

# Relationship between Child Development and Maternal Postpartum Depression: A Cross-Sectional Study

Mahdieh Saeri<sup>1</sup>, Mitra Savabi-Esfahani<sup>2\*</sup>, Arezo Aghaii<sup>3</sup>, Gholamreza Kheirabadi<sup>4</sup>

1. School of Medicine, Isfahan University of Medical sciences, Isfahan, Iran

2. Department of Midwifery and Reproductive Health, Nursing and Midwifery Care Research Center, Faculty of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran

3. Department of Midwifery and Reproductive Health, Faculty of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran

4. Department of Psychiatry, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

## ABSTRACT

**Background:** The first two years of life is of paramount importance for child development, and the acquired skills during this period will be the basis for success in the future. Postpartum depression as one of the common mental health issues in mothers may be associated with child development.

**Methods:** This cross-sectional study was conducted on 366 women (aged 18-45 years) referred to health care centers. Demographic characteristics form, Edinburg postnatal depression scale, as well as ages and stages questionnaires, were used for data collection. The collected data were analyzed in SPSS software (version 18) at a significant level of less than 0.05.

**Results:** The mean maternal depression score in an abnormal state was higher, compared to that in the normal state, requiring the follow-up situations in communication, fine motor, and personal-social domains. Moreover, the ANOVA test demonstrated a statistically significant difference between the maternal depression score in various situations of mentioned domains ( $P=0.03$ ,  $P=0.016$ , and  $P=0.018$ ). There was no statistically significant difference between maternal depression scores in various situations of gross motor and problem-solving domains ( $P=0.503$  and  $P=0.145$ ). Furthermore, Pearson test results pointed to a significant relationship between depression scores and the state of development in communication, fine motor, and personal-social domains.

**Conclusion:** As evidenced by the obtained results, health care providers should consider postpartum depression in order to maintain and improve children's development. The provision of adequate information regarding child development can improve the quality of care for the children whose mothers suffer from postpartum depression.

**Keywords:** Child, Development, Depression, Maternal, Postpartum

## Introduction

The development of the brain structure and function is very rapid in the first two years of life (1) when an opportunity is provided for children to acquire various skills. The acquired skills will be the basis for success in the future; therefore, any defect can lead to an irreversible loss for the child (2, 3, 4). Development is a process in which the child's brain and the nervous system undergo a multifaceted change so that the child gradually acquires new capabilities and skills (5, 6). The development includes some domains, such as physical, cognitive, and psychosocial development (7).

Based on previously conducted studies, child

development is affected by genetics, environmental, psychological, and socioeconomic factors (8). Developmental disorders were reported in 39% of children under 5 years in low-income countries, and their distribution in different regions of Iran was demonstrated to range from 18.7%-22.5% (9). The main cause of developmental disorders has remained unknown. Despite biological and nutritional factors affecting the development of children, recent research has pointed to a significant relationship between children's development and social determinants of maternal health (10). Moreover, the quality of mother-child

\* Corresponding author: Mitra Savabi-Esfahani, Department of Midwifery and Reproductive Health, Nursing and Midwifery Care Research Center, Faculty of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran. Tel: +983137927525; Email: M\_savabi@nm.mui.ac.ir

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interaction can affect child development (11) and help brain development (12). Several studies revealed the role of mothers in the facilitation of children's social-emotional development (13), language and literacy skills (14), as well as cognitive development (15).

Maternal health, especially mental health, is considered a basis for children's health (16). In this regard, one of the most common problems that can involve maternal health is postpartum depression with incidence rates of 13% and 34% in developed and developing countries, respectively (17, 18). The data indicated that the postpartum depression is 25%-39% in Iran; moreover, severe cases of this disease may persist until two years after childbirth (19).

Postpartum depression reduces a mother's ability to support child (20), mother-child involvement, sensitivity, and conditional responsiveness (21). Depressed mothers are incapable of appropriate interaction with their children. They show less affection and spend less time to play with their children (22, 23). Mothers with postpartum depression do not have a good mother-child bonding and respond less to child signals (24). Therefore, the children of depressed mothers have lower stimuli and experience improper interaction which can have a negative impact on their development (22, 25).

Ali et al. in Pakistan claimed that postpartum anxiety and depression influenced mental, social, emotional, linguistic, cognitive, and motor development (26). Nonetheless, other studies revealed that postpartum depression had no effect on the cognitive, psychological, and motor development of the child (27, 28).

