

**Investigation of Risk Factors for Postpartum Depression Development Among  
Reproductive Age Women Living in Yerevan Who Have 1-3 Months Old  
Children:  
A Case-Control Study**

Master of Public Health Integrating Experience Project

Professional Publication Framework

by

Diana Petrosyan, MD, MPH Candidate

Advisor: Haroutune Armenian, MD, DrPH

Reader: Kim Arzoumanian, PhD

College of Health Sciences

American University of Armenia

Yerevan, Armenia

2009

## TABLE OF CONTENT

<b>LIST OF ABBREVIATIONS</b> .....	<i>iv</i>
<b>ACKNOWLEDGMENTS</b> .....	<i>v</i>
<b>ABSTRACT</b> .....	<i>vi</i>
<b>1. INTRODUCTION</b> .....	<b>1</b>
1.1. <i>Postpartum Affective Disorders</i> .....	<i>1</i>
1.2. <i>Postpartum Depression</i> .....	<i>1</i>
1.3. <i>Situation in Armenia/ Rationale of the Study</i> .....	<i>5</i>
1.4. <i>Aims and research questions</i> .....	<i>6</i>
<b>2. METHODS</b> .....	<b>6</b>
2.1. <i>Study Design</i> .....	<i>6</i>
2.2. <i>Study Population</i> .....	<i>7</i>
2.3. <i>Sample Size</i> .....	<i>7</i>
2.4. <i>Data Collection</i> .....	<i>8</i>
2.5. <i>Study Instrument</i> .....	<i>8</i>
2.6. <i>Study Variables</i> .....	<i>9</i>
2.7. <i>Data Management and Analysis</i> .....	<i>10</i>
2.8. <i>Ethical Consideration</i> .....	<i>11</i>
<b>3. RESULTS</b> .....	<b>11</b>
3.1. <i>Response Rate</i> .....	<i>11</i>
3.2. <i>Descriptive Statistics</i> .....	<i>11</i>
3.3. <i>Simple Logistic Regression</i> .....	<i>12</i>
3.3.1. <i>Testing for Confounding</i> .....	<i>14</i>
3.4. <i>Multiple Logistic Regression Analysis</i> .....	<i>14</i>
3.4.1. <i>Predictive Model</i> .....	<i>15</i>

4. <b>DISCUSSION</b> .....	15
4.1. <i>Study Limitations</i> .....	17
4.2. <i>Strengths of the Study</i> .....	18
5. <b>RECOMMENDATIONS</b> .....	18
6. <b>CONCLUSION</b> .....	18
<i>Table 1: Descriptive Statistics by Cases and Controls</i> .....	24
<i>Table 2: Odds Ratios (OR) of Probable PPD associated with risk factors</i> .....	28
<i>Table 3: Simple Logistic Regression: Testing for Confounding</i> .....	31
<i>Table 4: Interaction between Maternal Age at Childbirth and Mode of Delivery</i> .....	32
<i>Table 5: Multiple Logistic Regression Model</i> .....	33
<i>Table 6: Results of Akaike’s Information Criteria</i> .....	34
<i>Table 7: Final Predictive Model of Probable PPD</i> .....	35
<b>APPENDICES</b> .....	36
<i>Appendix 1</i> .....	36
<i>Appendix 2</i> .....	37
<i>Appendix 3</i> .....	38
<i>Appendix 4</i> .....	39
<i>Appendix 5</i> .....	41
<i>Appendix 6</i> .....	46
<i>Appendix 7</i> .....	51
<i>Appendix 8</i> .....	52
<i>Appendix 9</i> .....	53
<i>Appendix 10</i> .....	56

## **LIST OF ABBREVIATIONS**

<b>AIC</b>	Akaike's Information Criteria
<b>AMD</b>	Armenian Dram
<b>BF</b>	BF
<b>BMI</b>	Body Mass Index
<b>CI</b>	Confidence Interval
<b>C-Section</b>	Cesarean Section
<b>df</b>	degree of freedom
<b>DSM- IV</b>	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
<b>EPDS</b>	Edinburg Postnatal Depression Scale
<b>HHS</b>	Household Health Survey
<b>OR</b>	Odds Ratios
<b>PHC</b>	Primary Health Care
<b>PPD</b>	PPD
<b>SD</b>	Standard Deviation
<b>VIF</b>	Variance Inflation Factor

## **ACKNOWLEDGMENTS**

I would like to express my deepest gratitude to my advisor Dr. Haroutune Armenian and my reader Dr. Kim Arzoumanian for their support and valuable instructions.

I am very grateful to Dr. Varduhi Petrosyan for her very helpful comments and unconditional support.

I appreciate the whole MPH faculty for the knowledge and skills that they shared with us.

I am very thankful to the heads of Primary Health Care facilities for their cooperation and the all the study participants.

I am very grateful to my family and friends for understanding, encouragement, patience and support.

## **ABSTRACT**

*Introduction:* Postpartum depression (PPD) is a major depressive disorder with postpartum onset and is one of the most common complications of childbearing, affecting 13.00% of postpartum women. PPD has a great impact on the family and economy, and is considered as one of the major public health problems.

*Objective:* To identify the risk factors for PPD development and measure the combined effect of maternal age at the last childbirth, mode of the last delivery, and breastfeeding (BF) status on the risk of PPD among reproductive age (18-45) women living in Yerevan.

*Methods:* The study utilized a case-control study design. Cases were reproductive age (18-45) women living in Yerevan who had at least one 1-3 months old child registered in Primary Health Care (PHC) facilities and had probable PPD. Controls were reproductive age (18-45) women living in Yerevan who had at least one 1-3 months old child registered in the same PHC facilities and did not have probable PPD. The study conducted telephone interviews for data collection. The study measured probable PPD status through Edinburg Postnatal Depression Scale (EPDS) and assessed the exposure status among cases (n=63) and controls (n=272) through structured questionnaire. Data analysis was performed using STATA statistical software.

*Results:* After adjusting for the identified confounders (current BMI, employment status, exposure to secondhand smoke, child care anxiety score, and self esteem score) among women who gave birth to their last child through vaginal delivery the odds ratio (OR) of probable PPD among women aged less than 25 years compared to those aged more than 25 years was 0.89 (95% CI: 0.43-1.82) while among women who gave birth to their last child through Cesarean section (C-section) the OR was 7.78 (95% CI: 1.49-40.73).

*Conclusion:* The study revealed that the association between maternal age at the last childbirth and probable PPD was varying by the mode of delivery indicating that mode of delivery modified the effect of maternal age at the last childbirth on probable PPD. The study showed that the risk of probable PPD associated with the younger (<25 years) age at the last childbirth was statistically significantly increased only among women who delivered their last child through C-section. Meanwhile, the risk of probable PPD associated with younger (<25 years) age at the last childbirth tended to be lower among those women who delivered their last child through vaginal delivery.

## **1. INTRODUCTION**

### ***1.1. Postpartum Affective Disorders***

Although pregnancy and childbirth are a time of happiness for many families, the sudden change in the pattern of their lives places new parents at risk of developing postpartum affective disorders. Postpartum affective disorders are typically divided into three categories: postpartum blues, postpartum depression (PPD), and puerperal (postpartum) psychosis (1). Appendix 1 presents the summary on prevalence, onset, duration and symptoms of three types of postpartum affective disorders (1-3).

Major depression is defined by the presence of either depressed mood or decreased interest or pleasure in activities plus at least four symptoms including appetite (usually loss of appetite with weight loss) and sleep disturbances (insomnia and fragmented sleep), physical agitation or psychomotor slowing, fatigue, decreased energy, feelings of worthlessness or excessive or inappropriate guilt, decreased concentration or ability to make decisions and suicidal or homicidal ideation (including recurrent thoughts about harming themselves or their infants). These symptoms must be present for most of the day nearly every day for two weeks or more (4;5).

### ***1.2. Postpartum Depression***

PPD is a major depressive disorder with postpartum onset, usually occurring within 4-6 weeks after giving birth and lasting for at least 2 consecutive weeks (6-8). According to the Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV), an episode of depression is considered to have postpartum onset if it begins within four weeks after delivery (4;5). The onset of PPD may be seen as early as 2 weeks after giving birth but it may appear up

to the end of the first year after birth (1;8-11). Appendix 2 presents the summary on the symptoms of major depression with postpartum onset according to the DSM-IV.

PPD is one of the most common complications of childbearing, affecting approximately 10.00-15.00% of women (1). Although longitudinal and epidemiological studies have yielded varying prevalence rates depending on definition of PPD and settings of the studies, a meta-analysis of 59 studies reported a prevalence of 13.00% (one out of every eight women), with most cases starting in the first three months postpartum (12;13).

PPD has a great impact on the family and economy, and is considered a major public health problem (14;15). The effects of PPD may have serious consequences on the quality of life of all family members, marital relationship, may increase the risks for suicide and infanticide as well as may have deleterious effect on women's parenting capacities which have an adverse impact on the maternal-infant interaction including course of infant cognitive and emotional development, and behavioral deficits in children through adulthood (8;9;15-18). Women who have experienced PPD are significantly more likely to experience future episodes of depression, both following subsequent deliveries and also unrelated to childbirth (15;19-21).

Despite its high prevalence, PPD often remains unrecognized by healthcare professionals and family members and as a result, mothers and their families are left untreated and suffer in silence, fear and confusion (11;22;23). A systematic review of the literature concluded that the majority of women from diverse cultures who experience PPD do not actively seek help, since depression in response to the arrival of the child is considered culturally unacceptable (18).

The cause of PPD remains unclear with extensive research suggesting many contributory factors, including obstetric, biological, psychological and social factors (11;15;16).

Several studies have consistently found that significant strong to moderate predictors of PPD include depressed mood or anxiety during pregnancy (antenatal depression or anxiety), personal psychiatric history, recent stressful life events, and lack of social support (1;8;22;24-26). The research findings are consistent regarding the evaluation of the role of social support in PPD development suggesting that women whose perceived social support during pregnancy is low are more likely to develop it (1;8). Studies consistently show that having previously experienced depressive symptoms at any time, not just related to childbirth, leads to a significantly increased risk of PPD (1). The evidence regarding family history of any psychiatric illness and PPD is inconclusive: some large scale studies suggest that it confers risk of PPD, others suggest that family history of any psychiatric condition is not a significant predictor of PPD (1;16). One of the difficulties in establishing the association of family history of mental illness and PPD is that the patient needs to be aware of relatives with psychiatric problems and be willing to disclose that information (1).

The evidence regarding factors describing socioeconomic status (such as low income, financial strain, mother's occupation, and lower social status) suggests that they have a small but significant predictive relationship to PPD (1;16;24;26). These results are consistent across different cultures and countries (1).

The results are inconclusive concerning the mode of delivery as a risk factor for postpartum depressive disorder. It has been reported that women undergoing emergency cesarean sections (C-section) are more likely to develop PPD, but it is still unclear if delivery complications or long and painful labor leading to emergency procedures account for this association (1). On one hand some studies revealed that women with severe acute postpartum pain had a 3-fold increased risk of PPD compared to those with mild or no postpartum pain, on

the other hand the evidence indicates that pregnancy and delivery related complications, particularly C-sections and assisted vaginal delivery, have a small but significant effect on the development of PPD (1;27-29). However, a review of the evidence examining the link between C-section and PPD revealed that out of 24 studies only 9 found either significant adverse association or borderline significant adverse association and the rest found no significant association between these two conditions (29-34).

The impact of breastfeeding (BF) on the development of PPD is still in dispute. Several recent studies showed an association between maternal depression and BF duration, but the findings were conflicting. Some studies suggest that PPD has a negative impact on duration of BF while the others indicate depressive symptoms are not predictors of BF duration (34-39). Two studies conducted in the same country revealed that mothers presenting psychiatric problems in the first month postpartum had twice the odds of interrupting BF early, but another study conducted there showed that BF patterns were not associated with PPD (36). Two other studies examining the link between PPD and BF duration demonstrated that maternal depression had a significant negative impact on BF duration: at any time in the first year after the birth, depressed women had a 1.25 times greater risk of stopping BF than not depressed women (or fewer depressed women were breastfeeding and that depressed women stopped BF earlier) (35;37). In addition, one of these studies described that the onset of depression occurred at or before cessation of BF in majority of the cases (93.00%), which suggests that hormonal changes associated with BF or its cessation are unlikely to be responsible for the development of postpartum affective disorders. However, it was not identified in this study whether the onset of PPD was independent of BF experience or whether the difficulties with BF played a role in the initial development of depression by reducing the levels of self-esteem and confidence in their

ability to be effective mothers. On the other hand, some other studies revealed that in approximately 17.00% of women, BF cessation preceded the onset of PPD and that not continuing to breastfeed was a predictor of that (40;41).

