The Relationship between Women's Empowerment and Antenatal Health Care in Egypt

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Abstract:

Antenatal health care utilization is very important not only for mothers but also for babies because it is leading to reduce maternal and child mortality. Women's relative lack of decision-making power and their unequal access to employment, finances, education, basic health care are considered to be the root causes of their ill-health and that of their children. The main purpose of this paper is to examine whether women's empowerment and receiving regular antenatal care are simultaneously determined. The Recursive Bivariate Probit model is used to achieve this goal. Factor analysis technique is used to construct availability and quality of health services indicators. The recursive bivariate probit estimates show that women's empowerment and receiving regular antenatal care are simultaneously determined. Additionally, women's empowerment has a significant and positive impact on receiving regular antenatal care. This finding confirms that women's empowerment is crucial to improve maternal health care in developing countries.

Keywords:
Women's Empowerment- Antenatal Health Care- Recursive Bivariate Probit

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1. Introduction

In 2000, at the millennium summit, all 191 United Nations member states signed the millennium declaration which set eight millennium development goals (MDGs) to be achieved by the year 2015. The fifth Millennium Development goal calls for improving maternal health care and includes a target of reducing the maternal mortality ratio by three quarters between 1990 and 2015 and achieving universal access to reproductive health through antenatal care coverage. If the world achieves the fifth Millennium Development Goal by 2015, more than two million women will survive childbirth [17]. Most maternal and child deaths are preventable and avoidable with reproductive health services.

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 [20]. Empowering women is critical to advancing human development and achieving progress towards the MDGs.

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. Additionally, this Conference stated that the level of antenatal and postnatal care is affected by the availability of health services and the demand by pregnant women and mothers for these services [3]. The Women Deliver conference, held in London in October 2007, demonstrated that maternal and newborn health is a key to the economic growth and the social fabric of developing nations. It emphasized that gender equality and women's empowerment are critical for development efforts to reduce poverty, improve health, and achieve economic stability and growth [18].

Accordingly, the aim of this study is to identify the interactive relation between women's empowerment and the use of maternal health care. Traditionally, the effect of women's empowerment and the use of maternal health care are analyzed separately. This study employs the recursive bivariate probit model to perform the analysis using the Egypt Demographic and Health Survey (EDHS) 2008.

Objectives of the Study

This study will try to meet the following objectives:
1. Examining the levels, trends and differentials of utilization of antenatal health care services.
2. Modeling the relationship between women's empowerment and the use of antenatal health care in Egypt by the Recursive Bivariate Probit. The study tries to explore if women's empowerment and antenatal health care utilization are dependently determined.

This study is divided into six sections. The first section consists of 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. 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 2008). This survey was conducted on behalf of the Ministry of Health and Population [MOHP], and the National Population Council [NPC] by El-Zanaty and Associates. This survey included detailed information on fertility, family planning, infant and child mortality, maternal and child health and overall reproductive behavior. The EDHS 2008 covered a representative sample of 16,527 ever married women in the age group of 15-49 years. Only married women aged 15-49 whose last birth was during the five-year period before the survey are included in the analysis. As a result, 8036 women are 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 recursive bivariate probit model.

First: Descriptive Analysis
Descriptive analysis is used in order to summarize information of the data set in an attempt to show the level and differentials of antenatal health care utilization in Egypt. In addition, the descriptive analysis is applied to investigate 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 is a data reduction technique for investigating interdependences. It studies the interrelationships among the variables in an effort to find a new set of variables, fewer in numbers than the original set of variables [1]. Factor analysis technique is applied to construct the availability and quality of health services indicators within EDHS 2008 data.