It should be considered that providing adequate information regarding children's development can improve the health care of the children whose mothers suffer from such problems as postpartum depression. According to research conducted in this regard, as well as the importance of maintaining and promoting the physical and mental health of mothers and children (19), the researchers in the present study strived to carry out research in this field. Therefore, this research aimed to investigate the relationship between postpartum depression and child development in the first two years of life.

## Methods

### *Study design and population*

Isfahan is divided into four areas: west, east, north, and south. The health care centers which

are located in all areas provide such care practices as monitoring growth and child development to mothers and children. It has been reported that 11.8% of children had developmental disorders in the city (9, 29). This cross-sectional study was conducted on 366 mothers who were referred to health care centers. The study population included all mothers (aged 18-45 years) whose children were maintained in health care centers.

### *Inclusion and exclusion criteria*

The inclusion criteria for the mothers were no history of infertility, addiction, chronic diseases, and experience of severe stress during the past six months. Mothers' stress was assessed using the Holmes-Rahe scale, and a score of less than 150 was regarded (30) as the inclusion for the study. Moreover, in this study, term and single delivery, birth weight of 2500-4000 g, lack of intrauterine growth restriction (IUGR), not being a step-child, and lack of specific disease history were considered the inclusion criteria of the study for children.

The sample size was calculated at 366 subjects based on the following equation:

$$N = (Z_1 + Z_2)^2 (1 - r^2) / r^2 + 2$$

We considered  $Z_1$  value for a confidence interval of 99%=2.58 and  $P=0.5$ . When we assumed power of test=90 %,  $Z_2$  was determined to be equal to 1.87. The Correlation coefficient ( $r$ ) was considered at least 0.2.

### *Methods*

The health centers were randomly selected from all health centers in different areas of Isfahan using the lottery method. Therefore, each health center was assigned a number; thereafter, numbers were randomly drawn from the box. The samples were mothers who were referred to health centers in order to receive care for themselves and their children.

### *Instruments*

In this study, three questionnaires of socio-demographic characteristics of the mothers, the Edinburg postnatal depression scale (EPDS), as well as the ages and stages questionnaire (ASQ), were used. The Edinburg postnatal depression scale contains 10 items which are rated on a four-point Likert scale, ranging from 0 to 3 (0= not at all, 1= not very often, 2= most of the time, and 3= all the time). The items 3 and 5 to 10 are reversely scored. The total score is calculated by the addition of all scores. A score of more than 12 indicates postnatal depression (27).

On the other hand, ASQ was used to assess the development of children. This questionnaire is relatively simple and completed by parents or caregivers. The ASQ contains 19 questionnaires for 19 different age groups. Each questionnaire consists of 30 items arranged from easier activities to more difficult ones (7). Five domains of development are assessed by ASQ (communication, gross motor, fine motor, personal-social, and problem-solving), along with a public or general section (21). There is a set of 6 items for each domain. The mothers are asked to respond to the items by considering their child's performance. The responses to the items are included yes, sometimes, and not yet with point values of 10, 5, and 0, respectively. Cut-off points determine whether children are at risk and should be referred for more follow-up and evaluation or children are recognized within a normal developmental (7, 27).

#### **Measuring tools: validity and reliability**

In total, the Iranian version of the Edinburgh questionnaire was investigated by researchers. The validity and reliability of EPDS in Iran were acceptable. The assessment of validity using known groups revealed reasonable results. The Cronbach's alpha and intraclass correlation coefficients in test-retest were reported as 0.83 and 0.80, respectively (31).

The ASQ national version was standardized and confirmed as a valid and reliable tool. The sensitivity and specificity of ASQ were obtained at 72% and 86% (27). To determine the content validity of the socio-demographic questionnaire after studying the related books and papers, the questionnaire was evaluated and confirmed by 15 faculty members of Isfahan University of Medical Sciences.

#### **Ethical consideration**

The present article was extracted from a research project approved by the Research Deputy and Ethics Committee of Isfahan University of Medical science (code: 291179). The participation of mothers was voluntary and based on informed consent.

#### **Data Analyses**

We used descriptive statistical analysis (mean, standard division, and frequency distribution) and other statistical methods (ANOVA test and Pearson's correlation). Ultimately, the collected data were analyzed in SPSS software (version 18). A p-value less than 0.05 was considered

statistically significant.

