

# Postpartum depression among mothers attending primary health care centers, Iraq 2019

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## Keywords:

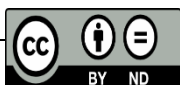
Postpartum Depression, prevalence, PHCCs

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## ABSTRACT

Pregnancy is a significant event in a woman's life and is associated with psychological and biological changes. Antenatal and postnatal care has traditionally neglects the emotional and psychological health and focuses on the physical health and consequently depression after pregnancy is overlooked and underdiagnosed. The study aims to identify the prevalence and the underlying determinants of Postpartum Depression (PPD) among newly delivered mothers. A cross-sectional study conducted in convenient sample of 52 PHCCs belonging to 13 health directorates (Kirkuk, Salahadin, Diyala, Anbar, Baghdad/ Karkh, Baghdad/ Rusafa, Babel, Karbala, Najaf, Wasit, Diwanayah, Muthanna and Dhi Qar). The (1608) mothers within the first six weeks after giving birth who attended to PHCCs were included. Basic socio-demographic variables were compiled using a form that was filled through direct interview. PPD was assessed using Edinburg Postnatal Depression Scale with cutoff point  $\geq 12$ . Data was collected during the period from October 1 to November 30 on 2019. The prevalence of PPD was 37.4%. The depressed mothers were significantly associated with; Age of mother and her husband, insufficient income family, neonatal complications, history of infertility, pregnancy complications, unplanned pregnancy, inadequate family care, family discord or domestic violence, history of depression or anxiety symptoms before or during pregnancy, and family history of mental disorders. The determinants of PPD were (inadequate family support, pregnancy complications, neonatal complications, family discord or domestic violence, psychological symptoms before or during the pregnancy and family history of mental disorders). PPD is a common illness and associated with many physical, social and psychological factors, it is not highlighted by society and health service providers, which requires spreading community awareness of the mental health concepts and increases the ability of health services provider to assess the mental health of pregnant mothers and manage mental disorders accompanying them.



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## 1. Introduction

Depression is a common mental disorder, affects about 121 million people worldwide. It is an important risk factor for suicide, particularly affecting adolescents and women during reproductive age [1]. Pregnancy is a significant event in woman's life and is associated with psychological and biological changes [2]. Antenatal and postnatal care traditionally neglects the emotional and psychological health and focuses on the physical health [3].

Postpartum depression (PPD) is defined as a mood disorder that affects a woman after giving birth [4]. Its diagnosis was based on a person's symptoms. Most of the women experience a brief period of unhappiness or worry after childbirth, but PPD should be suspected when a woman complains from severe symptoms of extreme sadness, anxiety, crying episodes, low energy, irritability, and changes in sleeping or eating patterns. These symptoms last over two weeks and typically onset between one week and one month from delivery [5].

The salient features of PPD include:

- PPD is a serious under-recognized public health problem, making a substantial contribution to maternal and infant morbidity and mortality.
- One in five newborn's mother experiences significant mental health problems, the most common of which are depression and anxiety states.
- Newborn's Mothers with PPD are less able to care for themselves and their infants, whose survival, health and development could be then compromised.
- PPD can affect the health and development of children; it may predict poor growth and high risk of diarrhea in infants, which may reduce child survival.
- Recognition of depression during the postnatal period can be done with simple, reliable, and affordable tools.

The exact cause of PPD is unclear and believed to be a combination of emotional and physical factors. These may include factors such as hormonal changes, sleep deprivation, a prior episode of PPD, bipolar disorder, a family history of depression, psychological stress, complications of childbirth, lack of support, or a drug use disorder [6].

The PPD represents a considerable public health problem that affects the whole family. Its effects on marital relationship and children as well as the mother make it an important condition to prevent, diagnose, and treat [6]. Untreated PPD can have adverse long-term effects; for the mother, it may be the precursor of chronic recurrent depression and for her children, ongoing depression can contribute to emotional, behavioral, cognitive and interpersonal problems in later life [7].

### Objectives:

- To estimate the prevalence of PPD among a sample newly delivered mothers attending PHCCs in Iraq, 2019.
- To identify the determinants of PPD among those mothers.