There is evidence that cigarette smoking is associated with the elevated risk of mood disorders particularly major depression, and the relationship is bidirectional (42).

Studies conducted within Western societies have found no association between the gender of the child and PPD (1;34). However, recent studies conducted in India, Turkey and China provide evidence that spousal disappointment with the gender of the baby, specifically if the baby is a girl, is significantly associated with developing PPD (1;24;43). Therefore, the parent's reaction to the gender of the baby may be a potential risk factor for PPD within certain cultural groups (1).

Other risk factors for PPD cited in the literature include younger age at childbirth ( $\leq 25$  years), and fewer years of education (18;22;25;29;35). However, the available meta-analytic data indicate that demographic variables such as maternal age, level of education, relationship status with the spouse, and socioeconomic status are not strongly associated with risk for PPD (1;44). Another meta-analysis of risk factors for PPD identified single marital status and unplanned/unwanted pregnancy as risk factors for postpartum depressive disorder (26).

### ***1.3. Situation in Armenia/ Rationale of the Study***

The results of the Household Health Survey (HHS) conducted in 2006 indicated that approximately 50.00% of more than 40 years old women living in Armenia had symptoms of either possible or probable depression. Moreover, a clear positive correlation was observed between mean depression score and age (45). To date, there are no studies conducted in Armenia that investigated the problem of PPD. Taking into account that PPD differs from major

depression only with its onset it could be considered as one of the major public health problems in Armenia.

#### ***1.4. Aims and research questions***

The study aims were:

- To identify risk factors for the onset of PPD among reproductive age (18-45) women living in Yerevan who have at least one 1-3 months old child
- To identify interactions between risk factors for the onset of PPD
- To develop recommendations to predict and prevent the onset of PPD

The study research questions were:

- What is the prevalence of PPD in the sample population?
- What are the risk factors for PPD development among reproductive age (18-45) women living in Yerevan?
- What is the combined effect of maternal age at the last childbirth, mode of the last delivery, and BF status on the risk of PPD development? Is there an interaction between these factors on the risk of PPD development?

## **2. METHODS**

### ***2.1. Study Design***

The student investigator conducted a case-control study to investigate the association between the factors listed above and the risk of PPD. The case-control study is very informative and efficient design as it is well suited for investigating rare diseases (outcomes) and/or those with long latency, is relatively quick to mount and conduct with minimal financial expenditures. In addition, it requires comparatively few study subjects, allows testing multiple hypotheses

(evaluation of interactions and confounding factors) and assesses multiple exposures and those that are changing over time (46).

## ***2.2. Study Population***

The target population of the study included reproductive age (18-45) women living in Yerevan. The study population included reproductive age (18-45) women living in Yerevan who had at least one 1-3 months old child registered in selected Primary Health Care (PHC) facilities. The study selected seven PHC facilities by convenience based on their magnitude of served population and location to have larger list of 1-3 months old children from diverse districts of Yerevan. The student investigator received permission from the head of each selected PHC facility prior to the data extraction from the list of 1-3 months old children.

Cases for the study were reproductive age (18-45) women living in Yerevan who had at least one 1-3 months old child registered in selected PHC facilities and had elevated scores in Edinburg Postnatal Depression Scale (EPDS) ( $\geq 12$ ) indicating the existence of probable PPD.

Controls for the study were reproductive age (18-45) women living in Yerevan who had at least one 1-3 months old child registered in selected PHC facilities and had not elevated scores in EPDS ( $< 12$ ) indicating the absence of probable PPD.

Exclusion criteria were residency outside of Yerevan, absence of contact information as well as not understanding Armenian language.

## ***2.3. Sample Size***

The student investigator calculated the sample size based on the formula for unmatched case-control study in the STATA 10.0 statistical package. The risk variable of interest and outcome variable were BF and probable PPD, respectively. Type I error and power of the study were specified as  $\alpha$  equal to 0.05 and  $1-\beta$  equal to 0.80, respectively.

Considering the proportion of breastfeeding mothers among women with PPD estimated as 20.00%, and the proportion of breastfeeding mothers among women without PPD estimated as 42.00% sample size was estimated to be 50 cases and 200 controls (12).

#### ***2.4. Data Collection***

The student investigator launched data collection on May 1, 2009 and ended on May 31, 2009. Telephone interviews were the method of data collection as they allowed the investigator to gather the required data in relatively short period of time and with less financial expenditures. The study obtained the contact information of the study population from the list of 1-3 months old children in the selected PHC facilities. The student investigator did the telephone interviews with the study population using two questionnaires to identify cases and controls as well as to collect data on risk factors for PPD development. Each participant gave an oral consent before starting the actual interview. The actual interview with the provision of oral consent form lasted about 15 minutes.

#### ***2.5. Study Instrument***

The student investigator used two questionnaires during the telephone based interviews. The first questionnaire was EPDS to measure the presence of probable PPD (Appendices 7 & 8). It was developed in 1980s for screening postpartum women and has been a valuable and efficient way to identify women with probable PPD. This instrument is the most frequently used instrument to assess postpartum depressive symptomatology and identify at-risk mothers (26). EPDS is a simple, 10 item self-rating questionnaire that can be completed within 5 minutes. Each item is rated on a 4-point scale (0-3) to produce a summative score ranging from 0 to 30, with higher scores indicating lower maternal mood. The cutoff score of 12 was set in this study for evaluation of probable PPD. The sensitivity for detecting major depression for the threshold

of 12 was reported to be 100.00% with a specificity of 82.00% (28). Moreover, the women indicating any suicidal ideation (scores 1 or higher on the item #10) were assumed to have probable PPD independent of their total score (47).

The student investigator developed the second questionnaire to explore the relationships between the probable PPD and potential risk factors (Appendices 5 & 6). It was consisted of 48 mainly close-ended questions and included the following main domains: socio-demographic characteristics, baby's gender, reproductive history, smoking patterns, pregnancy planning, BF practices, pain, stressful life events, self esteem, anxiety and social support. The questions were adapted from the questionnaires previously used to investigate the risk factors for PPD development in other countries as well as questions added by the student investigator based on other study instruments (45;48-51).

The study pre-tested EPDS and the developed questionnaire among reproductive (18-45) age women who had at least one 1-3 months old child (n=5) through telephone interviews before starting data collection and made some changes in the questions related to the baby's gender, stressful life events, child care anxiety score, and self esteem score based on the pre-test results.

## ***2.6. Study Variables***

The dependent variable (outcome) of the current study was the probable PPD status. The presence of the probable PPD was identified if the participant's EPDS score was more than or equal to 12 and/or if the participant had any suicidal ideation on item #10 in EPDS defined above. Independent variables of the study were: age at last childbirth, current body mass index (BMI), education, total number of people living in the household, total number of employed members in the household, employment status, household average monthly income, general standard of living, total number of luxury items in the household, child's gender, parents' desired

gender of the child, discrepancy between actual and parents' desired gender of the child, total number of alive children, miscarriages, induced abortions, stillbirths, children died during the first year of life, high blood pressure during the pregnancy, smoking, total number of smokers, exposure to secondhand smoke, pregnancy planning, mode of the last delivery, expected mode of delivery, current and exclusive BF, time of BF cessation, lumbar-pelvic pain after delivery and currently, stressful life events, social support, child care anxiety score, and self-esteem score. Appendix 9 presents the summary on the study variables.

### ***2.7. Data Management and Analysis***

The student investigator entered all gathered data into SPSS for Windows 11.0 statistical software and imported the data into STATA 10.0 statistical package for analysis after recoding and cleaning procedures through range checking and spot checking.

The study generated basic descriptive statistics (means, medians, and frequencies) for both cases and controls and categorized some continuous variables for the final analysis using cut-points from previous studies. The study used independent t-test for comparison of means and Pearson's chi-square test of the null hypothesis of homogeneity to compare differences in proportions between two groups.

The student investigator performed simple logistic regression to assess the relationships between each independent variable and the outcome. To define the independent risk factors, potential interactions, and to control for potential confounders the study performed multiple logistic regression analysis. The study applied Variance Inflation Factor (VIF) method for detecting the severity of multicollinearity for variables in the final model and the variables that highly correlate to each other were not included in the final model together. All results with a p-

value less than 0.05 were considered as statistically significant while those with p-value of 0.05-0.1 as borderline significant.

### ***2.8. Ethical Consideration***

The Institutional Review Board (IRB) at the American University of Armenia (AUA) approved the study. All the women were enrolled in the study after giving informed oral consent (Appendices 3 & 4).

## **3. RESULTS**

### ***3.1. Response Rate***

The response rate was 96.70 %. However, the study team failed to contact 82 subjects due to different reasons (wrong phone numbers, being out of city, or not being at home). Five respondents met exclusion criteria (not understanding Armenian language). The first stage of data collection process was stopped when 323 interviews were completed with 51 cases and 272 controls among the respondents. An additional 114 subjects were contacted, screened with EPDS to identify more cases. Twelve such subjects were identified and interviewed with risk assessment questionnaire. Final data analysis was based on 63 cases and 272 controls. The prevalence rate of probable PPD in the study population was 14.42%.

### ***3.2. Descriptive Statistics***

Table 1 presents descriptive statistics of the study population by cases and controls. All study participants were married and gave birth at 10 different maternity homes. The vast majority of participants gave birth to one child. Mean EPDS scores were 14.33 (SD: 3.61) for cases and 6.04 (SD: 2.79) for controls.

Descriptive statistics revealed that compared to controls cases were significantly younger (mean age of the cases was 26.22 years (SD: 4.44) vs. 27.49 years (SD: 4.74)) and had lower

current BMI (mean BMI for cases was 23.25 kg/m<sup>2</sup> (SD: 3.12) vs. 24.33 kg/m<sup>2</sup> (SD: 3.89)).

Statistically significant differences between the cases and controls were also found regarding the household average monthly income, general standard of living, total number of luxury items, children died during the first year of life, exposure to secondhand smoke, stressful life events, social support, child's care anxiety score as well as self esteem score.

### ***3.3. Simple Logistic Regression***

Table 2 presents a detailed description of simple logistic regression analysis results with corresponding crude odds ratios (OR), 95% CIs and p-values.

The estimated crude OR of the association between participant's age at last childbirth and probable PPD was 1.86 (95% CI: 1.07-3.24) indicating that the odds of having probable PPD among women aged less than 25 years is 1.86 times greater compared to women aged more than 25 years.

The estimated crude OR of the association between the participant's current BMI and the probable PPD was 0.92 (95% CI: 0.85-0.99) suggesting that women having one kg/m<sup>2</sup> higher BMI were 0.92 times less likely to develop probable PPD.

Estimated crude OR of the association of the total number of luxury items in the household was 0.72 (95% CI: 0.61-0.86) meaning that each more luxury item in the household decreased the odds of having probable PPD by 28% (95% CI 0.61-0.86).

Compared to women living in the households with average monthly income of more than 50,000 Armenian drams (AMD) women living in the households with average monthly income of less than 50,000 AMD had 2.32 times higher odds of having probable PPD (95% CI: 1.25-4.29).

Perceived general standard of living was significantly associated with the risk of having probable PPD: those with perceived general standard of living “below the average” had 2.33 (95% CI: 1.30-4.20) times higher odds of having probable PPD compared to those women, whose perceived general standard of living was “above the average”.

To be able to conduct meaningful analysis, the student-investigator combined ever having stillbirths and children died during the first year of life into one new variable for the analysis. Women who ever had either a stillbirth or child died during the first year of life were approximately 4.00 times more likely to develop probable PPD (95% CI: 1.29-12.30).

The analysis also revealed that being one more hour exposed to secondhand smoke increases the odds of having probable PPD by 1.10 times (95% CI: 1.02-1.19).

Those women who experienced stressful life events since being pregnant defined as having a car accident, loss of relatives, troubles in marital relationship, or employment status had 2.30 times higher odds of having probable PPD compared to women who did not (95% CI 1.14-4.66).

The estimated crude OR of the association between the participant’s child care anxiety score and probable PPD was 1.28 (95% CI: 1.16-1.4) indicating that each unit increase in the child care anxiety increased the odds of developing probable PPD 1.28 times.

