

Variable	Coefficient	Exp (Coefficient)
Women's age	-0.0037*	0.996
Terminated pregnancy		
No(ref)		
Yes	0.1065*	1.11
Reading Newspaper		
No(ref)		
Yes	0.0971*	1.10
Watching TV		
No(ref)		
Yes	0.1172**	1.12
Relationship between spouses		
No(ref)		
Yes	-0.0466*	0.95
Place of residence		
Rural(ref)		
Urban	0.2688*	1.31
Region		
Urban governorates(ref)		
Urban lower Egypt	-0.0810*	0.92
Urban upper Egypt	-0.1584*	0.85
Frontier governorates	0.1673*	1.18
Wealth index		
Poorest(ref)		
Poorer	0.1225*	1.13
Middle	0.1686*	1.18
Richer	0.2464*	1.28
Richest	0.3553*	1.43

* Significant at level 1% **Significant at level 5%

Exposure to the media increases significantly the number of antenatal care visits. Table (6) shows that the expected number of antenatal care visits for women who are reading newspapers is 1.10 times the expected number of antenatal care visits for women who are not reading newspapers while holding all other variables in the model constant. Additionally, the expected number of antenatal care visits for women who are watching television is 1.12 times the expected number of antenatal care visits for women who are not watching television.

The results of the fitted model show that the exposure to a terminated pregnancy has a significant impact on the number of antenatal care visits, where the expected number of antenatal care visits for woman who had a terminated pregnancy is 1.11 times the expected number of antenatal care visits for woman who did not have a terminated pregnancy.

In addition, the zero-inflated negative binomial regression generates the inflation equation which predicts whether or not a woman takes the value zero (did not receive antenatal care). Table (7) shows the results of the inflation equation.

Table (7): Results of inflation equation for examining the impact of women's background characteristics on receiving antenatal care

Variable	Coefficient	Exp (Coefficient)
Women's age	0.0370*	1.04
Women's education		
No education(ref)		
Incomplete primary	-0.3858*	0.68
Complete primary	-0.2678**	0.77
Incomplete secondary	-0.4758*	0.62
Complete secondary	-0.9165*	0.40
Higher	-1.4873*	0.23
Terminated pregnancy		
No(ref)		
Yes	-0.2563*	0.77
Reading Newspaper		
No(ref)		
Yes	-0.1749**	0.84
Watching TV		
No(ref)		
Yes	-0.3549*	0.70
Region		
Urban governorates(ref)		
Urban upper Egypt	0.3364*	1.40
Rural upper Egypt	0.6719*	1.96
Wealth index		
Poorest(ref)		
Poorer	-0.2408*	0.79
Middle	-0.4785*	0.62
Richer	-0.8587*	0.42
Richest	-1.3723*	0.25
Vuong Test		
Z	46.93*	

* Significant at level 1% **Significant at level 5%

The results of Table (7) indicate that there are some variables predict significantly whether or not the woman has zero antenatal visit. Table (7) shows that the wealth index has a negative impact on the probability that the women will have a zero visit. The probability of woman to be in the zero group will decrease by 75 percent if the woman in the richest quintile in comparison with woman in the poorest quintile. Additionally, the probability of woman to be in the zero group will decrease by 58 percent if the woman in the richer quintile in comparison with woman in the poorest quintile. Thus, the higher level of wealth index, the less likely the woman has a zero visit.

The exposure to a terminated pregnancy has a significant impact on the probability that women will have zero visit. The probability of woman to be in the zero group will decrease by 23 percent if the woman had a terminated pregnancy in comparison with the woman did not have a terminated pregnancy.

As shown in Table (7), women's education has a negative significant impact on the probability that women will have zero visit. The probability of woman to be in the zero group will decrease by 77 percent if the woman has higher education in comparison with woman with no education. Additionally, the probability of woman to be in the zero group will decrease by 60 percent if the woman has complete secondary in comparison with woman with no education. ***Thus, the education made the women receive antenatal care but did not increase the number of antenatal care visits.***

The findings of this study show that the exposure to the media has significant impact on the probability that women will have zero visit. The probability of women to be in the zero group will decrease by 16 percent if the women read newspapers in comparison with those do not read newspapers. The probability of women to be in the zero group will decrease by 30 percent if the women watch television in comparison with the women do not watch television.