## 2. METHODS

A cross-sectional study with analytic component was conducted in convenient sample of 52 PHCCs

belonging to 13 health directorates (Kirkuk, Salahadin, Diyala, Anbar, Baghdad / Karkh, Baghdad / Rusafa, Babel, Karbala, Najaf, Wasit, Diwaniyah, Muthanna and Dhi Qar). All mothers within the first six weeks after delivery who attended the selected PHCCs and meeting the eligibility criteria were informed about the purpose of the study and those who agreed to participate were given an informed consent and enrolled in the study.

Inclusion criteria: All mothers after giving birth who attended the selected PHCCs and accepted to participate in this study

Exclusion criteria: Any mother within the first six weeks after delivery, who complained from any of following conditions were excluded from the study:

- History of chronic disease such as (diabetes mellitus, hypertension, renal disease, liver disease, thyroid disease, malignancy).
- A recent history of psychological trauma (DSM-IV; defines trauma as a direct personal experience of an event that involves actual or threatened death or serious injury) [8].
- Diagnosed physical or learning disability.
- Known cases of depression.

The total number of mothers who participated in this study was 1608. A structured questionnaire was developed by Mental Health Section/ NCDs Department, General Directorate of Public Health, MoH after reviewing related studies, required data was collected Data was collected during the period from October 1 to November 30 of 2019 through direct interview by trained healthcare workers in psychosocial units with assistance of healthcare worker in immunization, maternal and child health units in selected PHCCs. The data collected to gather the following:

- Age of participant and age of her husband
- Educational level of participant and her husband is classified into illiterate or primary school, secondary school, and higher education
- Occupation is classified into employer and housewife.
- Family income was divided into three categories; insufficient, sufficient, and more than sufficient based on a subjective estimation of participants.
- Smoking (cigarettes and shisha) is classified into three types; current smoker, ex-smoker, and non-smoker.
  - Current smoker: individual who has smoked greater than 100 cigarettes in their lifetime and currently smokes at least monthly.
  - Ex-smoker: individual who has smoked greater than 100 cigarettes in their lifetime and does not smoke at last month.
  - Non-smoker: individual who has smoked less than 100 cigarettes in their lifetime and does not currently smoke [9].
- Mode of delivery is divided into normal vaginal delivery and caesarian section.
- Neonatal complications: The participants asked about the following health problems of their last child (prematurity, low birth weight, asphyxia, congenital anomalies, septicemia, hypoglycemia, jaundice, and any acute infections).
- Antenatal care is classified into no visit, one to three visits, and four visits or more [10].
- complications during the last pregnancy: the participants asked about the following health problems during the last pregnancy (gestational diabetes mellitus, heart diseases, hyperemesis gravidarum, antepartum hemorrhage, preeclampsia, eclampsia, preterm delivery)
- Infertility is divided into; primary infertility when a woman is unable to ever bear a child, either due

to the inability to become pregnant or the inability to carry a pregnancy to a live birth, and secondary infertility when a woman is unable to bear a child, either due to the inability to become pregnant or the inability to carry a pregnancy to a live birth following either a previous pregnancy or a previous ability to carry a pregnancy to a live birth [11].

Unintended pregnancy or unwanted pregnancy is defined as pregnancy that is reported to have been either unwanted (that is, the pregnancy occurred when no children, or no more children, were desired) or mistimed (that is, the pregnancy occurred earlier than desired). It is a core concept that is used to better understand the fertility of populations and the unmet need for contraception (birth control) and family planning.

Family support after delivery: The participants asked about family support from their parents or husbands after delivery, and it described subjectively by participants as adequate and inadequate family support

Domestic violence is defined as a pattern of abusive and threatening behaviors that may include physical, emotional, economic and sexual violence as well as intimidation, isolation and coercion. The purpose of it is to establish and exert power and control over another; men most often use it against their intimate partners [12].

Anxiety or depression symptoms before or during the last pregnancy: these symptoms included: persistent fear or tension, anger or persistent emotion, persistent sadness, fatigue without reason, worthless or suicide ideation, insomnia, and eating and sleeping disorders [13].

Family history of mental disorders: The participants were asked whether any of their family members had a diagnosed mental disorder.