Third: The Recursive bivariate probit model
A recursive model is a multi-equation model, it may be written in general form as:

$$Y_{1,i} = \alpha_1 + \alpha_2 X_i + \varepsilon_{1,i}$$

$$Y_{2,i} = \beta_1 + \beta_2 X_i + \beta_3 Y_{1,i} + \varepsilon_{2,i}$$

$$Y_{3,i} = \lambda_1 + \lambda_2 X_i + \lambda_3 Y_{1,i} + \lambda_4 Y_{2,i} + \varepsilon_{3,i}$$

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$$Y_{n,i} = \theta_1 + \theta_2 X_i + \theta_3 Y_{1,i} + \theta_2 Y_{2,i} + \ .... \ + \theta_{n+1} Y_{n-1,i} + \varepsilon_{n,i}$$

Where the Ys are endogenous variables and X, may be a vector, exogenous variables [15]. Variables whose values are determined interactively within the model are described as endogenous variables. Variables whose values are determined outside the model are described as exogenous variable [19]. Ordinary least squares (OLS) can be applied appropriately even in the context of simultaneous equations. This is the case of the recursive, triangular, or causal models [9].

This study is interested to estimate two equations. Where Y_1 refers to women's empowerment and Y_2 is receiving regular antenatal health care. Women's empowerment is a binary variable. Also, receiving regular antenatal care is a binary variable, where this variable takes the value 1 if the number of antenatal care visits is at least 4 and takes the value 0 if the number of visits is less than 4. Since the two variables are binary, then the study will use the recursive bivariate probit model.

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

3.1 Indicator of Women's Empowerment

In the previous literature, some researchers create women's empowerment indicators by using the sums of binary input variables. Women will be scored 1 for answers to each variable that contributed to a higher degree of empowerment; otherwise they will be scored 0 (Bloom, et al., (2001); Kamal (2006); Shafei (2005)). Other researchers used factor analysis technique to create women's empowerment indicators (Hussein (2009); Kishor (2000)). This study will depend on the first method.

The 2008 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 as replies 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 used to construct women's empowerment indicator 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 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.

An index is created using the sums of the nine binary variables to construct the indicator of women's empowerment[4]. It ranged from 0 to 9 according to the responses of the respondents on the nine questions. According to this index, the woman does not be empowered if the value of the index is from 0 to 4 and she is empowered if the index value is from 5 to 9. Categories from 0 to 4 are merged to be "0" and this means

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[4] Equal weights were given to the 9 variables of the women's empowerment.

that woman does not be empowered, as well as categories from 5 to 9 are merged to be "1" and this means that woman is empowered.

3.2 Availability of Health Services

In the 2008 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 indicator of availability of health services is constructed using the factor analysis technique. One factor is extracted and this factor explains about 59 percent of the total variations among the data and it represents the availability of health services.

3.3 Quality of Health Services

In the 2008 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, and, if they were told, whether they received any information about where to go if they experienced any 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 2008]. Through these variables, factor analysis technique is used also to construct the indicators of quality of health services. Table (1) 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 65 percent of the total variations among the data.

Table (1): Eigen values of factor analysis to quality of services and total variance explained

Factors	Eigen values	percent of variance explained	Cumulative percent of variance
1	2.803	46.715	46.715
2	1.065	17.743	64.458

The results of the factor analysis show that the first factor includes the following four variables: blood sample taken, urine sample taken, blood pressure measured, and woman was weighted. This factor explains about 47 percent of the variation and it represents "content of antenatal care".

The second factor includes the following three variables: woman was told about the signs of pregnancy complications, told where to go if she had any of these 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 Antenatal care and its correlates

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 74 percent of the last births in the five-year period before the survey. Less than one percent of women reported that they had received antenatal care from a trained nurse or midwife. However, almost 26 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. Figure (1) shows that 74 percent of antenatal health care services was provided by private sector while 24 percent was provided by public sector provider.

Figure (1): Distribution of women who received ANC according to the place of ANC, 2008
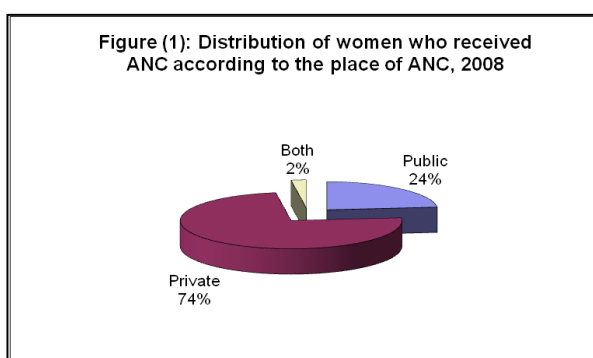
According to WHO, the pregnant woman is considered to have received regular antenatal care if she mentioned that she had made at least four visits to a trained medical provider. Women received regular antenatal care for 67 percent of last births in the five years period before the survey, while there is 33 percent of women did not receive regular antenatal care or did not receive any antenatal care during pregnancy.