Additionally, region has a significant impact on the probability that women will have zero visit, where women from urban or rural Upper Egypt are more likely to receive zero visit than women from urban governorates.

Vuong test compares the zero-inflated negative binomial model to a standard negative binomial model. Because the z-value is significant, the Vuong test shows that the zero-inflated negative binomial is a better fit than the standard negative binomial.

4.2.2 Impact of Indicators of Women's Empowerment on Number of Antenatal Care Visits

This subsection focuses mainly on examining the impact of indicators of women's empowerment on number of antenatal health care visits by zero-inflated negative binomial regression. The indicators of women's empowerment are treated as continuous variables in the zero-inflated negative binomial model.

The results of the zero-inflated negative binomial model are presented in Table (8). The results show that indicators of women's empowerment have a highly significant and positively impact on number of antenatal care visits, where the

expected number of antenatal care visits increases by almost one visit if women's empowerment indicators increase by one unit while holding all other variables in the model constant. Thus, the higher level of indicators of women's empowerment, the higher predicted number of antenatal care visits.

Table (8): Results of ZINBR for examining the impact of women's empowerment indicators on number of antenatal care visits and the results of the Inflation equation for zero visits

Variable	Coefficient	Exp (Coefficient)
ZINB Model		
Making daily decisions	0.0517*	1.053
Control over finances	0.0317*	1.032
Decision for contraceptive use	0.0167**	1.017
Freedom of movement	0.0326*	1.033
Inflation Equation		
Making daily decisions	-0.2931*	0.746
Control over finances	-0.2284*	0.796
Decision for contraceptive use	-0.1158*	0.891
Freedom of movement	-0.1850*	0.831
Vuong Test		
Z	42.05*	

* Significant at level 1% **Significant at level 5%

Table (8) shows the logistic regression results of examining the impact of indicators of women's empowerment on the probability that a woman will have zero visit. The results indicate that the higher level of indicators of women's empowerment, the less likely the women to have zero visit. For example, the probability of women to be in the zero group will decrease by 17 percent if the level of freedom of movement increases by one unit and all other variables keep constant. Also, the probability of women to be in the zero group will decrease by 25 percent if the level of making daily decisions increases by one unit.

The significance level of Vuong test shows that the zero-inflated negative binomial is a better fit than the standard negative binomial.

4.2.3 Impact of Availability and Quality of Health Services on Number of Antenatal Care Visits

The objective of this subsection is to study the effect of the availability and quality of health services on number of antenatal care visits. The indicators of availability and quality of health services are treated as continuous variables in the zero-inflated negative binomial model.

Table (9) summarizes results of ZINBR for examining the impact of availability and quality of health services on the number of antenatal care visits. The results of the fitted model show that the availability and quality of health services have a positive impact on the number of antenatal care visits. The expected number of antenatal care visits increases by almost one visit if the level of availability of health services increases by one unit. Additionally, the expected number of antenatal care visits increases by almost one visit if the indicators of quality of health services

increase by one unit while holding all other variables in the model constant. Thus, the higher level of indicators of quality of health services, the higher predicted number of antenatal care visits. Vuong test shows that the zero-inflated negative binomial is a better fit than the standard negative binomial

Table (9): Results of ZINBR for examining the impact of availability and quality of health services on number of antenatal visits

Variable	Coefficient	Exp (Coefficient)
Availability of health services	0.0258*	1.026
Content of antenatal care	0.1299*	1.139
Treatment with complications	0.1304*	1.139
Vuong Test		
Z	25.64*	

* Significant at level 1%

4.2.4 Determinants of Number of Antenatal Care Visits

This subsection aims at identifying the most important determinants of number of antenatal care visits. The zero-inflated negative binomial regression is used. The dependent variable is the number of antenatal care visits. The explanatory variables used in the model include background characteristics of the women, indicators of women's empowerment, and indicators of availability and quality of health services. Table (10) shows the significant variables of zero-inflated negative binomial regression model.