Screening of PPD: by using the Edinburgh Postnatal Depression Scale (EPDS), the instrument was designed to screen for PPD [14].

Edinburgh Postnatal Depression Scale (EPDS) is a 10-item scale that designed to screen PPD [14]. It is the most widely used and validated screening questionnaire for PPD [15]. For each item, women are asked to select one of four responses that most closely describe how they have felt over the past 7 days. Each response has a value between 0 and 3; scores for the 10 items are summed to give a total score between 0 and 30. The cut-off point to indicate the presence of depression is  $\geq 12$ . At this cut-off point, the sensitivity of this scale for identification of major depression has been found to be  $>95\%$  with a specificity of  $> 95\%$  and the consistency was at level of 0.83 [16].

Pilot study: The pilot study carried out in Al Salam PHCC of Baghdad/ Al-Karkh DoH, and involved 10 mothers within 6 weeks after delivery before starting data collection, to test the clarity and applicability of the study tool, the time needed for filling the questionnaire and to address the difficulties that may be faced during the study.

### **2.1 Data Management and Statistical Analysis:**

The data were coded and each questionnaire assigned with a serial identifying number when the data entered and analysis by the researcher using Statistical Package for Social Sciences (SPSS v.21).

The data were presented as frequency table, pie and bar charts.

Chi-square test applied to test the association between categorical data.

Logistic regression analysis was applied using PPD as the dependent variable and the variables that showed significant association in the binary analysis as the independent variables.

The level of significance was set at a P value of  $< 0.05$ .

### **2.2 Official and Ethical Consideration:**

The official approval was granted from:

- NCDs Department, General Directorate of Public Health, MoH-Iraq
- Verbal consent was obtained from the participants.
- All personal information was kept anonymous and not be divulged except for the study purpose.

### **3. RESULTS**

The total number of mothers who participated in this study was 1608. They were distributed in 52 PHCCs in 13 different DoH in Iraq. The highest proportion of participants was found in age group 25 - 34 years (44.7%). Around 40% of participants were illiterate or finished the primary school. The highest proportions of participants (74.2%) were housewives and 73% had more than one child. Family income was subjectively considered insufficient in 22.2% of participants. The vast majority of mothers who included in this study were non-smokers (95.1%) and others either current or ex-smoker.

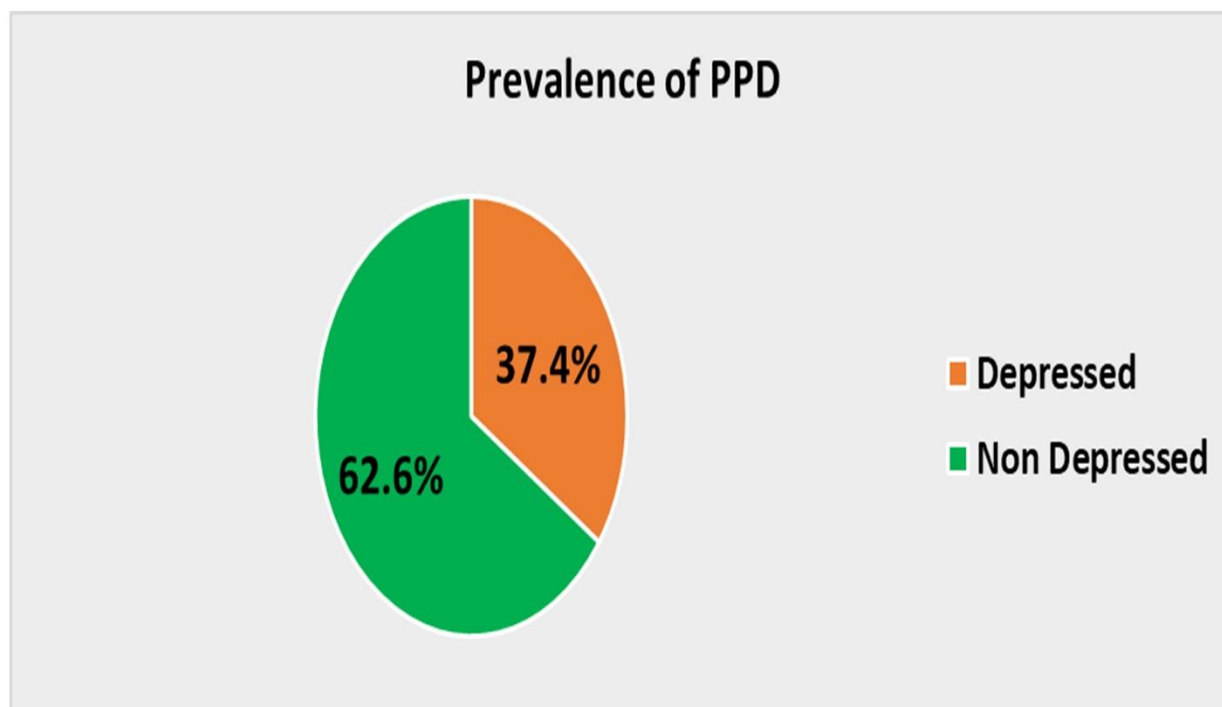
Regarding reproductive health; about 34% of participants had delivered their last child by cesarean section and about 6.6% of newborn child suffered from neonatal complications as (prematurity, asphyxia, congenital anomaly, septicemia, hypoglycemia, respiratory distress syndrome, jaundice, and severe infections) after delivery. The proportion of male newborn delivered by the participants was slightly more than that of female children (52.5%).