In the following, the relation 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.

4.1.1. Antenatal Care Utilization according to Background Characteristics

Table (2) presents the percentage of antenatal health 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 81 percent of births compared to only 59 percent among women live in rural areas. Also, there is a significant relationship between region and number of antenatal care visits, where 79 percent of mothers live in urban Lower Egypt received regular antenatal care, while only 51 percent of women live in rural Upper Egypt received regular antenatal care.

Exposure to media increases significantly the number of antenatal care visits. For example, 44 percent of women who do not watch Television received regular antenatal health care for their last births, while this percentage increased to 68 percent among women who watch Television.

Table (2): Distribution of antenatal health care utilization according to women's background characteristics, 2008

Items	Number of ANC visits		Total	
	Less than 4	4 or more	%	N
Place of Residence* Urban	19.1	80.9	100	3020
Rural	41	59	100	5016
Region* Urban governorates	14	86	100	1075
Urban Lower Egypt	21	79	100	712
Rural Lower Egypt	34.4	65.6	100	2282
Urban Upper Egypt	24.1	75.9	100	945
Rural Upper Egypt	49.5	50.5	100	2564
Frontier governorates	33.9	66.1	100	458
Current Age* 15-19	28.7	71.3	100	276
20-24	29.7	70.3	100	1943
25-29	30.9	69.1	100	2631
30-34	35	65	100	1724
35-39	36.1	63.9	100	963
40-44	43.2	56.8	100	416
45-49	40.8	59.2	100	83
Educational attainment*				
No education	53.6	46.4	100	2186
Incomplete primary	41.3	58.7	100	553
Complete primary	37.1	62.9	100	268
Incomplete secondary	32.8	67.2	100	983
Complete secondary	24.8	75.2	100	3073
Higher	9.9	90.1	100	973
Work status*				
Not working for cash	34.2	65.8	100	7100
Working for cash	21.4	78.6	100	936
Watching Television*				
No	56.5	43.5	100	284
Yes	32	68	100	7752
Listening to Radio*				
No	41.1	58.9	100	3453
Yes	27	73	100	4583
Reading Newspaper*				
No	37.2	62.8	100	6168
Yes	18.3	81.7	100	1868
Wealth index* Poorest	57.6	42.4	100	1767
Poorer	43.4	56.6	100	1641
Middle	34.1	65.9	100	1669
Richer	19	81	100	1515
Richest	9.9	90.1	100	1444
Partner's educational attainment*				
No education	53.3	46.7	100	1363
Incomplete primary	41.5	59.5	100	868
Complete primary	32.7	67.3	100	387
Incomplete secondary	35.5	64.5	100	976
Complete secondary	28.4	71.6	100	3223
Higher	15	85	100	1217
Total	33	67	100	8036

Source: Calculated by authors using EDHS, 2008
* Significant at level 1%   ** Significant at level 5%

There is a significant relationship between both woman's education and husband's education and number of antenatal care visits. Data of Table (2) shows that women with university education or higher are more than twice as likely as women who have never attended school to have received regular antenatal care. Moreover, 85 percent of women whose husbands have university education or higher received regular antenatal care compared to only 47 percent of women whose husbands have never attended school.

There is a significant positive relationship between both women's work status and wealth index and receiving regular antenatal care. Table (2) shows that 66 percent of women who do not work for cash received regular antenatal care, while this percentage increased to 79 percent among those who work for cash. Moreover, only 42 percent of women who are in the poorest quintile received regular antenatal care, while this percentage increased to 90 percent among women who are in the richest quintile.