The results show that the wealth index has a positive significant impact on number of antenatal care visits. For example, the expected number of antenatal care visits for women in the richest quintile is 1.39 times the expected number of antenatal care visits for women in the poorest quintile after controlling all other variables and indicators constant. Additionally, regarding the inflation model, the results show that the wealth index has a negative impact on the probability that women will have a zero visit. The probability of woman to be in the zero group will decrease by 75 percent if the woman in the richest quintile in comparison with woman in the poorest quintile. ***As a result, the higher level of wealth index, the less likely the woman has a zero visit, and the higher predicted number of antenatal care visits.***

As shown in Table (10), place of residence is one of the main determinants of number of antenatal care visits. The expected number of antenatal care visits for woman from urban areas is 1.27 times the expected number of antenatal care visits for woman from rural areas while holding all other variables in the model constant. Additionally, region has a significant impact on number of antenatal care visits. The expected number of antenatal care visits for woman from the urban Lower or Upper Egypt is less than the expected number of antenatal care visits for woman from the urban governorates. However, the expected number of antenatal care visits for woman from the frontier governorates is more than the expected number of antenatal care visits for women from the urban governorates.

Table (10) shows that the freedom of movement only from the indicators of women's empowerment has a positive impact on the number of antenatal care visits. The expected number of antenatal care visits increases by almost one visit if the level of freedom of movement increases by one unit. Accordingly, making daily decision, control over finances and decision for contraceptive use as indicators for women's empowerment do not affect the number of antenatal care visits received by the women.

However, regarding the inflation model, Table (10) shows that the higher level of indicators of women's empowerment (control over finances, freedom of movement, and making daily decisions), the less likely the women have a zero visit. The probability of women to be in the zero group will decrease by 28 percent if the level of control over finances increases by one unit. Also, the probability of women to be in the zero group will decrease by 15 percent if the level of freedom of movement increases by one unit and all other variables keep constant. Additionally, the probability of women to be in the zero group will decrease by 11 percent if the level of making daily decisions increases by one unit. ***Accordingly, women's empowerment affects the decision to go to receive antenatal care but does not increase the number of antenatal care visits.***

The results of the fitted model show that the quality of health services has a positive impact on the number of antenatal care visits. The expected number of antenatal care visits increases by almost one visit if the indicators of quality of health services increase by one unit while holding all other variables in the model constant.

The findings of this study show that the current age of women has a negative significant impact on the number of antenatal care visits. Increasing the current age of women by one year will decrease the expected number of antenatal care visits by almost one visit. Additionally, the higher the women's age, the more likely the women have zero visit. ***Accordingly, women with higher age are less likely to go to receive antenatal care and less likely to increase the number of visits.***

Exposure to the media increases significantly the number of antenatal care visits. Table (10) shows that the expected number of antenatal care visits for women who are reading newspapers is 1.09 times the expected number of antenatal care visits for women who are not reading newspapers while holding all other variables in the model constant. Additionally, the expected number of antenatal care visits for women who are watching television is 1.10 times the expected number of antenatal care visits for women who are not watching television.

The exposure to a terminated pregnancy has a significant impact on the number of antenatal care visits. Table (10) shows that the expected number of antenatal care visits for women who had a terminated pregnancy is 1.11 times the expected number of antenatal care visits for women who did not have a terminated pregnancy. Moreover, the exposure to a terminated pregnancy has a significant impact on the probability that women will have zero visit. The probability of woman to be in the zero group will decrease by 26 percent if the woman had a terminated pregnancy in comparison with the woman did not have a terminated pregnancy. ***Accordingly, the exposure to a terminated pregnancy increases the probability of receiving antenatal care and increases the number of antenatal care visits.***

As shown in Table (10), women's education has a negative significant impact on the probability that women will have a zero visit. The probability of woman to be in the zero group will decrease by 78 percent if the woman has higher education in comparison with woman with no education. Additionally, the probability of woman to be in the zero group will decrease by 57 percent if the woman has complete secondary education in comparison with woman with no education. ***Thus, education made the women receive antenatal care but did not increase the number of antenatal care visits.***

Vuong test compares the zero-inflated negative binomial model to a standard negative binomial model. Because the z-value is significant, the Vuong test shows that the zero-inflated negative binomial is a better fit than the standard negative binomial.