Mother without previous child was represented 16.7% of study sample, those with child aged 1 year and 2 years represented (23.9%, 27.3%) respectively and those of 3 years or more child represent 32.1%. The 20.8% of participants not received antenatal care and 31.9% of them not complete antenatal care visits (four visits) during the last pregnancy. About 17% of participants had history of infertility (primary or secondary infertility) before the last pregnancy and 65.4% suffered from complications as gestational diabetes mellitus, heart diseases, hyperemesis gravidarum, antepartum hemorrhage, preeclampsia, eclampsia, preterm delivery...etc. during their last pregnancy and 35% of the study participants reported that the last pregnancy was unwanted.

About 17% of participants had inadequate family support from their parents or husbands after delivery, and 27% of participants had emotional problems or domestic violence with their husbands or other close relatives. Considering mental health state, about 39% of participants suffered from symptoms of depression or anxiety before or during the last pregnancy, and 9.6% of them had family history of mental disorders.

#### **3.1 Prevalence of PPD:**

The prevalence of PPD among participants was 37.4% (33.8 – 38.9) 95% C.I. (Figure 1).



**Figure 1:** Prevalence of PPD among the study participants

The highest prevalence of PPD was found among participants aged  $\geq 45$  years (62.5%) with significant association ( $P=0.009$ ). We noticed that there was a significant association ( $P=0.001$ ) between prevalence of PPD and family income, about half of participants with PPD had insufficient income (48.5%). There was no significant association between prevalence of PPD and participants educational level, it is occupation, and their children number ( $P \geq 0.05$ ), and the highest prevalence of PPD was seen among current smoker's mothers (47.7%) with no significant association ( $P=0.166$ ) between PPD and smoking. See Table 1.

**Table 1:** Distribution of the study group by PPD and participant's characteristics

Variable	PPD		Total (%) n=1608	P- Value
	Yes (%) n= 601	No (%) n= 1007		
<b>Age group (Years)</b>				
15 - 24	204 (33.7)	402 (66.3)	606 (37.7)	<b>0.009</b>
25 - 34	272 (37.9)	446 (62.1)	718 (44.7)	
35 - 44	115 (42.9)	153 (57.1)	268 (16.7)	
$\geq 45$	10 (62.5)	6 (37.5)	16 (1.0)	
<b>Husband age group (Years)</b>				
15 - 24	66 (29.6)	157 (70.4)	223 (13.9)	<b>0.003</b>
25 - 34	267 (35.8)	479 (64.2)	746 (46.4)	
35 - 44	190 (40.3)	281 (59.7)	471 (29.3)	
$\geq 45$	78 (46.4)	90 (53.6)	168 (10.4)	
<b>Educational level</b>				
Illiterate or Primary School	243 (38.2)	393 (61.8)	636 (39.6)	0.652
Secondary School	230 (36.0)	409 (64.0)	639 (39.7)	
Higher Education	128 (38.4)	205 (61.6)	333 (20.7)	
<b>Husband Educational level</b>				