## **Results**

In terms of socio-demographic characteristics, the results showed that the mean age of mothers was 27.67 years, and the majority of them (49.2%) had a diploma. Furthermore, 93.2% of subjects were housewives. The delivery mode was a cesarean section in 66% of mothers and most mothers had one child (Table 1).

**Table 1.** Frequency distribution of socio-demographic characteristics

Characteristics	Number	Percent (%)
Child age (month)		
6-4	86	23.4
12-76	118	32.2
18-13	96	26.2
24-19	66	18.2
Maternal age (year)		
25-18	120	32.8
35-26	219	59.8
45-36	27	7.4
Maternal employment		
Housewife	341	93.2
Employed	25	6.8
Maternal education		
High school	89	24.3
Diploma	180	49.2
University	97	26.5
Father education		
High school	57	15.6
Diploma	195	53.3
University	114	31.1
Number of children		
1	230	62.8
2	109	29.8
3	23	6.3
4-5	4	1.1
Mode of delivery		
Normal vaginal delivery	124	34
Cesarean section	242	66

The mean depression score in this study was  $7.06 \pm 5.06$ . In the studied population, 19.4% of women were found to be depressed with a score of above 12. The highest frequency distribution of personal-social, communication, gross motor, fine motor, and problem-solving was in the normal state (95.9%, 94%, 94%, 92.9%, and 90.2%, respectively). Although the mean scores of maternal depression were different in normal, abnormal, and follow-up situations of gross motor and problem-solving domains, there was no statistically significant difference between maternal depression in various situations of gross motor and problem-solving domains ( $P=0.503$  and  $P=0.145$ ).

The mean depression score of mothers in an abnormal state was higher, as compared to that in the normal state, requiring the follow-up

**Table 2.** Maternal depression score according to dimension and situation of child development

Dimension of child development	Situation	Mean and standard deviation of maternal depression score	ANOVA test	P-value
Communication	Abnormal	10.66 ± 3.21	3.85	0.03
	Follow-up	9.21±6.5		
	Normal	7.63±4.96		
Gross motor	Abnormal	5±1	6.87	0.503
	Follow-up	8.57±4.8		
	Normal	7.77±5.09		
Fine motor	Abnormal	10.75±4.99	4.15	0.016
	Follow-up	9.54±5.28		
	Normal	7.64±5.03		
Problem solving	Abnormal	8.45±6.33	1.94	0.145
	Follow-up	9.64±4.9		
	Normal	7.62±5.09		
Personal-social	Abnormal	13±3.82	4.07	0.018
	Follow-up	10.63±6.96		
	Normal	7.64±4.96		

**Table 3.** Pearson's correlation between maternal depression score and dimension of child development

Dimension of child development	Maternal depression score	
	Pearson correlation	Sig. (2-tailed)
Communication	-0.177	0.001
Gross motor	-0.065	0.216
Fine motor	-0.182	0.001
Problem solving	-0.109	0.037
Personal-social	-0.189	0.001

situations in communication, fine motor, and personal-social domains. Moreover, the ANOVA test showed a statistically significant difference between the maternal depression score in normal and abnormal states, as well as a need for follow-up conditions in the three domains ( $P=0.03$ ,  $P=0.016$ , and  $P=0.018$ ) (Table 2). Furthermore, Pearson test results demonstrated a significant relationship between the depression score and the state of development in communication, fine motor, and personal-social domains (-177, -182, -189) (Table 3).

## Discussion

In general, the results of the current research pointed out that maternal postpartum depression was not related to the domains of gross motor and child problem-solving; nonetheless, maternal depression was associated with the domains of communication, fine motor, and personal-social.

The mother's sensitivity to child behavior is the center of communication and interaction between mother and child, as well as the development of the emotional and social dimensions of the child. The inability to control maternal emotions and insensitivity of mothers can increase the crying of the child, reduce maternal duties, and consequently, weaken the regulation of emotions, reduce motivation,

destroy the learning of social behavior, and impair child development. Furthermore, depressed mothers revealed slower responses to child vocalizations, as compared to non-depressed ones (32). In addition, the establishment of communication, telling stories, and playing with the child were less frequently observed in depressed mothers (33).