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

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 [3]. 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" [20]. This confirms the importance of women's empowerment on increasing antenatal health care utilization. Table (3) presents the percentage of antenatal health care utilization according to variables of women's empowerment.

The results indicate that there is a significant relationship between variables of freedom of movement and number of antenatal care. More than half of women (58 percent) who have a big problem at getting permission to go to health unit received regular antenatal care while this percentage increased to 68 percent among women who have not this problem.

Table (3) shows 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. More than three quarters (80 percent) of women who participate in decision related to how their earnings spent received regular care, while this percentage decreased to 54 percent among women who do not participate in this decision.

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 likely to receive regular care than those who do not participate in these decisions. Table (3) shows that about 60 percent of women who did not participate in decision making received regular antenatal care, while this percentage increased to about 69 percent of women who participated in these decisions.

Table (3): Distribution of antenatal health care utilization by variables of women's empowerment, 2008

Items	Number of ANC visits		Total	
	Less than 4	4 or more	%	N
Freedom of movement				
Getting permission to go to health unit*				
Big Problem	42.2	57.8	100	831
Not big Problem	31.9	68.1	100	7184
Going to health unit alone*				
Big Problem	38.8	61.2	100	2384
Not big problem	30.5	69.5	100	5630
Control over finances				
Who decide how woman's earnings spent*				
Not Participate	45.8	54.2	100	31
Participate	19.7	80.3	100	832
Decision for contraceptive use				
Who has final say (use contraception)**				
Not Participate	41.7	58.3	100	135
Participate	31.8	68.2	100	4857
Making daily decisions				
Who has final say (own health care)*				
Not Participate	40.7	59.3	100	1392
Participate	31.2	68.8	100	6644
Who has final say (purchases for daily needs)*				
Not Participate	36.5	63.5	100	2304
Participate	31.4	68.6	100	5732
Who has final say (large purchases)*				
Not Participate	35.7	64.3	100	4061
Participate	29.9	70.1	100	3975
Who has final say (visits to family)*				
Not Participate	41	59	100	1807
Participate	30.6	69.4	100	6229
Who decide how husband's earnings spent*				
Not Participate	38.2	61.8	100	2488
Participate	30.5	69.5	100	5548
Total	33	67	100	8036

Source: Calculated by authors using EDHS, 2008
* Significant at level 1%   ** Significant at level 5%

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

The International Conference on Population and Development (ICPD, 1994) in Cairo stated that the level of antenatal and postnatal care is affected by the availability of health services and the demand by pregnant women and mothers for these services [3]. 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?" [20].

Accordingly, the quality and the availability of antenatal care services are very important to attract women to receive antenatal care. Therefore, the services that are available and responsive to pregnant women will make a great contribution to the expansion of antenatal care. Table (4) presents the percentage of antenatal health care utilization according to variables of availability and quality of health services.

The results indicate that there is a significant relationship between variables of availability of services and number of antenatal care visits. Table (4) shows that women who have problems such as 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. For example, about 56 percent of women who have a big problem at having to take transport to go to health facility received regular care, while this percentage increased to 70 percent among women who have not this problem.

The results indicate that there is a significant relationship between variables of quality of health services and number of antenatal care visits. Data of Table (4) 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 31 percent among women who their blood pressure was not measured received regular antenatal care, while this percentage increased to 77 percent among women who their blood pressure was measured.

Table (4): Distribution of antenatal health care utilization by availability and quality of services, 2008