The estimated crude OR of the association between the participant’s self esteem score and probable PPD was 0.72 (95% CI: 0.61-0.84) meaning that each unit increase in self esteem score decreased the odds of developing probable PPD by 28%.

Women who have experienced lumbar-pelvic pain either after the childbirth or currently had 1.58 times higher odds of having probable PPD (95% CI 0.90-2.75).

Associations between employment status, social support and probable PPD development had borderline statistical significance.

### ***3.3.1. Testing for Confounding***

Table 3 presents the results of simple logistic regression for the association of the participant's age at the last childbirth with covariates and the probable PPD. The results of simple logistic regression analysis revealed that current BMI, employment status, exposure to secondhand smoke, child care anxiety score, and self esteem score were statistically significantly associated with both age at the last childbirth and probable PPD indicating that these variables were confounders of the association between age at the last childbirth and probable PPD.

### ***3.4. Multiple Logistic Regression Analysis***

Possible interactions between age at the last childbirth and other independent variables were checked and statistically significant interaction was revealed between the mode of the last delivery and age at the last childbirth (Table 4 & 5; Appendix 10). Among women who gave birth to their last child through vaginal delivery the OR of probable PPD among women aged less than 25 years compared to those aged more than 25 years was 1.35 (95% CI: 0.73-2.52) while among women who delivered their last child through C-section the OR of probable PPD was 10.22 (95% CI: 2.63-39.75).

The research team entered all identified confounders for the participant's age at last childbirth into multiple logistic regression analysis. After adjusting for the identified confounders (current BMI, employment status, exposure to secondhand smoke, child care anxiety score, and self esteem score) the OR of probable PPD among women aged less than 25 years compared to those aged more than 25 years was 0.89 (95% CI: 0.43-1.82) for women who

gave birth to their last child through vaginal delivery while for those women who gave birth to their last child by C-section OR was 7.78 (95% CI: 1.49-40.73) (Table 5; Appendix 10).

### ***3.4.1. Predictive Model***

The study team used multiple logistic regressions analysis to find the final model for prediction of probable PPD. Each full model was tested against the nested model using Akaike's Information Criteria (AIC) which "penalizes" models with more predictors and thus favors parsimonious models (52). The best fitting model included the participant's age at the last childbirth, current BMI, education, total number of luxury items, current BF, child care anxiety score, and self esteem score as well as interaction term between age at the last childbirth and mode of the last delivery (Table 6 & 7, Appendix 10). VIF method helped to check for colinearity among the variables in the final predictive model; it revealed that none of the variables included in the final model were highly correlated (Appendix 10). The model fit was tested with Hosmer-Lemeshow (HL) goodness of fit test. The HL test statistics was 5.73 (degree of freedom (df) =8, Prob > chi2 = 0.68) indicating good calibration (Appendix 10).

## **4. DISCUSSION**

This case-control study investigated the relationship between age at the last childbirth, mode of the last delivery and BF status and probable PPD in 335 reproductive age (18-45) women having at least one 1-3 months old child in Yerevan.

The study identified that the prevalence of probable PPD in the study population was 14.42%. Different studies conducted all over the world reported the prevalence rate of PPD to be 10.00-15.00% but a meta-analysis of 59 studies reported an average prevalence rate of PPD to be 13.00% (1;12;13).

The unadjusted OR for the association between age at the last childbirth and probable PPD status suggested that women aged younger than 25 years at the last childbirth had approximately two times higher odds of probable PPD. Meanwhile, further analysis revealed that current BMI, employment status, exposure to secondhand smoke, child care anxiety score, and self esteem score confounded the association between age at the last childbirth and probable PPD status. This study suggested that after controlling for identified confounders the odds of probable PPD was 1.19 times higher among women aged less than 25 years compared to women aged more than 25 years. A few number of studies revealed that maternal age at childbirth less than 30 years increased the risk of PPD but two meta-analyses of over 10,000 subjects reported that maternal age at childbirth was not a strong factor for PPD development (1;13;22;26;29;53). However, most of the published studies reported risk factors for PPD among such subpopulations as adolescent, single and impoverished mothers and it is possible that significant demographic risk factors for PPD are lost when meta-analysis is applied, owing to homogeneity of the research samples (1;44).

However, this study revealed that the association between the age at the last childbirth and probable PPD was varying between the strata of the mode of delivery (vaginal delivery vs. C-section) indicating that mode of delivery modified the effect of age at the last childbirth on probable PPD. This study suggested that the risk of probable PPD associated with the younger age (<25 years) at the last childbirth was statistically significantly increased only among women who delivered their child through C-section. Meanwhile, the risk of probable PPD associated with younger age (<25 years) at the last childbirth tended to be lower among those women who delivered their child through vaginal delivery. Equivocal findings have been reported for associations between C-sections and PPD in several other studies (14;29-33). The study team

did not find any studies looking for effect modification between maternal age at the last childbirth and mode of delivery on the risk of PPD development; therefore could not compare its results with the results with other findings.

The results from different studies were controversial regarding the impact of BF on PPD development (34-38;40;41). This study failed to demonstrate the association between BF and the probable PPD. This might be due to the fact that the study population included only women who had 1-3 months old children, thus, both cases and controls reported high prevalence of BF (79.37% vs. 86.76%) which could make variability of exposure negligible. However, the study developed model for predicting and preventing probable PPD development where BF was included as a predictor of probable PPD along with maternal age at childbirth, BMI, education, number of working luxury items in the household, child care anxiety score, self esteem score, and mode of delivery.

#### ***4.1. Study Limitations***

The study used the EPDS to measure the presence of probable PPD. EPDS is not a diagnostic tool, so care must be taken when interpreting the results (47). Besides, it had not been translated and validated in Armenian settings. Another limitation of the study was that the questionnaire used to measure exposure status was not validated in Armenia as well. The student investigator selected PHC facilities by convenience. Along with other case-control studies this study was susceptible to recall bias. Although the interviewer was aware of the subjects' case or control status only with a few study participants (12 cases) still that could lead to a potential interviewer bias. Study population included only women who had 1-3 months old children while the PPD can be developed up to one year after the childbirth.

#### ***4.2. Strengths of the Study***

The study used the same data sources and applied the same instrument to identify both cases and controls assuring that they were coming from the same base population (54). With most of the cases the interviewer was not aware of the subjects' case or control status while collecting data on the risk factors. Thus, the process of identification of cases and controls was independent from the process of obtaining information on exposure minimizing the interviewer bias. Although the risk factors assessment instrument was not a validated one but it was developed based on other questionnaires previously used to investigate the risk factors for PPD development in other countries and pretested among study population.

### **5. RECOMMENDATIONS**

The study recommends 1) conducting further studies to validate the Armenian version of EPDS as it is a valuable and efficient screening tool for identifying of women at higher risk of developing PPD; 2) conducting another study investigating the association between the risk factors and PPD development among reproductive age women with longer interval (up to one year) after the last childbirth; 3) to better understand the cultural peculiarities of risk factors for PPD development among Armenian women; 4) to develop protocols for screening and identifying women at higher risk of PPD development; 5) to raise awareness of health professionals as well as general population about the problem of PPD.

### **6. CONCLUSION**

The presented case-control study was the first one investigating the problem of PPD and potential risk factors for its development among reproductive age women living in Yerevan and

having 1-3 months old children. It demonstrated that probable PPD does exist in Armenian women and its prevalence does not differ much from the prevalence of PPD in other cultures.

The study revealed that the association of maternal age at the last childbirth and PPD varied by the mode of delivery indicating that the effect of younger age (<25 years) at the last childbirth on the risk of probable PPD development was different for women who gave birth to their last child through C-section compared to women who gave birth to their last child through vaginal delivery.

## REFERENCE LIST

- (1) E Robertson, S Grace, et al. Antenatal risk factors for postpartum depression: a synthesis of recent literature. *General hospital psychiatry* 2004; 26:289-295.
- (2) K Kendall-Tackett. Postpartum depression and the breastfeeding mother. *La Leche League International* 2004;1-23.
- (3) R Nonacs, LS Cohen. Postpartum mood disorders: diagnosis and treatment guidelines. *Journal of Clinical Psychiatry* 1998; 59(S2):34-40.
- (4) K L Wisner, L B Parry, et al. Clinical practice. Postpartum depression. *The New England Journal of Medicine* 2002; 347(3):194-199.
- (5) American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*, 4th edition. 2000.
- (6) American Psychiatric Association. *Diagnostic and statistical manual of mental disorders*, 4th edition. 2000.
- (7) L Gao, S Chan, et al. Depression, perceived stress and social support among first-time chinese mothers and fathers in the postpartum period. *Research in Nursing & Health* 2009; 32:50-58.
- (8) T Liabsuetrakul, A Vittayanont, et al. Clinical applications of anxiety, social support, stressors and self-esteem measured during pregnancy and postpartum for screening postpartum depression in Thai women. *Journal of Obstetrics and Gynaecology* 2007; 33(333):340.
- (9) B Posmontier. Sleep quality in women with and without postpartum depression. *Journal of Obstetric, Gynecologic, and Neonatal Nursing* 2008; 37:722-737.
- (10) DG Inwood. Postpartum psychotic disorders. In *Synopsis of Psychiatry: Behavioral Sciences, Clinical Psychiatry* 1994; 7:852-858.
- (11) CT Beck. Symptoms of PPD: stopping the thief that steals motherhood. *Association of Women's Health, Obstetric and Neonatal Nurses Lifelines* 1999; 3:41-44.
- (12) S J McCoy, J M Beal, et al. Risk factors for postpartum depression: a retrospective investigation at 4 - weeks postnatal and a review of the literature. *The Journal of American Osteopathic Association* 2006; 106:193-198.
- (13) M W O'Hara, A M Swain. Rates and risk of postpartum depression-a meta-analysis. *International Review of Psychiatry* 1996; 8:37-54.

- (14) KL Wisner, C Chambers, et al. Postpartum depression: a major public health problem. *Journal of the American Medical Association* 2006; 296:2616-2618.
- (15) P J Cooper, L Murray. Prediction, detection, and treatment of postnatal depression. *Archives of Disease in Childhood* 1997; 77:97-101.
- (16) CL Dennis, L Ross. The clinical utility of maternal self-reported personal and familial psychiatric history in identifying women at risk for postpartum depression. *Acta Obstetrica et Gynecologica* 2006; 85:1179-1185.
- (17) MP Austin, S Kildea, et al. Maternal mortality and psychiatric morbidity in the perinatal period: challenges and opportunities for prevention in the Australian setting. *Medical Journal of Australia* 2007; 186(7):364-367.
- (18) J McGarry, H Kim, et al. Postpartum depression and help-seeking behavior. *Journal of Midwifery & Women's Health* 2009; 54:51-56.
- (19) R Warner, L Appleby, et al. Demographic and obstetric risk factors for postnatal psychiatric morbidity. *British Journal of Psychiatry* 1996; 168:607-611.
- (20) CL Dennis. Psychosocial and psychological interventions for prevention of postnatal depression: systematic review. *British Medical Journal* 2005; 331(15).
- (21) PJ Cooper, L Murray. Course and recurrence of postnatal depression. Evidence for the specificity of the diagnostic concept. *British Journal of Psychiatry* 1995; 166:191-195.
- (22) E Ege, S Timur, et al. Social support and symptoms of PPD among new mothers in Eastern Turkey. *J Obstet, Gynaecol* 2008; 34:585-593.
- (23) CT Beck. Screening methods for symptoms of postpartum depression. *Journal of Obstetric, Gynecologic, and Neonatal Nursing* 1995; 24:308-312.
- (24) I Dindar, S Erdogan. Screening of Turkish women for postpartum depression within the first postpartum year: the risk profile of a community sample. *Public health nursing* 2007; 24:176-183.
- (25) B Leigh, J Milgrom. Risk factors for antenatal depression, postnatal depression and parental stress. *BMC psychiatry* 2008;8-24.
- (26) C Beck. Predictors of postpartum depression: an update. *Nursing Research* 2001; 50:275-285.
- (27) J Eisenach, P Pan, et al. Severity of acute pain after childbirth, but not type of delivery, predicts persistent pain and postpartum depression. *Pain* 2008; 140:87-94.
- (28) A Gutke, A Josefsson, et al. Pelvic Girdle Pain and Lumbar Pain in Relation to Postpartum Depressive Symptoms. *Spine* 2007; 32(13):1430-1434.