In a review study, Porto et al. (2016) assessed mechanisms through which depression affects child development during the first year of life. They showed that maternal depression was related to atypical emotions (34). The researchers have pointed to the effect of maternal depression on the social development of the child (33). Stein et al. (2014) conducted a study to investigate the correlation between perinatal mental disorders and the development of children. The findings of the stated study pointed out that the children of depressed mothers obtained the lowest score in cognitive and social domains, as compared to the control group (35).

In the same context, Besse et al. (2021) pointed out that the children of depressed mothers had poorer communication and social development, in comparison with those with non-depressed mothers (36). Liu et al. (2017) also demonstrated that mothers' depression symptoms were associated with lower cognitive

scores in children aged 56 months and less. In the current study, by controlling confounding variables, it was indicated that the mean cognitive score was lower in children 6-8 weeks postpartum whose mothers obtained a high score of postpartum depression, as compared to that in children with non-depressed mothers (17).

The results of some studies on the direct effect of postpartum depression on all children are different and even controversial. Vameghi et al. (2015) suggested that apart from maternal depression, the socioeconomic status of the family is effective in the development of children aged 6-18 months (37). The findings of another study on one-year-old children in Iran indicated no significant relationship between maternal depression and the range of the gross motor. In the referred study, the socioeconomic status of the family was shown as the effective factor so that the prevalence of the disorder in the gross motor was higher in families with lower socioeconomic status (38).

Furthermore, according to some researchers, prenatal depression is more prevalent in mothers and the most predictor of postpartum depression. Therefore, what we regard as the negative impacts of postpartum depression on the development of children are in fact the additional effects resulting from previous or chronic depression in mothers, and postpartum depression does not affect the cognitive, motion, and psychological development of children (27), or its undesirable effect is negligible (28, 39).

Moreover, researchers mentioned that postpartum depression is not a direct and significant factor in the developmental disorders of children. Nevertheless, the following mediating variables can be also effective: maternal, genetic, and hereditary factors, physical problems of the child (27), child's gender, interactions, and communication between mother and child (28, 40), quality of the family atmosphere and health, social and economic support, as well as the presence of chronic prenatal depression or repeated recurrence (41,42). It should be noted that the relationship between maternal depression and the development of the child may be a two-way relationship. Therefore, an integrated approach to improving the development of children may include programs considering the parent-child relationship, maternal depression, as well as child's health and nutrition (43). Tsivos (2015) believes that intervention in postpartum depression, apart from enhancing the quality of

the mother-infant relationship, can improve the development of babies (44).

### **Limitations**

Although the relationship between depression and some domains of development of children was indicated in this research, the limitations of this study should be also considered. Among the notable limitations, we can refer to the following: the information from mothers for the diagnosis of depression or developmental disorders of children was obtained using a self-reporting method and not based on a clinical evaluation. In this respect, Corastein mentioned that depressed women may have a more negative perception of their children's behavior and report more problems with their children (27). Secondly, a cross-sectional study design was used in this study. Therefore, the lack of evaluation of changes in depression scores in different periods and lack of control over confounding variables, such as economic and maternal social support, are other limitations of this study that would require further research.

### **Conclusion**

It seems that health care providers should consider the postpartum depression of mothers in order to maintain and improve child development. The provision of adequate information regarding children's development can improve the quality of care for the children whose mothers suffer from postpartum depression. Consequently, it is recommended to assess the development of children with depressed mothers.

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### **Conflicts of interest**

There are no conflicts of interest.

### **References**

1. Haartsen R, Jones E JH, Johnson M H, Human brain development over the early years. *Curr Opin Behav.* 2016;10:149-154.
2. Gertler P, Heckman J, Pinto R, Zanolini A, Vermeersch C, Walker S, et al. Labor market returns to an early childhood stimulation intervention in Jamaica. *Science (New York, N.Y.)* 2014; 344(6187):998-1001.
3. Roia A, Paviotti E, Ferluga V, Montico M, Monasta L, Ronfani L, et al. Promoting effective child development practices in the first year of life: does