Table (10): Results of ZINB regression for examining the determinants of number of antenatal visits and the Inflation model for zero visit

Variable	Coefficient	Exp(coeff.)
ZINB Model		
Women's age	-0.0025**	0.997
Terminated pregnancy		
No(ref)		
Yes	0.1051*	1.11
Reading Newspaper		
No(ref)		
Yes	0.0870*	1.09
Watching TV		
No(ref)		
Yes	0.0940**	1.10
Relationship between spouses		
No(ref)		
Yes	-0.0479*	0.95
Place of residence		
Rural(ref)		
Urban	0.2409*	1.27
Region		
Urban governorates(ref)		
Urban lower Egypt	-0.0844*	0.92
Urban upper Egypt	-0.1586*	0.85
Frontier governorates	0.1556*	1.17
Wealth index		
Poorest(ref)		
Poorer	0.1159*	1.12
Middle	0.1540*	1.17
Richer	0.2402*	1.27
Richest	0.3263*	1.39
Content of antenatal care	0.0748*	1.07
Treatment with complications	0.0850*	1.08
Freedom of movement	0.0304*	1.03
Inflation Equation		
Women's age	0.0256*	1.03
Women's education		
No education(ref)		
Incomplete primary	-0.3830*	0.68
Incomplete secondary	-0.4348*	0.65
Complete secondary	-0.8353*	0.43
Higher	-1.5266*	0.22
Terminated pregnancy		
No(ref)		
Yes	-0.2999*	0.74

Table (10): Continued

Variable	Coefficient	Exp(coeff.)
Region		
Urban governorates(ref)		
Urban upper Egypt	0.9102*	2.48
Rural upper Egypt	1.1581*	3.18
Wealth index		
Poorest(ref)		
Poorer	-0.2248*	0.80
Middle	-0.4482*	0.64
Richer	-0.8026*	0.45
Richest	-1.3834*	0.25
Making daily decisions	-0.1203*	0.89
Control over finances	-0.3223**	0.72
Freedom of movement	-0.1576*	0.85
Vuong Test		
Z	32.15 *	

* Significant at level 1% **Significant at level 5%

5. Discussion

The findings of this study show that only freedom of movement from the indicators of women's empowerment has a positive impact on the number of antenatal care visits. In India, women's empowerment in terms of decision-making power, control over finances, and freedom of movement had a positive relationship with antenatal health care use but freedom of movement was the only measure that demonstrated a statistically significant relationship where women with greater freedom of movement obtained higher levels of antenatal care (Bloom, et al.,2001).

The findings reveal that place of residence is one of the main determinants of number of antenatal care visits. The expected number of antenatal care visits for women from urban areas is 1.27 times the expected number of antenatal care visits for women from rural areas. These findings agree with the literature in northern Sudan where the woman living in urban areas has higher likelihood of receiving checkup during pregnancy than the woman living in rural areas with odds ratio about 2 times. (Alkonti, 1995).

The results show that wealth index has a positive significant impact on number of antenatal care visits. As from the literature in India, it is proved that high economic status has a positive relationship to the antenatal care score (Bloom, et al., 2001).

The study shows that exposure to the media increases significantly the number of antenatal care visits. As from the literature in Egypt, it is proved that women who are exposed to mass media are more likely to receive antenatal health care with odds ratio around 1.2 times (Mostufa, 2003).

Women's age is found to have a negative impact on the number of antenatal care visits. These findings agree with the literature in Egypt, it is proved that the younger mothers are more likely to receive antenatal health care than older mothers with odds ratio 1.026 (Mostufa, 2003).