- (29) P Hiltunen, T Raudaskoski, et al. Does pain relief during delivery decrease the risk of postnatal depression. *Acta Obstetrica and Gynecologica Scandinavica* 2004; 83:257-261.
- (30) R Patel, D Murphy, et al. Operative delivery and postnatal depression. *British Medical Journal* 2005; 330:879.
- (31) V Koo, J Lynch, et al. Risk of postnatal depression after emergency delivery. *Journal of obstetrics and gynecology* 2003; 29:246-250.
- (32) M Chaaya, O Campbell, et al. Postpartum depression: prevalence and determinants in Lebanon. *Archives of women mental health* 2002; 5:65-72.
- (33) F Carter, C Frampton, et al. Cesarean section and postpartum depression: a review of the evidence examining the link. *Psychosomatic medicine* 2006; 68:321-330.
- (34) KL Wisner, ZN Stowe. Psychobiology of postpartum mood disorders. *Seminars in Reproductive Endocrinology* 1997; 15:77-89.
- (35) J Henderson, S Evans, et al. Impact of postnatal depression on breastfeeding duration. *Birth* 2003; 30(3):175-180.
- (36) M Hasselmann, G Werneck, et al. Symptoms of postpartum depression and early interruption of exclusive breastfeeding in the first two months of life. *Saude Publica, Rio de Janeiro* 2008; 24(Sup.2):5341-5352.
- (37) T Field, M Hernandez-Reif, et al. Breastfeeding in depressed mother-infant dyads. *Early child development and care* 2002; 172:539-545.
- (38) M Flores-Quijano, A Córdova, et al. Risk for Postpartum Depression, Breastfeeding Practices, and Mammary Gland Permeability. *Journal of Human Lactation* 2008; 24(1):50-57.
- (39) M Eberhard-Gran, A Eskild, et al. Depression in postpartum and non-postpartum women: prevalence and risk factors. *Acta Psychiatrica Scandinavica* 2002; 106:426-433.
- (40) V Sharma, C Corpse. Case study revisiting the association between breastfeeding and postpartum depression. *Journal of Human Lactation* 2008; 24:77-79.
- (41) S Misri, D Sinclair, et al. Breastfeeding and postpartum depression: is there a relationship? *The Canadian journal of psychiatry* 1997; 42:1061-1065.
- (42) M Munafo, J Heron, et al. Smoking patterns during pregnancy and postnatal period and depressive symptoms. *Nicotine and Tobacco Research* 2008; 10:1609-1620.
- (43) R Xie, A Liu, et al. Fetal gender and postpartum depression in a cohort of Chinese women. *Social Science & Medicine* 2007; 65:680-684.

- (44) L Ross, V Campbell, et al. Demographic characteristics of participants in studies of risk factors, prevention and treatment of postpartum depression. Review paper. Canadian Journal of Psychiatry 2006; 51:704-710.
- (45) American University of Armenia, Center for Health Services Research and development. Primary Health Care Reform Project. Household Health Survey: Baseline Evaluation. 2006. Available at: [http://www.auachsr.com/publications\\_reports2006.php](http://www.auachsr.com/publications_reports2006.php). 2006.
- (46) H K Armenian. Problem Investigation and Inferences Using Case-Control Method. The Case-control Method: Design and Applications. New York: Oxford University Press, 2009: 17-33.
- (47) J Cox, J Holden, et al. Edinburgh Postnatal Depression Scale (EPDS). British Journal of Psychiatry 1987; 150:782-786.
- (48) S Arakelyan. Investigation of reproductive risk factors for endometrial cancer development among women aged 45-75 years in Yerevan, Armenia. American University of Armenia, College of Health Sciences. Master of Health Thesis Project. Available at: <http://www.auachsr.com/mph2007.php>. 2007.
- (49) K Hekimian. Infant feeding practices in Armenia. Report on comparative study and national survey, Yerevan, Armenia: American University of Armenia, Center for Health Services Research. Available at: [http://www.auachsr.com/publications\\_reports1997.php](http://www.auachsr.com/publications_reports1997.php). 1997.
- (50) Center for disease control and prevention. Pregnancy Risk Assessment Monitoring System (PRAMS). Phase Five Questionnaire, Topic Reference. Available at: <http://www.cdc.gov/PRAMS/References/Phase5TopicsReferenceindexworks.doc> . 2009.
- (51) I Khachiyan. An effect of socio-demographic variables on child spacing in Yerevan. American University of Armenia, College of Health Sciences. Master of Health Thesis Project. Available at: <http://www.auachsr.com/mph2007.php>. 2005.
- (52) R Sharpf. Course of biostatistics. Course notes. Model selection American University of Armenia Master of Public Health Program 2008.
- (53) O Bernazzoni, JF Saucier. Psychosocial predictors of depressive symptomatology level in postpartum women. Journal of affective disorders 1997; 46:39-49.
- (54) H K Armenian. Avoiding Bias in Case Control Selection. The Case-Control Method: Design and Applications. New York: Oxford University Press, 2009: 33-63.

## TABLES

*Table 1: Descriptive Statistics by Cases and Controls*

Variable	Values: % (n)		P-value
	Cases 18.81% (n=63)	Controls 81.19% (n=272)	
<b>Child's Age</b>			
Mean	2.18	2.16	0.788
Median	2.27	2.27	
SD	0.63	0.65	
Min - Max	0.79-3.06	0.56-3.06	
<b>EPDS Score</b>			
Mean	14.33	6.04	<0.0005
Median	14.00	6.00	
SD	3.61	2.79	
Min - Max	6.00-25.00	0.00-11.00	
<b>Age at the Last Childbirth (years)</b>			
Mean	26.22	27.49	0.054
Median	25.06	27.02	
SD	4.44	4.74	
Min - Max	18.78-37.17	19.28-43.73	
<b>Age Categories (years)</b>			
≥25	49.21% (31)	66.91% (182)	0.026
<25	50.79% (32)	33.08% (90)	
<b>Current BMI</b>			
Mean	23.25	24.33	0.044
Median	23.03	23.83	
SD	3.12	3.89	
Min - Max	16.80-31.64	12.24-34.78	
<b>Participant's Education (years)</b>			
>13	49.21% (31)	50.00% (136)	0.910
≤13	50.79% (32)	50.00% (136)	
<b>Total # of People Living in the Household</b>			
Mean	5.87	5.74	0.597
median	6.00	5.00	
SD	1.96	1.71	
min - max	3.00-15.00	3.00-12.00	
<b>Total # of Currently Employed Members in the Household</b>			
Mean	1.71	1.66	0.714
Median	2.00	2.00	
SD	1.10	1.09	
Min - Max	0.00-4.00	0.00-6.00	
<b>Employment Status</b>			
Employed	23.81% (15)	35.29% (96)	0.081
Unemployed	76.19% (48)	64.71% (176)	
<b>Household's Average Monthly Income (AMD)</b>			
>50,000	67.40% (35)	78.66% (188)	0.007
≤50,000	38.60% (22)	21.34% (51)	

Variable	Values: % (n)		P-value
	Cases 18.81% (n=63)	Controls 81.19% (n=272)	
<b>General Standard of Living</b>			
Above average	30.16% (19)	50.18% (136)	0.004
Below average	69.84% (44)	49.82% (135)	
<b>Total # of Luxury Items</b>			
Mean	3.67	4.58	<0.0005
Median	3.00	5.00	
SD	1.96	1.61	
Min - Max	0.00-8.00	0.00-8.00	
<b>Last Child's Gender</b>			
Boy	52.38% (33)	55.15% (150)	0.691
Girl	47.62% (30)	44.85% (122)	
<b>Participant's Desired Gender of the Last Child</b>			
Boy	36.51% (23)	36.03% (98)	0.848
Girl	30.16% (19)	27.21% (74)	
No difference	33.33% (21)	36.76% (100)	
<b>Husband's Desired Gender</b>			
Boy	49.21% (31)	47.79% (130)	0.911
Girl	17.46% (11)	19.85% (54)	
No difference	33.33% (21)	32.35% (88)	
<b>Discrepancy Between Actual and Parents' Desired Gender of the Last Child</b>			
Concordance	65.08% (41)	66.54% (181)	0.825
Discordance	34.92% (22)	33.46% (91)	
<b>Total # of Alive Children</b>			
1	49.21% (31)	44.12% (120)	0.465
>1	50.79% (32)	55.88% (152)	
<b>Miscarriages</b>			
Never	85.71% (54)	86.40% (235)	Fisher's exact p=0.234
Ever	14.29% (9)	13.60% (30)	
<b>Induced Abortions</b>			
Never	84.13% (53)	81.99% (223)	0.688
Ever	15.87% (10)	18.01% (49)	
<b>Stillbirths or Dead Children</b>			
Never	90.48% (57)	97.43% (265)	Fisher's exact p=0.020
Ever	9.52% (6)	2.57% (7)	
<b>High Blood Pressure During the Last Pregnancy</b>			
Yes	9.52% (6)	10.29% (28)	Fisher's exact p=0.535
No	90.48% (57)	89.71% (244)	
<b>Smoking</b>			
Never	95.24% (60)	94.49% (257)	Fisher's exact p=0.552
Ever	4.76% (3)	5.51% (15)	
<b>Current Smoking*</b>			
Yes, daily	- <sup>1</sup>	13.33% (2)	Fisher's exact p=1.000
Yes, sometimes	- <sup>1</sup>	6.67% (1)	
No	100.00% (3)	80.00% (12)	

Variable	Values: % (n)		P-value
	Cases 18.81% (n=63)	Controls 81.19% (n=272)	
<b>Total # of Smokers</b>			
Mean	1.43	1.23	
Median	1.00	1.00	0.142
SD	1.00	0.95	
Min - Max	0.00-74.00	0.00-4.00	
<b>Exposure to the Secondhand Smoke</b>			
Mean	3.16	2.03	
Median	3.00	1.00	0.011
SD	3.55	3.02	
Min - Max	0.00-16.00	0.00-15.00	
<b>Pregnancy Planning</b>			
Planned	69.84% (44)	66.05% (179)	0.565
Unplanned	30.16% (19)	33.95% (92)	
<b>Expected Mode of the Last Delivery</b>			
Vaginal delivery	84.13% (53)	82.72% (225)	Fisher's exact
C-section	11.11% (7)	16.91% (46)	p=0.209
<b>Mode of the Last Delivery</b>			
Vaginal delivery	77.78% (49)	80.88% (220)	0.577
C-section	22.22% (14)	19.12% (52)	
<b>Current BF</b>			
Yes	79.37% (50)	86.76% (236)	0.134
No	20.63% (13)	13.24% (36)	
<b>Exclusive BF**</b>			
Yes	80.00% (40)	81.01% (192)	0.870
No	20.00% (10)	18.99% (45)	
<b>BF</b>			
Ever	84.62% (11)	77.14% (27)	Fisher's exact
Never	15.38% (2)	22.86% (8)	p=0.449
<b>Time of BF Cessation***</b>			
Mean	25.45	36.85	
Median	15.00	35.00	0.124
SD	15.72	21.59	
Min - Max	10.00-50.00	3.00-70.00	
<b>Lumbar-Pelvic Pain Either After the Last Delivery or Currently</b>			
No	41.27% (26)	52.57% (143)	0.106
Yes	58.73% (37)	47.43% (129)	
<b>Stressful Life events</b>			
No	77.78% (49)	88.97% (242)	0.018
Yes	22.22% (14)	11.03% (30)	
<b>Social support</b>			
Yes	95.24% (60)	97.43% (265)	Fisher's exact
No	4.76% (3)	2.57% (7)	p=0.285
<b>Child Care Anxiety Score</b>			
Mean	10.60	8.44	
Median	10.00	8.00	<0.0005
SD	3.38	2.61	
Min - Max	5.00-21.00	5.00-19.00	

Variable	Values: % (n)		P-value
	Cases 18.81% (n=63)	Controls 81.19% (n=272)	
<b>Self-Esteem Score</b>			
Mean	7.25	8.28	<0.0005
Median	7.00	8.00	
SD	1.86	1.63	
Min - Max	3.00-10.00	3.00-10.00	