Illiterate or Primary School	214 (40.7)	312 (59.3)	526 (32.7)	0.097
Secondary School	245 (37.0)	418 (63.0)	663 (41.2)	
Higher Education	142 (33.9)	277 (66.1)	419 (26.1)	
<b>Occupation</b>				
Employer	160 (38.6)	255 (61.4)	415 (25.8)	0.596
Housewife	441 (37.0)	752 (63.0)	1193 (74.2)	
<b>Smoking</b>				
Non smoker	564 (36.9)	966 (63.1)	1530 (95.1)	0.166
Current smoker	31 (47.7)	34 (52.3)	65 (4.0)	
Ex-smoker	6 (46.2)	7 (53.8)	13 (0.9)	
<b>Number of Children</b>				
One	148 (34.1)	286 (65.9)	434 (27.0)	0.104
More than one	453 (38.6)	721 (61.4)	1174 (73.0)	
<b>Monthly income</b>				
Insufficient	173 (48.5)	184 (51.5)	357 (22.2)	<b>0.001</b>
Sufficient	320 (33.5)	634 (66.5)	954 (59.3)	
More than sufficient	108 (36.4)	189 (63.5)	297 (18.5)	

We noticed that the prevalence of PPD increased with the increase age of participant's husbands and the highest prevalence of PPD was seen among  $\geq 45$  years age group (46.4%) with significant association ( $P=0.003$ ) between aging of participants' husbands and prevalence of PPD. No significant association found between prevalence of PPD and the level of education of participants' husbands ( $P \geq 0.05$ ).

Table 2 shows; the highest prevalence of PPD (40.3%) was seen among participants who had delivered their last child by cesarean section with no significant association between mode of delivery and prevalence of PPD ( $P=0.083$ ). We found that more than half of participants (58.5%) who had children suffered from neonatal complications were complaining from PPD with a significant association ( $P=0.001$ ) between neonatal complications and prevalence of PPD.

**Table 2:** Distribution of the study group by PPD and certain obstetrical factors

Variable	PPD		Total (%) n=1608	P- Value
	Yes (%) n= 601	No (%) n= 1007		
<b>Mode Of Delivery</b>				
NVD	379 (35.9)	678 (64.1)	1057 (65.7)	0.083
C/S	222 (40.3)	329 (59.7)	551 (34.3)	
<b>Child Gender</b>				
Male	304 (36.0)	541 (64.0)	845 (52.5)	0.235
Female	297 (38.9)	466 (61.1)	763 (47.5)	
<b>Neonatal Complications</b>				
Yes	65 (58.5)	46 (41.5)	111 (6.9)	<b>0.001</b>
No	493 (32.9)	1004 (67.1)	1497 (93.1)	
<b>Age of The Previous Child (Years)</b>				
No Previous Child	91 (34.0)	177 (66.0)	268 (16.7)	0.604

< 1 Year	146 (37.9)	239 (62.1)	385 (23.9)	
1 - 2 Years	171 (39.0)	268 (61.0)	439 (27.3)	
≥ 3 Years	193 (37.4)	323 (62.6)	516 (32.1)	
<b>Antenatal Care</b>				
No Visit	125 (37.3)	210 (62.7)	335 (20.8)	0.967
1 - 3 Visits	194 (37.8)	319 (62.2)	219 (31.9)	
≥ 4 Visits	282 (37.1)	478 (62.9)	760 (47.3)	
<b>History of infertility (primary or secondary)</b>				
Yes	122 (44.5)	152 (55.5)	274 (17.0)	0.008
No	479 (35.9)	855 (64.1)	1334 (83.0)	
<b>Complications During Pregnancy</b>				
Yes	463 (44.0)	589 (56.0)	1052 (65.4)	0.001
No	138 (24.8)	418 (75.2)	556 (34.6)	
<b>Unwanted Pregnancy</b>				
Yes	244 (42.9)	325 (57.1)	569 (35.4)	0.001
No	357 (34.4)	682 (65.6)	1039 (64.6)	

The highest prevalence of PPD was seen among mothers who had a child of one to two year old (39%) with no significant association ( $P=0.604$ ) between age of the last child and prevalence of PPD.