- timing make a difference? *BMC Pediatrics*. 2014; 14:222-22.
4. Ertem IO, Krishnamurthy V, Mulaudzi MC, Sguassero Y, Balta H, Gulumser O, et al. Similarities and differences in child development from birth to age 3 years by sex and across four countries: a cross-sectional, observational study. *Lancet Glob Health*. 2018;6(3):e279-e91.
  5. Sharda M, Foster NE, Hyde KL. Imaging Brain Development: Benefiting from Individual Variability. *J Exp Neurosci*. 2015;9(Suppl 1):11-8.
  6. Lokuketagoda B U W P, Thalagala N, Fonseka P, Tran T. Early Development Standards for Children Aged 2 to 12 Months in a Low-Income Setting. *SAGE Open*. 2016;6(4): 2158244016673128.
  7. Quigg TC, Mahajerin A, Sullivan PD, Pradhan K, Bauer NS. Ages and Stages Questionnaires-3 developmental screening of infants and young children with cancer. *J Pediatr Oncol Nurs*. 2013;30(5):235-41.
  8. Sinno D, Tamim H, Faytrouni F, Mikati M, ACharafeddine L. Factors affecting child development assessed by the Ages and Stages Questionnaire (ASQ) in an Arabic speaking population. *Early Hum Dev*. 2018;120:61-66.
  9. Torabi F, Akbari S A, Amiri S, Soleimani FM, Majd H A. Correlation between high-risk pregnancy and developmental delay in children aged 4-60 months. *Libyan J Med*. 2012; 7.
  10. Vameghi R, Amir Ali Akbari S, Sajedi F, Sajjadi HALavi Majd H. Relation between Social Determinants of Maternal Health and Child Development: A Path Analysis. *International Journal of Pediatrics* 2018; 6(12), 8643-54.
  11. Rocha NACF, Dos Santos Silva FP, Dos Santos MM, Dusing SC. Impact of mother-infant interaction on development during the first year of life: A systematic review. *J Child Health Care*. 2020;24(3):365-385.
  12. Bernier A, Calkins SD, Bell MA. Longitudinal Associations between the Quality of Mother-Infant Interactions and Brain Development across Infancy. *Child Dev*. 2016;87(4):1159-74.
  13. McDonnell CG, Fondren K, Speidel R, Valentino K. Emotion Socialization and Developmental Risk: Interactive Effects of Receptive Language and Maltreatment on Reminiscing. *J Child Fam Stud*. 2020;29(5):1236-1248.
  14. Thurman A. Parent-child interaction: how it impacts language and literacy skills; 2017. Graduate Research Papers. 617. Available from <https://scholarworks.uni.edu/grp/617>.
  15. Fenning RM, Baker JK. Mother-child interaction and resilience in children with early developmental risk. *J Fam Psychol*. 2012;26(3):411-20.
  16. Lees J. The effect of postpartum depression on child cognitive development; 2011. Available from <https://rdw.rowan.edu/etd/24>.
  17. Liu Y, Kaaya S, Chai J, McCoy D C, Surkan PJ, Black MM, et al. Maternal depressive symptoms and early childhood cognitive development: a meta-analysis. *Psychol Med*. 2017;47(4):680-89.
  18. Murray L, Halligan S, Cooper P. Effects of postnatal depression on mother-infant interactions and child development, the wiley blackwell handbook of infant development; 2010.
  19. Aghaii A, Savabi-Esfahani MK, Heirabadi GR. The Association between Maternal Depression and Lactation Status during the 24 Months after Delivery. *Int J Behav Sci*. 2015;13(4):581-86.
  20. Ronda V. The Effect of maternal psychological distress on children's cognitive development. Department of Economics, Johns Hopkins University; 2016.
  21. Liu X, Yang C, Yang Y, Huang X, Wang Y, Gao Y, Song Q, Wang Y, Zhou H. Maternal depressive symptoms and early childhood development: the role of mother-child interactions among mother-child dyads in rural areas of Central and Western China. *Peer J*. 2021;9: e11060.
  22. Mokwena KE. Neglecting maternal depression compromises child health and development outcomes, and violates children's rights in South Africa. *Children (Basel)*. 2021; 8(7):609.
  23. Sohrabi R, Amir Ali Akbari S, Ahmadi Doulabi M, Nasiri M. Relationship of Mothers' Spiritual, Social, and Mental Health and Self-efficacy with Child Development: A Path Analysis. *International J Pediatr*. 2020;8(9):12117-12129.
  24. O'Higgins M, Roberts ISJ, Glover V, Taylor A. Mother-child bonding at 1 year; associations with symptoms of postnatal depression and bonding in the first few weeks. *Arch Womens Ment Health*. 2013;16:381-389.
  25. Hardin JS, Jones NA, Mize KD, Platt M. Affectionate touch in the context of breastfeeding and maternal depression influences infant neurodevelopmental and temperamental substrates. *Neuropsychobiology* 2021; 80: 158-175.
  26. Ali NS, Mahmud S, Khan A, Ali BS. Impact of postpartum anxiety and depression on child's mental development from two peri-urban communities of Karachi, Pakistan: a quasi-experimental study. *BMC Psychiatry*. 2013;13: 274.
  27. Abdollahi F, Rezai Abhari F, Zarghami M. Postpartum depression effect on child health and development. *Acta Med Iran*. 2017;55(2):109-14.
  28. Kurstjens SWolke D. Effects of maternal depression on cognitive development of children over the first 7 years of life. *J Child Psychol Psychiatry*. 2001 42(5):623-36.
  29. Yaghini O, Kelishadi R, Keikha M, Niknam N, Sadeghi S, Najafpour E, Ghazavi M. Prevalence of developmental delay in apparently normal preschool children in Isfahan, Central Iran. *Iran J Child Neurol*. 2015;9(3):17-23.
  30. Noone PA. The Holmes-Rahe Stress Inventory. *Occup Med*, 2017; 67(7):581-582.
  31. Mazhari SNakhaee N. Validation of the Edinburgh postnatal depression scale in an Iranian sample. *Arch Womens Men Health*. 2007;10(6):293-7.
  32. Lam-Cassettari C, Kohlhoff J. Effect of maternal