\* Among the women who have ever smoked

\*\* Among the women who are currently BF

\*\*\* Among the women who have ever breastfed

<sup>1</sup> The data were insufficient to obtain interpretable results

*Table 2: Odds Ratios (OR) of Probable PPD associated with risk factors*

Variable	OR (95% CI)	P-value
<b>Age Categories (years)</b>		
≥25	1.00	
<25	1.86 (1.07-3.24)	0.027
<b>Current BMI</b>	0.92 (0.85-0.99)	0.045
<b>Participant's Education</b>		
>13	1.00	
≤13	1.03 (0.60-1.79)	0.910
<b>Total # of People Living in the Household</b>	1.04 (0.89-1.21)	0.596
<b>Total # of Currently Employed Members in the Household</b>	1.05 (0.82-1.34)	0.713
<b>Employment Status</b>		
Employed	1.00	
Unemployed	1.75 (0.93-3.28)	0.084
<b>Household's Average Monthly Income (AMD)</b>		
>50,000	1.00	
≤50,000	2.32 (1.25-4.29)	0.008
<b>General Standard of Living</b>		
Above average	1.00	
Below average	2.33 (1.30-4.20)	0.005
<b>Total # of Luxury Items</b>	0.72 (0.61-0.86)	<0.0005
<b>Last Child's Gender</b>		
Boy	1.00	
Girl	1.12 (0.65-1.94)	0.691
<b>Participant's Desired Gender of the Last Child</b>		
Boy	1.00	
Girl	1.09 (0.56-2.16)	0.795
No difference	0.89 (0.47-1.72)	0.739
<b>Husband's Desired Gender</b>		
Boy	1.00	
Girl	0.85 (0.4-1.82)	0.684
No difference	1.00 (0.54-1.85)	0.998
<b>Discrepancy Between Actual and Parents' Desired Gender of the Last Child</b>		
Concordance	1.00	
Discordance	1.07 (0.60-1.90)	0.825

Variable	OR (95% CI)	P-value
<b>Total # of Alive Children</b>		
1	1.00	
>1	0.81 (0.47-1.41)	0.465
<b>Miscarriages</b>		
Never	1.00	
Ever	1.06 (0.48-2.32)	0.887
<b>Induced Abortions</b>		
Never	1.00	
Ever	0.86 (0.41-1.81)	0.688
<b>Stillbirths or Dead children</b>		
Never	1.00	
Ever	3.98 (1.29-12.3)	0.016
<b>High Blood Pressure During the Last Pregnancy</b>		
No	1.00	
Yes	0.92 (0.36-2.32)	0.855
<b>Smoking</b>		
Never	1.00	
Ever	0.86 (0.24-3.05)	0.811
<b>Total # of Smokers</b>		
	1.23 (0.93-1.62)	0.143
<b>Exposure to the Secondhand Smoke</b>		
	1.10 (1.02-1.19)	0.013
<b>Pregnancy Planning</b>		
Planned	1.00	
Unplanned	0.84 (0.46-1.52)	0.565
<b>Expected Mode of the Last Delivery</b>		
Vaginal delivery	1.00	
C-section	0.65 (0.28-1.51)	0.313
<b>Mode of the Last Delivery</b>		
Vaginal delivery	1.00	
C-section	1.21 (0.62-2.35)	0.577
<b>Current BF</b>		
Yes	1.00	
No	1.70 (0.84-3.44)	0.138
<b>Exclusive BF</b>		
Yes	1.00	
No	1.09 (0.51-2.35)	0.824
<b>Lumbar-Pelvic Pain Either After the Last Delivery or Currently</b>		
No	1.00	
Yes	1.58 (0.9-2.75)	0.108
<b>Stressful Life Events</b>		
No	1.00	
Yes	2.30 (1.14-4.66)	0.020
<b>Social support</b>		
Yes	1.00	
No	2.30 (0.89-5.97)	0.086

<b>Variable</b>	<b>OR (95% CI)</b>	<b>P-value</b>
<b>Child Care Anxiety Score</b>	1.28 (1.16-1.40)	<0.0005
<b>Self-Esteem Score</b>	0.72 (0.61-0.84)	<0.0005

*Table 3: Simple Logistic Regression: Testing for Confounding*

Variable	Association between age at last childbirth and covariates ORs, (95% CI), p-value	Association between PPD status and covariates ORs, (95% CI), p-value
<b>Current BMI</b>	0.90 (0.84-0.96), 0.002	0.92 (0.85-0.99), 0.045
<b>Employment Status</b>		
Employed	1.00	1.00
Unemployed	3.65 (2.12-6.28), <0.0005	1.75 (0.93-3.28), 0.084
<b>Household's Average Monthly Income</b>		
>50,000	1.00	1.00
≤50,000	1.53 (0.9-2.62), 0.118	2.32 (1.25-4.29), 0.008
<b>General Standard of Living</b>	0.98 (0.63-1.52), 0.918	2.33 (1.3-4.2), 0.005
<b>Total # of Luxury Items</b>	0.91 (0.8-1.04), 0.179	0.72 (0.61-0.86), <0.0005
<b>Exposure to Secondhand Smoke</b>	1.08 (1.01-1.16), 0.032	1.10 (1.02-1.19), 0.013
<b>Stillbirths or Dead children</b>		
Never	1.00	1.00
Ever	1.07 (0.34-3.33), 0.912	3.98 (1.29-12.3), 0.016
<b>Current BF</b>	0.8 (0.42-1.52), 0.494	1.7 (0.84-3.44), 0.138
<b>Lumbar-Pelvic Pain After the Last Delivery or Currently</b>	0.98 (0.63-1.52), 0.920	1.58 (0.9-2.75), 0.108
<b>Stressful Life Events</b>	0.77 (0.39-1.51), 0.445	2.3 (1.14-4.66), 0.020
<b>Social Support</b>		
Yes	1.00	1.00
No	0.72 (0.18-2.85), 0.642	2.30 (0.89-5.97), 0.086
<b>Child Care Anxiety Score</b>	1.08 (1.00-1.17), 0.040	1.28 (1.16-1.40), <0.0005
<b>Self -Esteem Score</b>	0.89 (0.78-1.01), 0.079	0.72 (0.61-0.84), <0.0005

**Table 4: Interaction between Maternal Age at Childbirth and Mode of Delivery\***

Age Categories	Mode of delivery	
	Vaginal OR (95% CI), p-value	C-section OR (95% CI), p-value
≤25 years	1.35 (0.73-2.52), 0.342	6.82 (2.18-21.30), 0.001
>25 years	1.00**	0.67 (0.26-1.72), 0.403

\*Interaction term between the age at childbirth and mode of delivery was 7.56 (95% CI: 1.70-33.67), p=0.008

\*\*Reference group

**Table 5: Multiple Logistic Regression Model**

<b>Model</b>	<b>Age Categories</b>	<b>Current BMI</b>	<b>Employment Status</b>	<b>Secondhand Smoke</b>	<b>Child Care Anxiety Score</b>	<b>Self-Esteem Score</b>	<b>Mode of the Last Delivery</b>	<b>Age Categories* Mode of the Last Delivery</b>
	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>	<b>OR (95% CI)</b>
<b>Age Categories</b>	1.86 (1.07-3.24)							
<b>Age Categories+Current BMI+Employment Status+Secondhand Smoke+Child Care Anxiety Score+Self-Esteem Score</b>	1.19 (0.62-2.30)	0.89 (0.81-0.98)	1.5 (0.73-3.08)	1.04 (0.95-1.14)	1.24 (1.12-1.38)	0.76 (0.64-0.90)		
<b>Age Categories+Mode of the Last Delivery</b>	1.96 (1.11-3.45)						1.40 (0.70-2.77)	
<b>Age Categories+Mode of the Last Delivery+Age Categories*Mode of the Last Delivery</b>	1.35 (0.73-2.52)						0.67 (0.26-1.72)	7.56 (1.70-33.67)
<b>Age Categories+Current BMI+Employment Status+Secondhand Smoke+Child Care Anxiety Score+Self-Esteem Score+Mode of the Last Delivery+ Age Categories*Mode of the Last Delivery</b>	0.89 (0.43-1.82)	0.89 (0.81-0.98)	1.44 (0.70-2.96)	1.04 (0.95-1.15)	1.25 (1.12-1.39)	0.75 (0.63-0.89)	0.59 (0.21-1.65)	8.78 (1.48-52.05)

**Table 6: Results of Akaike's Information Criteria**

<b>Model</b>	<b>Covariates</b>	<b>AIC= -2(log likelihood)+2(model df)</b>
<b>Model 1</b>	Age Categories+Current BMI+Total # of Luxury Items + Mode of the Last Delivery+Age Categories*Mode of the Last Delivery +Child Care Anxiety Score+Self-Esteem Score	262.5
<b>Model 2</b>	Age Categories+Current BMI+Total # of Luxury Items + Mode of the Last Delivery+Age Categories*Mode of the Last Delivery +Child Care Anxiety Score+Self-Esteem Score+Current BF	261.8
<b>Model 3</b> <i>(Final model)</i>	Age Categories+Current BMI+Total # of Luxury Items + Mode of the Last Delivery+Age Categories*Mode of the Last Delivery +Child Care Anxiety Score+Self-Esteem Score+Current BF+Participant's Education	261.5
<b>Model 4</b>	Age Categories+Current BMI+Total # of Luxury Items + Mode of the Last Delivery+Age Categories*Mode of the Last Delivery +Child Care Anxiety Score+Self-Esteem Score+Current BF+Participant's Education+ Lumbar-Pelvic Pain After the Last Delivery or Currently	262.3
<b>Model 5</b>	Age Categories+Current BMI+Total # of Luxury Items + Mode of the Last Delivery+Age Categories*Mode of the Last Delivery +Child Care Anxiety Score+Self-Esteem Score+Current BF+Participant's Education+Stressful Life Events	261.8

**Table 7: Final Predictive Model of Probable PPD**

<b>Variable</b>	<b>Unadjusted OR (95% CI), p-value</b>	<b>Adjusted OR (95% CI), p-value</b>
<b>Age Categories (years)</b>		
≥25	1.00	1.00
<25	1.86 (1.07-3.24), 0.027	0.88 (0.43-1.82), 0.732
<b>Current BMI</b>	0.92 (0.85-0.99), 0.045	0.90 (0.81-0.99), 0.034
<b>Participant's Education</b>		
>13	1.00	1.00
≤13	1.03 (0.6-1.79), 0.910	0.57 (0.27-1.20), 0.137
<b>Total # of Luxury Items</b>	0.73 (0.61-0.86), <0.0005	0.65 (0.53-0.81), <0.0005
<b>Current BF</b>		
Yes	1.00	1.00
No	1.70 (0.84-3.44), 0.138	2.12 (0.90-4.97), 0.084
<b>Child Care Anxiety Score</b>	1.28 (1.16-1.4), <0.0005	1.27 (1.13-1.42), <0.0005
<b>Self-Esteem Score</b>	0.72 (0.61-0.84), <0.0005	0.75 (0.63-0.90), <0.0005
<b>Mode of the Last Delivery</b>		
Vaginal delivery	1.00	1.00
C-section	1.21 (0.62-2.35), 0.577	0.40 (0.14-1.18), 0.097
<b>Age Categories*Mode of the Last Delivery</b>	7.56 (1.70-33.67), 0.008	14.51 (2.23-94.30), 0.005
<b>Model characteristics: Pseudo R<sup>2</sup>=0.22; HL(chi2(8))=5.73, p=0.68); area under Receiver Operating Characteristic curve=0.8114</b>		

## APPENDICES

### *Appendix 1*

#### The Summary on Prevalence, Onset, Duration and Symptoms of Postpartum Affective Disorders

<b>Disorder</b>	<b>Prevalence (%)</b>	<b>Onset</b>	<b>Duration</b>	<b>Symptoms</b>
<b>Baby or maternity blues</b>	30-75	3 or 4 days after delivery	Hours to days, never more than 2 weeks, typically self-correcting	Lability of mood; tearfulness; forgetfulness; headaches; depersonalization; negative feelings toward baby/mothering; restlessness; irritability; nightmares.
<b>PPD</b>	10-15	Within 1 year after delivery	At least two weeks, but usually longer	Mood of sadness, despair, emptiness; anhedonia; low self-esteem and inappropriate guilt; apathy, low motivation, and social withdrawal; excessive emotional sensitivity; negative, pessimistic thinking; irritability and low frustration tolerance; suicidal ideas; sleep disturbance and abnormal fatigue; may include bipolar disorder.
<b>Puerperal psychosis</b>	0.1-0.2	Within 2 weeks after delivery	Weeks to months	Heightened or reduced motor activity; hallucinations; delusions; major depression; manic episodes; confusion; delirium.

Source: adapted from: Nonacs R, Cohen LS. Postpartum mood disorders: diagnosis and treatment guidelines. *Journal of Clinical Psychiatry* 1998; 59(Suppl 2): 34-40.