6. Conclusion

This study tries to examine the impact of women's empowerment and other related variables on antenatal health care utilization. To achieve the goals of this study, indicators of women's empowerment are constructed using factors analysis. These indicators are making daily decisions, control over finances, decision about contraceptive use and freedom of movement.

The results revealed that almost 29 percent of women did not receive antenatal health care during their pregnancy. Most pregnancy checkups were done at private health care. About 69 percent of antenatal health care services was provided by private sector while 29 percent was provided by public sector provider. Among women who received any antenatal care, more than three quarters (78 percent) started visits before the fourth month of pregnancy.

The findings of the study indicate that wealth index is considered to be the most important determinant of receiving antenatal care. The higher level of wealth index, the higher predicted number of antenatal care visits and less likely has a zero visit.

The results of the fitted model show that the quality of health services has a positive impact on the number of antenatal care visits. The expected number of antenatal care visits increases by almost one visit if the indicators of quality of health services increase by one unit while holding all other variables in the model constant.

The main conclusion here is that the higher level of indicators of women's empowerment (control over finances, freedom of movement, and making daily decisions), the less likely the women have a zero visit. However, only freedom of movement from the indicators of women's empowerment increases the number of antenatal care visits. Accordingly, women's empowerment affects the decision to go to receive antenatal care but does not increase the number of antenatal care visits.

The results of this analysis show that education made the women receive antenatal care but did not increase the number of antenatal care visits.

Women with higher age are less likely to go to receive antenatal care and less likely to increase the number of visits. Additionally, the exposure to a terminated pregnancy increases the probability of receiving antenatal care and increases the number of antenatal care visits.

Based on the above mentioned findings of both descriptive and multivariate analysis of antenatal health care utilization, the following recommendations can be introduced:

- Given that wealth index is considered to be the most important determinant of receiving antenatal health care. Women from higher wealth index are more likely to receive regular antenatal care than women from lower wealth index. For that reason, more governmental efforts should be made to improve women's economic status as a means to empower them to take better care of their health, especially during pregnancy.

- Given that women's education has a positive significant impact on receiving regular antenatal care, all possible efforts must be made to increase women's educational level. The government policies have to promote more efforts in order to eradicate illiteracy among women.

- Greater attention should be devoted to collect demographic data more detailed to measure women's empowerment.

- More programs and spots should be aired in different mass media to promote antenatal care.

- More efforts should be made to educate and train providers of antenatal health care services to offer more quality services. The question should not be "why do women not accept the service that we offer?", but "why do we not offer a service that women will accept?"

- Collection a lot of information about the complaints of health services to solve these problems in order to provide good services.

- Ask the women about the reasons for not receiving antenatal care.

- Further researches are needed to study the other factors affecting the level of utilization of antenatal health care services which are not included in this study to be able to improve the level of utilization of antenatal health care services in Egypt.

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Appendix

Table (1): Rotated Factor Loadings of Women's Empowerment

Variables	Factors			
	First	Second	Third	Fourth
Major household purchases	**0.730**	0.067	0.022	0.148
Daily household purchases	**0.677**	0.055	0.035	-0.209
Her health care	**0.687**	-0.008	-0.014	0.293
Visits her family or relatives	**0.707**	0.022	0.006	-0.034
How her husband's earnings is used	**0.546**	0.075	0.079	0.331
Work status	0.072	**0.981**	0.024	0.035
How her money is used	0.072	**0.981**	0.022	0.043
Current contraceptive method	0.034	0.025	**0.981**	0.017
Decision about contraceptive use	0.045	0.021	**0.981**	0.019
Getting a permission to go to the doctor	0.085	0.000	-0.018	**0.789**
Going to the doctor alone	0.061	0.052	0.034	**0.662**

Table (2): Rotated Factor Loadings of Quality of Health Services

Variables	Factors	
	First	Second
Blood pressure measured	**0.784**	0.128
Blood sample taken	**0.836**	0.116
Urine sample taken	**0.832**	0.142
Weight	**0.738**	0.057
Told about the signs of pregnancy complications	0.078	**0.790**
Given any iron tablets or syrup	0.132	**0.753**