- depression on infant-directed speech to prelinguistic infants: Implications for language development. *PLoS One*. 2020; 15(7):e0236787.
33. Slomian J, Honvo G, Emonts P, Reginster JY, Bruyère O. Consequences of maternal postpartum depression: A systematic review of maternal and infant outcomes. *Women's Health*. 2019; 15: 1745506519844044.
  34. Porto AJ, Nunes LM, Nelson CA. Behavioral and neural correlates of emotional development: typically developing infants and infants of depressed and/or anxious mothers. *J Pediatr*. 2016;92(3 Suppl 1):S14-22.
  35. Stein A, Pearson RM, Goodman SH, Rapa E, Rahman A, McCallum M, Howard LM, Pariante CM. Effects of perinatal mental disorders on the fetus and child. *Lancet*. 2014; 384(9956):1800-19.
  36. Besse D, Williams M, Spencer D, Walters B. The effects of postpartum depression on children's social development 2021. *Williams Honors College, Honors Research Projects*; 2021.
  37. Vameghi R, Amir Aliakbari S, Sajedi F, Sajjadi H, Alavimajd HHajighasemali S. Comparison of stress and perceived social support in mothers of 6-18 month-old children with and without developmental delay. *Hayat*. 2015; 21(3):74-87.
  38. Mohammadi Parsa N, Moradi AEinabadi F. An Investigation of the Relationship between Maternal Depression with Gross Motor and Fine Motor Delay in one-year Old Children. *J. Paramed. Sci Rehab*. 2015; 4(4):43-50.
  39. Field T. Prenatal depression effects on early development: A review. *Infant Behav Dev*. 2011;34(1): 1-14.
  40. Mirhosseini H, Moosavipoor SA, Nazari MA, Dehghan A, Mirhosseini S, Bidaki R, et al. Cognitive behavioral development in children following maternal postpartum depression: a review article. *Electron Physician*. 2015;7(8):1673-79.
  41. Rai S, Pathak ASharma I. Postpartum psychiatric disorders: Early diagnosis and management. *Indian J. Psychiatry*. 2015; 57(Suppl 2):S216-S21.
  42. Chu K M, Emasealu O V, Hu Z, O'Donnell F LClark L L. Risk of Mental Health Disorders Following an Initial Diagnosis of Postpartum Depression, Active Component, U.S. Armed Forces, 1998-2010. *MSMR*. 2015;22(6):6-12.
  43. Hurley KM, Yousafzai AK, Lopez-Boo F. Early Child Development and Nutrition: A Review of the Benefits and Challenges of Implementing Integrated Interventions. *Adv Nutr*. 2016; 7(2):357-63.
  44. Tsivos ZL, Calam R, Sanders MR, Wittkowski A. Interventions for postnatal depression assessing the mother-infant relationship and child developmental outcomes: a systematic review. *Int J Womens Health*. 2015; 7:429-47.