*Appendix 2*  
**Symptoms of major depression with postpartum onset\***

---

Major depression is defined by the presence of five of the following symptoms, one of which must be either depressed mood or decreased interest or pleasure†:

---

Depressed mood, often accompanied or overshadowed by severe anxiety

---

Markedly diminished interest or pleasure in activities

---

Appetite disturbance — usually loss of appetite with weight loss

---

Sleep disturbance — most often insomnia and fragmented sleep, even when the baby sleeps

---

Physical agitation (most commonly) or psychomotor slowing

---

Fatigue, decreased energy

---

Feelings of worthlessness or excessive or inappropriate guilt

---

Decreased concentration or ability to make decisions

---

Recurrent thoughts of death or suicidal ideation

---

\*From the *Diagnostic and Statistical Manual of Mental Disorders*, fourth edition (DSM-IV). PPD is defined in the DSM-IV as that which begins within four weeks after delivery.

†Symptoms must be present most of the day nearly every day for two weeks. A diagnosis of major depression also requires a decline from the woman's previous level of functioning and substantial impairment.

***Appendix 3***  
**Oral Consent Form**  
**American University of Armenia**  
**Institutional Review Board # 1/Committee on Human Research**  
**College of Health Sciences Subcommittee for Student Theses**

Title of Research Project: Investigation of risk factors for PPD development among reproductive age women living in Yerevan who have at least one 1-3 months old child.

Hello, my name is Diana Petrosyan. I am a psychiatrist and second year student of Master of Public Health Program at the American University of Armenia. I am conducting a study to investigate the risk factors for emotional disturbances among reproductive age women who have 1-3 months old child living in Yerevan.

You have been randomly selected to participate in this study as you have 1-3 months old child (ren). Your contact information has been obtained from the records of 1-3 months old children in your Primary Health Care facility (polyclinic). Permission to obtain your contact information has been received from the head of your Primary Health Care facility (polyclinic).

If you are willing to participate I will ask you some questions concerning your socio-demographic characteristics, emotional and health status as well as delivery and BF practices. The interview will take place at any time that is convenient for you and will last not more than 15 minutes.

Your participation in the study is voluntary. You may ask any questions at any time during the interview, or skip any question you think is inappropriate and stop it at any moment you want to with no further negative consequences.

Your participation in the study poses no risk for you. There will be no monetary or other direct benefits to you if you participate in this project. The information provided by you is of great value for investigation of risk factors for PPD development, which will be very helpful to understand and better address the problem of PPD among women.

The information you provided is fully confidential, your name will not be linked to your answers and only summary of aggregated data will be reported. The list with your name and contact information is accessible only to one person in the research team; it will be destroyed upon completion of the research.

If you want to talk to anyone about this research study you can contact the research co-investigator Kim Arzoumanian [kimarzoumanian@yahoo.com](mailto:kimarzoumanian@yahoo.com) or call Diana Petrosyan (010) 275882.

If you want to talk to anyone about the research study because you feel you have not been treated fairly or think you have been hurt by joining the study you should contact Yelena Amirkhanyan at (374 1) 51 25 92.

Thank you very much for your participation

*Appendix 4*  
**Հայաստանի ամերիկյան համալսարան  
Գիտահետազոտական Էթիկայի Հանձնաժողով  
Հանրային առողջապահության ֆակուլտետ  
Բանավոր Համաձայնագիր**

Հետազոտության անվանումը, հետծննդաբերական դեպրեսիայի (խնդիրների) զարգացմանը նպաստող ռիսկի գործոնների ուսումնասիրությունը Երևան քաղաքի վերարտադրողական տարիքի այն կանանց շրջանում, ովքեր ունեն ամենաքիչը մեկ 1-3 ամսեկան, երեխա:

Բարև Ձեզ, իմ անունը Դիանա Պետրոսյան է: Ես հոգեբույժ եմ և Հայաստանի ամերիկյան համալսարանի Հանրային առողջապահության ֆակուլտետի ավարտական կուրսի ուսանողուհի: Հայաստանի ամերիկյան համալսարանը անցկացնում է հետազոտություն, որի նպատակն է բացահայտել հետծննդաբերական դեպրեսիայի (խնդիրների) զարգացմանը նպաստող ռիսկի գործոնները Երևան քաղաքի վերարտադրողական տարիքի այն կանանց շրջանում, ովքեր ունեն 1-3 ամսեկան երեխա (ներ):

Դուք պատահականորեն ընտրվել եք մասնակցելու այս հետազոտությանը, քանի որ ունեք 1-3 ամսեկան երեխա (ներ): Ձեր տվյալները վերցվել են Ձեր՝ առողջության առաջնային պահպանման բուժհաստատությունից՝ տնօրենի համաձայնությամբ:

Եթե Դուք համաձայն եք մասնակցել այս հետազոտությանը, ապա ես Ձեզ կտամ հարցեր Ձեր սոցիալ-ժողովրդագրական հատկանիշների, հուզական և առողջական վիճակի, ինչպես նաև ծննդաբերության և կրծքով կերակրման վերաբերյալ: Հարցազրույցը տեղի կունենա մեկ անգամ, Ձեզ համար առավել հարմար ժամանակ, և կտևի ոչ ավելի, քան 15 րոպե:

Ձեր մասնակցությունը այս հետազոտությանը կամավոր է: Դուք կարող եք տալ հարցեր հարցազրույցի ընթացքում ցանկացած պահի, ինչպես նաև իրավունք ունեք չպատասխանել այն հարցերին, որոնք կարող են Ձեզ տհաճություն պատճառել կամ դադարեցնել հարցազրույցը, երբ ցանկանաք՝ առանց որևէ հետագա բացասական հետևանքների:

Ձեր մասնակցությունը այս հետազոտությանը որևէ ռիսկ չի ներկայացնում Ձեզ համար: Այս հետազոտությանը Ձեր մասնակցության դեպքում որևէ դրամական խրախուսանք կամ այլ պարգև նախատեսված չէ: Ձեր կողմից տրամադրված տվյալները կլինեն շատ օգտակար բացահայտելու հետծննդաբերական դեպրեսիայի (խնդիրների) զարգացմանը նպաստող ռիսկի գործոնները, որը կնպաստի առավել լավ հասկանալ և լուծել հետծննդաբերական դեպրեսիայի (խնդիրների) հետ առնչվող խնդիրները:

Ձեր կողմից տրամադրված ողջ տեղեկությունները կպահվեն խիստ գաղտնի, Ձեր պատասխանները կհրապարակվեն միայն ընդհանրական տեսքով՝ մյուս մասնակիցների պատասխանների հետ միասին: Հետազոտական թիմի միայն 1 անդամ է օգտագործում այն ցանկը, որը պարունակում է Ձեր անունը և հեռախոսի համարը: Այդ ցանկը պահվում է փակի տակ և կոչնչացվի հետազոտության ավարտից անմիջապես հետո:

Եթե Գուք ցանկանում եք խոսել որևէ մեկի հետ այս հետազոտության մասին, կարող եք դիմել հետազոտական թիմին՝ Կ. Արզումանյանին հետևյալ էլեկտրոնային հասցեով՝ [kimarzoumanian@yahoo.com](mailto:kimarzoumanian@yahoo.com) կամ Գիանա Պետրոսյանին հետևյալ հեռախոսահամարով՝ (37410) 275882:

Եթե Գուք ցանկանում եք խոսել որևէ մեկի հետ այս հետազոտության մասին, քանի որ գտնում եք, որ Ձեզ հետ անարդարացի են վարվել կամ մտածում եք, որ մասնակցությունը վնասել է Ձեզ, ապա զանգահարեք Ելենա Ամիրխանյանին (37410) 51 25 92 հեռախոսահամարով:

Շնորհակալություն մասնակցության համար

*Appendix 5*  
**Questionnaire**

1. **ID number** \_\_\_\_\_
2. **Maternity Home** \_\_\_\_\_
3. **Date of interview:** \_\_/\_\_/\_\_\_\_\_/\_\_\_\_\_  
Day/Month/Year
  
4. **Date of birth:** \_\_/\_\_/\_\_\_\_\_/\_\_\_\_\_  
Day/Month/Year
5. **Date of the child's birth:** \_\_/\_\_/\_\_\_\_\_/\_\_\_\_\_  
Day/Month/Year
6. **Indicate the highest level of education that you have completed**
  1. School (less than 10 years)
  2. School (10 years)
  3. Professional technical education (10-13 years)
  4. Institute/University
  5. Postgraduate
7. **What is your marital status during your last pregnancy?**
  1. Single
  2. Married
  3. Widowed
  4. Divorced
  5. Refused to respond
8. **How much did you weight before your last pregnancy?** \_\_\_\_\_kg
9. **What is your current weight?** \_\_\_\_\_kg
10. **How tall are you?** \_\_\_\_\_cm
11. **What is the total number of people living in your household (including you and children under 18 years old)?** \_\_\_\_\_
12. **How many members of your household (including yourself) are currently employed?** \_\_\_\_\_
13. **Are you currently employed?**
  1. Yes (*go to the Q14*)
  2. Yes, but on maternity/pregnancy leave (*go to the Q15*)
  3. No
14. **Which of the following best describes your situation?**
  1. Unemployed, looking for work
  2. Unemployed, not looking for work
  3. Can't work due to (permanent) disability
  4. Can't work due to inability to find/afford child care
  5. Student/attending school



20. What was the desired gender for you? \_\_Boy \_\_Girl \_\_No difference
21. What was the desired gender for your partner? \_\_Boy \_\_Girl \_\_No difference
22. To the best of your recall, please indicate how many times have you been pregnant and the outcome for each of your pregnancies
1. Total \_\_\_\_\_
  2. Live births \_\_\_\_\_
  3. Still births \_\_\_\_\_
  4. Spontaneous abortions or miscarriages \_\_\_\_\_
  5. Elective abortions (performed in a clinic) \_\_\_\_\_
  6. Number of children who died during their first year of life \_\_\_\_\_
  7. Other \_\_\_\_\_
  99. Refused to respond \_\_\_\_\_
23. Has the midwife or doctor told you that you have or have had high blood pressure during this pregnancy? \_\_Yes \_\_No (*Go to the Q25*)
24. If yes, what was the highest reading during this pregnancy? (High blood pressure is over 140/90) \_\_\_\_\_/\_\_\_\_\_ 99. \_\_\_\_\_Don't know
25. Have you ever smoked? \_\_Yes \_\_No (*Go to the Q29*)
26. Are you currently smoking?
1. \_\_\_\_\_cigarettes per day.
  2. \_\_\_\_\_cigarettes per week
  3. No
27. Did you smoke during your last pregnancy?
1. \_\_\_\_\_cigarettes per day
  2. \_\_\_\_\_cigarettes per week
  3. No
28. When did you stop smoking?
1. \_\_\_\_\_month before the last pregnancy
  2. At \_\_\_\_\_week of pregnancy
  3. I did not smoke before pregnancy
  4. I have not stopped smoking
29. How many cigarette smokers, not including yourself, were living in your home during your last pregnancy? \_\_\_\_\_
30. During your last pregnancy how many hours a day, on average, were you in the same room with another person who was smoking? \_\_\_\_\_hours 99. Don't know
31. Was this pregnancy planned?
1. Yes
  2. Partially planned
  3. No
  99. Don't know
32. How did you expect your *new* baby to be delivered?
1. Vaginally
  2. Cesarean delivery

99. Don't know

**33. How was your new baby delivered?**

1. Vaginally
2. Cesarean delivery

**34. Have you breastfeed your baby during last 24 hours?** \_\_\_ Yes (*Go to the Q37*) \_\_\_ No

**35. Have you ever breastfeed your child?** \_\_\_ Yes \_\_\_ No (*Go to the Q38*)

**36. How old was your baby when you stopped BF?** \_\_\_\_\_ 99. \_\_\_\_\_ Don't know

**37. Is this the only food your child got during the last 24 hours?**

1. Yes
2. No (specify) \_\_\_\_\_

**38. After delivery did you feel any pain in the lumbar or pelvic location?** \_\_ Yes \_\_ No (*Go to the Q40*)

**39. Do you still feel the pain in the lumbar or pelvic location?**

1. None
2. Mild
3. Moderate
4. Severe

**40. Have you had any of following life event since your last pregnancy? (check all that apply)**

1. Loss of relative (s)
2. Car accident
3. Other (specify) \_\_\_\_\_
4. No

**41. Do you feel you have someone to rely on?** \_\_\_\_\_ Yes \_\_\_\_\_ No

**42. Do you feel there is someone who can understand your problems?** \_\_\_ Yes \_\_\_ No

**Please indicate the one which best describes your feelings since delivery**

	Not at all	Rarely	Some	Usually	Always
<b>Anxiety</b>					
<b>43. I felt that I wasn't able to care for my child well</b>					