Items	Number of ANC visits		Total	
	Less than 4	4 or more	%	N
Availability of services				
Distance to health facility*				
Big problem	44.6	55.4	100	1577
Not big problem	30.2	69.8	100	6438
Having to take transport*				
Big problem	43.6	56.4	100	1668
Not big problem	30.1	69.9	100	6347
Concern that no female health provider*				
Big problem	38.9	61.1	100	3554
Not big problem	28.3	71.7	100	4459
Quality of services				
During pregnancy – weighed*				
No	58.7	41.3	100	956
Yes	24.3	75.7	100	6579
During pregnancy - blood pressure taken*				
No	68.6	31.4	100	1031
Yes	22.6	77.4	100	6504
During pregnancy - urine sample taken*				
No	49.1	50.9	100	2323
Yes	19.3	80.7	100	5212
During pregnancy - blood sample taken*				
No	50	50	100	2202
Yes	19.6	80.4	100	5333
Told about pregnancy complications*				
No	36	64	100	4982
Yes	14	86	100	2553
During pregnancy, given iron tablets/syrup*				
No	43.2	56.8	100	4810
Yes	18.8	81.2	100	3226
Total	33	67	100	8036

Source: Calculated by authors using EDHS, 2008
* Significant at level 1%   ** Significant at level 5%

4.1.4. Changes in antenatal care indicators during the period 2005-2008

Table (5) presents the changes in antenatal health care indicators between 2005 and 2008. According to table (5), there were substantial gains in antenatal care coverage. The results indicate that women received regular antenatal health care for 61 percent of last births at the time of the 2005 survey. By the time of the 2008 survey, this proportion had climbed to 67 percent. Additionally, data of table (5) shows that 69 percent of antenatal health care services were provided by private sector at the time of the 2005 survey. By the time of the 2008 survey, this proportion had increased to 74 percent.

Table (5): Changes in antenatal health care indicators between 2005 and 2008

Indicator	2005	2008	Change
Women receiving any ANC	71.3	74.2	2.9 (+)
Women receiving regular ANC	61.2	66.6	5.4 (+)
Women receiving first ANC visit within the first trimester (three months) of pregnancy	54.9	61.1	6.2 (+)
Women receiving last ANC visit within the last trimester (three months) of pregnancy	65.1	69.9	4.8 (+)
Place of ANC 　　　Public sector 　　　Private sector 　　　Both	 29 69 2	 24 74 2	 5 (-) 5 (+) -

Source: Calculated by authors using EDHS, 2005, 2008
(+) increased　　(-) decreased

The results presented in Table (5) indicated that about 55 percent of women who received antenatal care began seeing a provider within the first trimester of pregnancy at the time of the 2005 survey. By the time of the 2008 survey, this proportion had increased to 61 percent. On the other hand, 65 percent of women received last antenatal care visit within the last trimester of pregnancy at the time of the 2005 survey. By the time of the 2008 survey, this proportion had increased to about 70 percent.

4.2. Model Estimation

The Bivariate Probit Model is used in this study since the concerned response variables are binary variables. The bivariate probit model is a joint model for two binary outcomes which may be correlated with each other. Greene (1998) shows that estimators from the bivariate probit model become consistent and efficient when dependent variables in two equations are binary, and omitted variables are correlated with each other [7]. Maddala (1983) listed the bivariate probit model with endogenous dummy model among the recursive models. The recursive structure builds on a first reduced form equation for the potentially endogenous dummy and a second structural form equation determining the outcome of interest:

$$Y^{*}_{1i} = \tilde{\beta}_1 X_{1i} + u_{1i} \qquad (1)$$
$$Y^{*}_{2i} = \tilde{\beta}_2 X_{2i} + u_{2i} = \delta_1 Y_{1i} + \tilde{\delta}_2 Z_{2i} + u_{2i} \qquad (2)$$

Where: Y^{*}_{1i} and Y^{*}_{2i} are latent variables, Y_{1i} and Y_{2i} are binary variables observed following the rule:

$$\begin{cases} Y_{Li} = 1 & \text{if } Y^* > 0 \\ Y_{Li} = 0 & \text{if } Y^* \leq 0 \end{cases} \qquad ; L = 1,2$$

X_{1i} and Z_{2i} are vectors of exogenous variables, β_1 and δ_2 are parameter vectors, δ_1 is a scalar parameter, and $\tilde{\beta}_2 = (\delta_1 \ \tilde{\delta_2})$ .The error terms are assumed to be independently and identically distributed as bivariate normal[6].