<b>44. I was afraid of caring for my child</b>					
<b>45. I felt I need a lot of help with caring for my child</b>					
<b>46. I felt very stressed</b>					
<b>47. I felt frightened as if awful thing happened</b>					
<b>Self esteem</b>					
<b>48. I had a positive attitude toward myself</b>					
<b>49. I felt satisfied with myself</b>					

## Appendix 6

### Հարցաթերթիկ

1. ID \_\_\_\_\_
2. Ծննդատուն \_\_\_\_\_
3. Հարցազրույցի օր/ ամիս/ տարեթիվ \_\_/\_\_/\_\_\_\_\_
4. Չեր ծննդյան օր/ ամիս/ տարեթիվ \_\_/\_\_/\_\_\_\_\_
5. Երեխայի ծննդյան օր/ ամիս/ տարեթիվ \_\_/\_\_/\_\_\_\_\_
6. Որն է ամենաբարձր կրթությունը, որ ստացել եք
  1. Թերի միջնակարգ (դպրոց, 10 տարուց պակաս)
  2. Միջնակարգ (դպրոց, 10 տարի)
  3. Միջին մասնագիտական (ուսումնարան, 10-13 տարի)
  4. Ինստիտուտ/ համալսարան
  5. Հետդիպլոմային կրթություն (մագիստրատուրա, ասպիրանտուրա կամ դոկտորանտուրա)
7. Ինչպիսին է Ձեր ամուսնական կարգավիճակը
  1. Ամուսնացած
  2. Ամուրի
  3. Ամուսնալուծված
  4. Այրի
  5. Հրաժարվում է պատասխանել
8. Ինչպիսին էր Ձեր քաշը մինչև վերջին հղիությունը \_\_\_\_\_ կգ \_\_\_\_\_ Չգիտեմ
9. Ինչպիսին է Ձեր քաշը ներկայումս \_\_\_\_\_ կգ \_\_\_\_\_ Չգիտեմ
10. Որքան է Ձեր հասակը \_\_\_\_\_ սմ \_\_\_\_\_ Չգիտեմ
11. Ընդամենը քանի՞ մարդ է ապրում ձեր տանը (ներառյալ 18 տարեկանից փոքր երեխաներին և ձեզ) \_\_\_\_\_
12. Ընդամենը քանի՞ մարդ է ներկայումս աշխատում Ձեր տանը (ներառյալ ձեզ) \_\_\_\_\_
13. Ներկայումս դուք աշխատում եք
  1. Այո (*անցնել հարց 15-ին*)
  2. Այո, սակայն գտնվում եմ ֆիզ. արձակուրդի մեջ (*անցնել հարց 15-ին*)
  3. Ոչ
14. Թվարկվածներից որն է լավագույնս բնութագրում Ձեր վիճակը (*Կարդայ բոլոր պատասխանները*)
  1. Գործազուրկ, փնտրում եմ աշխատանք
  2. Գործազուրկ, աշխատանք չեմ փնտրում
  3. Չեմ կարող աշխատել կայուն հաշմանդամության պատճառով
  4. Չեմ կարող աշխատել, քանի որ չեմ կարող ապահովել երեխայի խնամքը
  5. Ուսանող
  6. Տնային տնտեսուհի
  7. Թոշակառու
  8. Սեփական բիզնես

9. Այլ \_\_\_\_\_

**15. Ո՞րն է լավագույնս բնութագրում ձեր տան ընդհանուր ամսական միջին եկամուտը**

1. Ոչ ավելի քան 25.000 դրամ
2. 25.000-50.000 դրամ
3. 51.000-100.000 դրամ
4. 101.000-250.000 դրամ
5. Ավելի քան 250.000 դրամ
6. Չգիտեմ

**16. Ինչպես կզնահատեիք Ձեր ընտանիքի ընդհանուր կենսամակարդակը**

1. Միջինից բավականին ցածր
2. Միջինից փոքր-ինչ ցածր
3. Միջին
4. Միջինից փոքր-ինչ բարձր
5. Միջինից բավականին բարձր
6. Վստահ չեմ/ դժվարանում եմ պատասխանել

**17. Ձեր տնտեսությունում ունե՞ք արդյոք հետևյալ աշխատող/գործող իրերը**

Իր	Այո	Ոչ
Անհատական ջեռուցման համակարգ (Baxi)		
DVD նվագարկիչ		
Ավտոմեքենա		
Ավտոմատ լվացքի մեքենա		
Համակարգիչ		
Արբանյակային ալեհավաք		
Բջջային հեռախոս		
Ամառանոց		

18. Նշեք ձեր վերջին երեխայի(ների) սեռը \_\_Տղա \_\_Աղջիկ \_\_Տղա \_\_Աղջիկ

19. Դուք գիտեիք երեխայի սեռը մինչ նրա ծնվելը \_\_Այո \_\_տղա \_\_\_\_\_Ոչ  
\_\_\_\_աղջիկ

20. Ինչ սեռի երեխա էիք Դուք ցանկանում \_\_Տղա \_\_Աղջիկ \_\_Առանց տարբերության

21. Ինչ սեռի երեխա էր ցանկանում Ձեր ամուսինը \_\_Տղա \_\_Աղջիկ \_\_Առանց տարբերության

22. Խնդրում եմ նշել ընդհանուր թվով քանի անգամ եք հղիացել և յուրաքանչյուր հղիության ելքը

1. ընդամենը \_\_\_\_\_
2. կենդանաձին \_\_\_\_\_
3. մեռելաձին \_\_\_\_\_
4. ինքնաբեր վիժում \_\_\_\_\_
5. հղիության արհեստական ընդհատում բժշկի կողմից \_\_\_\_\_
6. կյանքի 16 տարում մահացած երեխաներ \_\_\_\_\_
7. այլ \_\_\_\_\_
8. հրաժարվում է պատասխանել \_\_\_\_\_

23. Վերջին հղիության ընթացքում մանկաբարձը կամ բժիշկը ձեզ ասել են, որ Դուք ունեք բարձր զարկերակային ճնշում \_\_\_Այո \_\_\_Ոչ (Անցնել հարց 25-ին)

24. Նշեք խնդրում եմ ամենաբարձր ճնշումը, որ ունեցել եք վերջին հղիության ժամանակ ( 140/90-ից ավելի) \_\_\_\_\_/\_\_\_\_\_ 99.Չգիտեմ

25. Դուք երբևէ ծխել եք \_\_\_Այո \_\_\_Ոչ (անցնել հարց 29-ին)

26. Ներկայումս Դուք ծխում եք

1. այո \_\_\_\_\_ ծխախոտ/գլանակ օրեկան
2. երբեմն \_\_\_\_\_ ծխախոտ/գլանակ շաբաթական
3. ոչ

27. Դուք ծխել եք Ձեր վերջին հղիության ընթացքում

1. այո \_\_\_\_\_ ծխախոտ/գլանակ օրեկան
2. երբեմն \_\_\_\_\_ ծխախոտ/գլանակ շաբաթական
3. ոչ

28. Երբ եք դադարեցրել ծխելը

1. վերջին հղիությունից \_\_\_\_\_ ամիս առաջ
2. վերջին հղիության \_\_\_\_\_ շաբաթում
3. ես չեմ ծխել մինչև հղիությունը
4. չեմ դադարեցրել ծխելը

29. Ընդհանուր թվով բացի Ձեզանից քանի ծխող է ապրում տանը \_\_\_\_\_

30. Ձեր վերջին հղիության ընթացքում օրական միջինում քանի ժամ եք անցկացրել մի սենյակում, որտեղ այդ պահին կային ծխող/ներ \_\_\_\_\_ 99.դժվարանում եմ պատասխանել

31. Ձեր վերջին հղիությունը պլանավորված է եղել \_\_\_\_\_

- |                              |                             |
|------------------------------|-----------------------------|
| 1.Այո                        | 4. Չգիտեմ                   |
| 2. Որոշ չափով էր պլանավորված | 5. Դժվարանում եմ պատասխանել |
| 3.Ոչ                         |                             |

32. Ինչպես էիք ցանկանում ունենալ Ձեր վերջին երեխային

1. Ծննդաբերություն
2. Կեսարյան հատում
3. Չգիտեմ

33. Ինչպես եք ունեցել ձեր վերջին երեխային

1. Ծննդաբերություն
2. Կեսարյան հատում

34. Դուք կրծքով կերակրել եք Ձեր երեխային վերջին 24 ժամվա ընթացքում \_\_\_Այո (անցնել հարց 37-ին) \_\_\_Ոչ

35. Դուք երբևէ կրծքով կերակրել եք ձեր երեխային \_\_\_Այո \_\_\_Ոչ (անցնել հարց 38-ին)

36. Որքան ժամանակ եք կրծքով կերակրել Ձեր վերջին երեխային \_\_\_\_\_ 99. \_\_\_\_\_ Չեմ հիշում

37. Կրծքի կաթը միակ սննուղղն է, որ Ձեր երեխան ստացել է վերջին 24 ժամվա ընթացքում

4. Այո
5. Ոչ (նշել) \_\_\_\_\_

38. Ծննդաբերությունից/ կեսարյան հատումից հետո Դուք ունեցել եք ցավեր գոտկային կամ կոնքային հատվածներում \_\_Այո \_\_Ոչ (անցնել հարց 40-ին)

39. Ներկայումս Դուք ցավեր ունեք այդ շրջանում

1. այո \_\_\_\_\_թույլ  
\_\_\_\_\_միջին  
\_\_\_\_\_ուժեղ

2. ոչ

40. Ձեր վերջին հղիության ընթացքում կամ դրանից հետո Ձեր կյանքում եղել է որևէ դժբախտ պատահար

1. այո \_\_\_\_\_ հարազատի կորուստ  
\_\_\_\_\_ ավտովթար  
\_\_\_\_\_ այլ (նշել) \_\_\_\_\_

2. ոչ

41. Դուք զգում եք, որ կա(ն) մարդիկ ում Դուք կարող եք վստահել, ովքեր Ձեզ ապավինում են \_\_\_Այո \_\_\_Ոչ

42. Դուք զգում եք, որ կա մեկը, ով հասկանում է Ձեր պրոբլեմները \_\_\_Այո \_\_\_Ոչ

Վերջին մեկ ամսվա ընթացքում

	Երբեք	Հազվադեպ	Երբեմն	Հաճախ	Մշտապես
--	-------	----------	--------	-------	---------

Տազմապ					
43. Չեզ թվացել է, որ Դուք ի վիճակի չեք լավ հոգ տանել երեխայի մասին					
44. Դուք վախեցել եք հոգ տանել երեխայի մասին					
45. Չեզ թվացել է, որ Դուք օգնության կարիք ունեք, հոգ տանելու երեխայի մասին					
46. Դուք ստրեսի մեջ եղել եք					
47. Չեզ թվացել է, որ վատ բան կարող է պատահել					
<b>Ինքնագնահատական</b>					
48. Դուք դրականորեն եք վերաբերում Չեզ					
49. Դուք բավարարված եք ձեզանով					

*Appendix 7*  
**Edinburgh Postnatal Depression Scale**

**In the past 7 days:**

- 1. I have been able to laugh and see the funny side of things**
  1. As much as always could
  2. Not quite so much now
  3. Definitely not so much now
  4. Not at all
- 2. I have looked forward with enjoyment to things**
  1. As much as I ever did
  2. Rather less than I used to
  3. Definitely less than I used to
  4. Hardly at all
- 3. \*I have blamed myself unnecessarily when things went wrong**
  1. Yes, most of the time
  2. Yes, some of the time
  3. Not very often
  4. No, never
- 4. I have been anxious or worried for no good reason**
  1. No, not at all
  2. Hardly ever
  3. Yes, sometimes
  4. Yes, very often
- 5. \*I have felt scared or panicky for no very good reason**
  1. Yes, quite a lot
  2. Yes, sometimes
  3. No, not much
  4. No, not at all
- 6. \*Things have been getting on top of me**
  1. Yes, most of the time I haven't been able to cope at all
  2. Yes, sometimes I haven't been coping as well as usual
  3. No, most of the time I have coped quite well
  4. No, I have been coping as well as ever
- 7. \*I have been so unhappy that I have had difficulty sleeping**
  1. Yes, most of the time
  2. Yes, sometimes
  3. Not very often
  4. No, not at all
- 8. \*I have felt sad or miserable**
  1. Yes, most of the time
  2. Yes, quite often
  3. Not very often
  4. No, not at all
- 9. \*I have been so unhappy that I have been crying**
  1. Yes, most of the time
  2. Yes, quite often
  3. Only occasionally
  4. No, never
- 10. \*The thought of harming myself has occurred to me**
  1. Yes, quite often
  2. Sometimes
  3. Hardly ever
  4. Never

## Appendix 8

### Հետծննդաբերական Դեպրեսիաների Էդիմբուրգի Սանդղակ

#### Վերջին 1 շաբաթվա ընթացքում

1. **Դուք ուրախ եք և նկատում եք տարբեր իրադարձությունների դրական կողմերը**
  1. Այնքան, որքան կարողացել եմ մշտապես
  2. Կարծես ոչ այդքան այժմ
  3. Միանշանակ ոչ այդքան այժմ
  4. Գրեթե ոչ
2. **Դուք լավատես եք ապագայի հանդեպ**
  1. Այնպես, ինչպես միշտ
  2. Կարծես ավելի քիչ, քան նախկինում
  3. Միանշանակ ավելի քիչ, քան նախկինում
  4. Գրեթե ոչ
3. **Դուք անհիմն մեղադրում եք Ձեզ, երբ ինչ-որ բան սխալ է ստացվում**
  1. Այո, գրեթե միշտ
  2. Այո, երբեմն
  3. Ոչ հաճախ
  4. Ոչ երբեք
4. **Դուք անհանգիստ /տագնապալից եք առանց որևէ լուրջ պատճառի**
  1. Ոչ, գրեթե ոչ
  2. Դժվար թե
  3. Այո, երբեմն
  4. Այո, հաճախ
5. **Դուք ունեք վախի զգացողություն առանց որևէ լուրջ պատճառի**
  1. Այո, հաճախ
  2. Այո, երբեմն
  3. Ոչ հաճախ
  4. Գրեթե ոչ
6. **Դուք ունեք զգացողություն որ իրադարձություններին դիմակայելը վեր է Ձեր ուժերից**
  1. Այո, հիմնականում ես չեի կարողանում հաղթահարել/դիմանալ
  2. Այո, երբեմն ես այդքան էլ լավ չեի կարողանում հաղթահարել/դիմանալ, ինչպես առաջ
  3. Ոչ, հիմնականում ես կարողանում էի հաղթահարել/դիմանալ
  4. Ոչ, ես կարողանում էի հաղթահարել/դիմանալ այնպես, ինչպես առաջ
7. **Դուք այնքան դժբախտ եք Ձեզ զգում, որ դժվարություններ ունեք քնելու հետ**
  1. Այո, գրեթե միշտ
  2. Այո, երբեմն
  3. Ոչ հաճախ
  4. Գրեթե ոչ
8. **Դուք Ձեզ տխուր/դժբախտ զգում եք**
  1. Այո, գրեթե միշտ
  2. Այո, բավականին հաճախ
  3. Ոչ հաճախ
  4. Գրեթե ոչ
9. **Դուք այնքան դժբախտ եք Ձեզ զգում, որ լաց եք լինում**
  1. Այո, գրեթե միշտ
  2. Այո, հաճախ
  3. Հազվադեպ
  4. Երբեք
10. **Ունեցել եք ինքներդ Ձեզ վնասելու մտքեր**
  1. Այո, բավականին հաճախ
  2. Երբեմն
  3. Դժվար թե
  4. Երբեք

*Appendix 9*

**Description of Study Variables**

Variable Name	Type	Measure
Presence of probable PPD	Binary	1 Control 2 Case
Maternity Home	Nominal	1 Republic 2 Erebuni 3 Shengavit 4 Margaryan 5 St. Mariam 6 Gr. Lusavorich 7 8 <sup>th</sup> hospital 8 Malatia 9 1 <sup>st</sup> hospital 10 Tcereteli
Child's Age	Continuous	Numbers
EPDS Score	Continuous	Numbers
Age at the Last Childbirth (years)	Continuous	Numbers
Age Categories (years)	Binary	1 $\geq 25$ 2 $< 25$
Participant's BMI Before the Last Pregnancy (kg/m <sup>2</sup> )	Continuous	Numbers
Current BMI (kg/m <sup>2</sup> )	Continuous	Numbers
Participant's Education (years)	Ordinal	1 School (less than 10 years) 2 School (10 years) 3 Professional technical education (10-13years) 4 Institute/University 5 Postgraduate
Participant's Education (years)	Binary	1 $> 13$ 2 $\leq 13$
Total # of People Living in the Household (including the participant and children under 18 years old)	Continuous	Numbers
Total # of Currently Employed Members in the Household	Continuous	Numbers

(including the participant)		
Employment status	Binary	1 Employed 2 Unemployed
Household's Average Monthly Income (AMD)	Ordinal	1 < 25,000 2 25,000-50,000 3 51,000-100,000 4 101,000-250,000 5 >250,000
Household's Average Monthly Income (AMD)	Binary	1 >50,000 2 ≤50,000
General Standard of Living	Ordinal	1 Substantially below average 2 Little below average 3 Average 4 Little above average 5 Substantially above average
General Standard of Living	Binary	1 Above average 2 Below average
Total # of Luxury Items	Continuous	Numbers
Last Child's Gender	Binary	1 Boy 2 Girl
Participant's Desired Gender of the Last Child	Nominal	1 Boy 2 Girl 3 No difference
Husband's Desired Gender of the Last Child	Nominal	1 Boy 2 Girl 3 No difference
Discrepancy Between Actual and Parents' Desired Gender of the Last Child	Binary	1 Concordance 2 Discordance
Total # of Alive Children	Binary	1 1 2 >1
Stillbirths	Binary	1 Never 2 Ever
Miscarriages	Binary	1 Never 2 Ever
Induced Abortions	Binary	1 Never 2 Ever
Children Died During the First Year of Life	Binary	1 Never 2 Ever
Stillbirths or Dead children	Binary	1 Never 2 Ever
High Blood Pressure During	Binary	1 No

the Pregnancy		2 Yes
Smoking	Binary	1. Never 2. Ever
Current Smoking	Nominal	1. Yes, daily 2. Yes, sometimes 3. No
Total # of Smokers in the Household	Continuous	Numbers
Exposure to Secondhand Smoke	Continuous	Numbers
Pregnancy Planning	Nominal	1 Planned 2 Unplanned
Expected Mode of the Last Delivery	Nominal	1 Vaginal delivery 2 C-section
Mode of the Last Delivery	Nominal	1 Vaginal delivery 2 C-section
BF	Binary	1 Ever 2 Never
Current BF	Binary	1 Yes 2 No
Exclusive BF	Binary	1 Yes 2 No
Time of BF Cessation	Continuous	Numbers
Lumbar-Pelvic Pain After the Last Delivery	Binary	1 No 2 Yes
Lumbar-Pelvic Pain Currently	Binary	1 No 2 Yes
Lumbar-Pelvic Pain After the Last Delivery or Currently	Binary	1 No 2 Yes
Stressful Life Events	Binary	1 No 2 Yes
Social Support	Binary	1 Yes 2 No
Child Care Anxiety Score	Continuous	Numbers
Self-Esteem Score	Continuous	Numbers

## Appendix 10

### STATA Output for Logistic Regression

#### 1. Interaction between participant's age at the last childbirth and mode of the last delivery

```
. logistic newstatus agecat if newdeliv==0
```

```
Logistic regression                Number of obs   =       269
                                   LR chi2(1)         =         0.90
                                   Prob > chi2        =       0.3434
Log likelihood = -127.23129         Pseudo R2      =       0.0035
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
agecat	1.352343	.4296786	0.95	0.342	.7254967 2.5208

```
. logistic newstatus agecat if newdeliv==1
```

```
Logistic regression                Number of obs   =        66
                                   LR chi2(1)         =       11.90
                                   Prob > chi2        =       0.0006
Log likelihood = -28.157326         Pseudo R2      =       0.1744
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
agecat	10.22222	7.082625	3.36	0.001	2.628919 39.74783

```
. gen agecat_newdelivery=agecat*newdelivery
```

```
. logistic newstatus agecat newdelivery agecat_newdelivery
```

```
Logistic regression                Number of obs   =       335
                                   LR chi2(3)         =       13.10
                                   Prob > chi2        =       0.0044
Log likelihood = -155.38862         Pseudo R2      =       0.0404
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
agecat	1.352343	.429681	0.95	0.342	.7254942 2.520808
newdelivery	.6672241	.3230261	-0.84	0.403	.2583305 1.723327
agecat_new~y	7.558897	5.761771	2.65	0.008	1.696797 33.6734

```
. lincom agecat+agecat_newdelivery
```

```
( 1) agecat + agecat_newdelivery = 0
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
(1)	10.22222	7.082698	3.35	0.001	2.628882 39.74839

#### 2. Multiple logistic regression model

```
. logistic newstatus agecat bmil newemp shs anxietyscore esteemscore newdelivery
agecat_newdelivery
```

```
Logistic regression                               Number of obs   =       316
                                                    LR chi2(8)      =       53.21
                                                    Prob > chi2     =       0.0000
Log likelihood = -128.42616                       Pseudo R2      =       0.1716
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
agecat	.886389	.3258182	-0.33	0.743	.4312612 1.821832
bmil	.8913748	.0440716	-2.33	0.020	.8090494 .9820773
newemp	1.435882	.5311235	0.98	0.328	.6954485 2.964646
shs	1.042785	.0498959	0.88	0.381	.9494368 1.145312
anxietyscore	1.24567	.0689098	3.97	0.000	1.117674 1.388325
esteemscore	.751565	.0669304	-3.21	0.001	.6311944 .8948907
newdelivery	.5914328	.3094139	-1.00	0.315	.2121246 1.648997
agecat_new-y	8.778126	7.971808	2.39	0.017	1.48043 52.04942

```
. lincom agecat+agecat_newdelivery
```

```
( 1) agecat + agecat_newdelivery = 0
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
(1)	7.780834	6.57109	2.43	0.015	1.486508 40.72725

### 3. Final predictive model for probable PPD

```
. logistic newstatus agecat bmil newedu total newbreastfeed anxietyscore esteemscore
newdelivery agecat_newdelivery
```

```
Logistic regression                               Number of obs   =       325
                                                    LR chi2(9)      =       70.36
                                                    Prob > chi2     =       0.0000
Log likelihood = -121.75127                       Pseudo R2      =       0.2242
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
agecat	.8807424	.3260082	-0.34	0.732	.4263589 1.819376
bmil	.8958652	.0464518	-2.12	0.034	.8092947 .991696
newedu	.5685373	.2157413	-1.49	0.137	.2702438 1.196085
total	.6531439	.0719271	-3.87	0.000	.5263454 .8104886
newbreastf-d	2.11869	.9215774	1.73	0.084	.9032664 4.969571
anxietyscore	1.269951	.0740941	4.10	0.000	1.132725 1.423802
esteemscore	.7513041	.0689252	-3.12	0.002	.6276621 .8993022
newdelivery	.4005504	.2208188	-1.66	0.097	.1359563 1.180089
agecat_new-y	14.51472	13.85829	2.80	0.005	2.234102 94.30062

```
. lincom agecat+agecat_newdelivery
```

```
( 1) agecat + agecat_newdelivery = 0
```

newstatus	Odds Ratio	Std. Err.	z	P> z	[95% Conf. Interval]
(1)	12.78373	11.20846	2.91	0.004	2.292689 71.28041

```
. lfit,group(10)
```

Logistic model for newstatus, goodness-of-fit test

(Table collapsed on quantiles of estimated probabilities)

```
      number of observations =      325
      number of groups      =       10
Hosmer-Lemeshow chi2(8)    =       5.73
      Prob > chi2          =      0.6771
```

```
. lroc
```

Logistic model for newstatus

```
number of observations =      325
area under ROC curve   =      0.8114
```

#### 4. Variance Inflation Factor

```
. vif
```

Variable	VIF	1/VIF
agecat_new-y	1.40	0.712588
newdelivery	1.40	0.712952
agecat	1.25	0.797604
newedu	1.21	0.827517
total	1.20	0.834080
anxietyscore	1.10	0.909326
esteemscore	1.09	0.920546
bmil	1.08	0.928241
newbreastf-d	1.05	0.956554
Mean VIF	1.20	