The exogeneity test in the recursive bivariate probit model arises from allowing the correlation between the error terms (u_{1i} and u_{2i}) to be non-zero. The exogeneity test can be constructed from the following null and alternative hypotheses: $H_0: \rho = 0$ and $H_a: \rho \neq 0$ where ρ is the coefficient of correlation between the residuals from equations (1) and (2). H_0 corresponds to the assumption of exogeneity of the women's empowerment variable in the antenatal care equation [10].

Table (6) provides the recursive bivariate probit estimates. The results demonstrate that women's empowerment increases the probability that the woman receives at least four antenatal cares at less than 5% significance level. The null hypothesis $\rho = 0$, i.e. women's empowerment and receiving regular antenatal care are independently determined, is rejected. It suggests that receiving regular antenatal care and women's empowerment are simultaneously determined and therefore the recursive bivariate probit model specification is more appropriate than the two separate univariate probit models.

Table (6) also reports the effects of other socioeconomic variables on receiving regular antenatal care. There is a significant relationship between both women's education and husband's education and receiving regular antenatal care. Data of Table (6) shows that the women who have achieved secondary or higher education are more likely to receive at least four antenatal care visits compared with the women who have never attended school. Moreover, women whose husbands have achieved secondary or higher education are more likely to receive regular antenatal care compared with those have husbands have never attended school.

The results indicate that wealth index significantly increases the likelihood of receiving regular antenatal care. Table (6) shows that woman from the richest quintile is more likely to receive regular antenatal care compared with woman from the poorest quintile. Additionally, it can be noticed that women's work status has a significant impact on receiving regular antenatal care. Women who work for cash are more likely to receive at least four antenatal care visits compared with women who do not work for cash.

The findings of this study show that the availability of health services significantly increases the likelihood of receiving regular antenatal care. Additionally, the results indicate that the higher level of indicators of quality of health services, the more likely the women to receive at least four antenatal care visits.

Table (6): Recursive Bivariate Probit Estimates

Variables	Women's Empowerment		Regular ANC	
	Coefficient	St. error	Coefficient	St. error
Women's Empowerment			1.166**	0.343
Place of residence Rural(ref)				
Urban	-0.282**	0.135	0.147	0.167
Region Urban governorates(ref)				
Urban lower Egypt	0.217**	0.084	-0.039	0.096
Rural Lower Egypt	0.375**	0.146	-0.388***	0.212
Urban upper Egypt	-0.096	0.072	-0.295*	0.078
Rural Upper Egypt	-0.142	0.145	-0.750*	0.178
Frontier governorates	-0.619*	0.093	-0.512*	0.115
Wealth index Poorest(ref)				
Poorer	-0.004	0.051	0.173**	0.056
Middle	0.006	0.056	0.285*	0.066
Richer	0.116***	0.066	0.540*	0.083
Richest	0.095	0.078	0.737*	0.118
Reading Newspaper No(ref)				
Yes	0.233*	0.049	0.116**	0.056
Watching TV No(ref)				
Yes	0.252*	0.092	0.130	0.092
Listening to Radio No(ref)				
Yes	0.039	0.036	0.022	0.033
Women's age 15-24(ref)				
25-39	0.174*	0.037	-0.045	0.057
40-49	0.346*	0.079	0.043	0.099
Work status				
Not working for cash				
Working for cash	0.529*	0.072	0.215**	0.085
Women's education				
No education(ref)				
Incomplete primary	0.146**	0.070	0.179**	0.066
Complete primary	0.034	0.090	0.059	0.086
Incomplete secondary	0.086	0.059	0.151**	0.057
Complete secondary	0.201*	0.055	0.242*	0.052
Higher	0.322*	0.094	0.385*	0.089
Husband's education				
No education(ref)				
Incomplete primary	-0.064	0.062	-0.019	0.060
Complete primary	-0.047	0.083	0.116	0.082
Incomplete secondary Complete	0.033	0.063	0.057	0.059
secondary	0.087	0.055	0.105**	0.052
Higher	0.127	0.079	0.268**	0.077
Availability of health services			0.029**	0.015
Content of antenatal care			0.337*	0.049
Treatment with complications			0.237*	0.039
Rho (ρ)	0.711	0.235		
LR test	3.506***			

Source: Calculated by authors using EDHS, 2008

* Significant at level 1%   **Significant at level 5%   ***Significant at level 10%

Table (6) provides the determinants of women's empowerment estimated by the recursive bivariate probit model. Data of Table (6) shows that women's education is associated with higher women's empowerment, implying the possibility that the women who have achieved secondary or higher education are more empowered than those who have never attended school. Additionally, women's working status contributes to the higher level of women's empowerment, suggesting that women who work for cash are more empowered than those who do not work for cash. The results indicate that exposure to the media increases significantly the likelihood of women's empowerment.

5. Discussion

The findings of this study show that wealth index significantly increases the likelihood of receiving regular antenatal care. As from literature in India, it is proved that high economic status has a positive relationship to the antenatal care score (Bloom, et al., 2001). Additionally, the results show that women's education is correlated with receiving regular antenatal care. As from literature in Tajikistan, it is proved that women who have achieved secondary or higher education are more likely to receive at least four antenatal care visits compared with women who have never attended school (Kamiya 2010). One of the major findings is that women's working status is correlated with women's empowerment at the less than 1% significance level. This result is consistent with the findings from Tajikistan (Kamiya 2010).

The study shows that the higher level of indicators of quality of health services, the more likely the women to receive at least four antenatal care visits. As from literature in Egypt, it is proved that the quality of health services has a positive impact on the number of antenatal care visits (Zaky et al. 2009).

The findings reveal that receiving regular antenatal care and women's empowerment are simultaneously determined and therefore the recursive bivariate probit model specification is more appropriate than the two separate univariate probit models. This result is consistent with the findings from Tajikistan (Kamiya 2010). Additionally, the study shows that women's empowerment increase the probability that the woman receives at least four antenatal cares.

6. Conclusion and Recommendations

This paper tries to examine whether or not women's empowerment and receiving regular antenatal care are simultaneously determined. The recursive bivariate probit model is used to achieve this goal. According to EDHS 2008 data, an indicator of women's empowerment is created using the sums of the binary input variables which express women's empowerment. Factor analysis technique is used to construct the availability and quality of health services indicators.

The results revealed that almost 26 percent of women did not receive antenatal health care during their pregnancy. Most pregnancy checkups were done at private health care. About 74 percent of antenatal health care services were provided by private sector while 24 percent was provided by public sector provider. Moreover,

women received regular antenatal care for 67 percent of last births in the five years period before the survey.

The main conclusion is that the recursive bivariate probit estimates show that women's empowerment and receiving regular antenatal care are simultaneously determined. Additionally, women's empowerment has a significant and positive impact on receiving regular antenatal care. This finding confirms that women's empowerment is crucial to improve maternal health care in developing countries.

The findings of this study show that the availability and quality of health services significantly increase the likelihood of receiving regular antenatal care.

The results show that some factors such as women's education, husband's education, women's work status and wealth index have significant and positive impact on receiving regular antenatal care.

The findings of this study reveal that some factors such as women's age, exposure to media, women's education and women's work status contribute to the higher level of women's empowerment.

Based on the above mentioned findings of both descriptive and multivariate analysis of antenatal care utilization, the following recommendations can be introduced:
- ✓ More efforts should be made to reduce inequity inside the country.

- ✓ More governmental efforts should be made to target poor women and increase their awareness of the risks they might be exposed in order to encourage them to utilize antenatal health care services.

- ✓ Awareness programs about antenatal care should target less educated women and inform them about the advantages of antenatal care utilization.

- ✓ Collecting information about how women who had antenatal care were satisfied with the services offered to them and the problems they face during receiving the antenatal care to have the ability to solve these problems.

- ✓ Collecting information about the complaints of antenatal health care services is important to solve these problems in order to provide good services.

- ✓ Further researches, using more accurate measures of women's empowerment, on the relationship between women's empowerment and antenatal health care utilization are required to draw more robust empirical results.

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