Regarding the association between PPD and antenatal care, we found that the highest prevalence of PPD was found among participants of irregular or not had antenatal care (37.8%, 37.3% respectively) with no significant association ( $P=0.967$ ) between prevalence of PPD and antenatal care. Also the highest prevalence of PPD was seen in mothers with previous history of infertility and mothers who suffered from complications during their last pregnancy (44.5% and 44% respectively) with a statistically significant association between history of infertility, pregnancy complications and increased prevalence of PPD ( $P=0.008$ ,  $P=0.001$  respectively).

We also noticed that 42.9% of participants who didn't want the last pregnancy complained from PPD with a significant association ( $P=0.001$ ) between unwanted pregnancy and prevalence of PPD. There was no significant association found between prevalence of PPD and gender of the last child ( $P \geq 0.05$ ).

Table 3 shows; regarding the association between prevalence of PPD and family support after delivery, 50.7% of participants who had inadequate family support from their parents or husbands after delivery were complaining from PPD with a statistically significant association ( $P=0.001$ ) between family support and increased prevalence of PPD. We noticed that more than half proportion of participants who had emotional problems or domestic violence with their husbands or other close relatives suffered from PPD (51.4%) with a significant association ( $P=0.001$ ) between emotional problems and increased prevalence of PPD.

**Table 3:** The association between PPD and mental health status of participants

Variable	PPD		Total (%) n= 1608	P- value
	YES (%) n= 601	NO (%) n= 1007		
<b>Family Support After Delivery</b>				
Yes	461 (34.6)	871 (65.4)	1332 (82.8)	0.001



No	140 (50.7)	136 (49.3)	276 (17.2)	
<b>Emotional Problems or Domestic Violence</b>				
Yes	223 (51.4)	211 (48.6)	434 (27.0)	<b>0.001</b>
No	378 (32.2)	796 (67.8)	1174 (73.0)	
<b>Previous symptoms of Depression or Anxiety</b>				
Yes	367 (58.5)	260 (41.5)	627 (39.0)	<b>0.001</b>
No	234 (23.9)	747 (76.1)	981 (60.0)	
<b>Family History of Mental Disorders</b>				
Yes	109 (70.3)	46 (29.7)	155 (9.6)	<b>0.001</b>
No	492 (33.9)	961 (66.1)	1453 (90.4)	

Concerning the association between prevalence of PPD and previous depression or anxiety before or during the last pregnancy, we found that 58.5% of participants who had a history of depression or anxiety were suffered from PPD with a statistically significant association (P=0.001) between the previous history of depression and increased prevalence of PPD.

The highest proportion of participants with PPD was seen in participants with a positive family history of mental disorders (70.3%) with significant association (P=0.001) between positive family history of mental disorders and increased prevalence of PPD.

Table 4 shows; by using binary logistic regression analysis, six factors were found to be the determinants factors of PPD. These factors were participant's history of mental disorder, neonatal complications, family history of mental disorders, inadequate family support, pregnancy complications, emotional problems with husbands and important persons.

**Table 4:** Determinants of PPD by logistic regression analysis

Factors	Odds ratio	95% C.I.		P - Value
		lower	upper	
<b>History of mental disorder</b>	3.485	2.767	4.390	0.001
<b>Neonatal complications</b>	3.144	1.520	6.503	0.001
<b>Family history of mental disorders</b>	3.020	2.038	4.476	0.001
<b>Inadequate family support</b>	2.288	1.392	3.759	0.001
<b>Pregnancy complications</b>	1.746	1.364	2.235	0.001
<b>Domestic discord</b>	1.324	1.022	1.716	0.034

#### 4. DISCUSSION

The objective of this study was to estimate the prevalence of PPD among 1608 newly delivered mothers attending 52 PHCCs in Iraq, 2019 and to identify the determinants of PPD among them. It illustrates that the prevalence of PPD was 37.4% by using Edinberg Postnatal Depression Scale (EPDS) with cutoff point 12 [14], [15], which is regarded as a gold standard and the most commonly self-rated scale used [15], [16]. Iranian study in 2017 [17] and Saudi study in 2014 [18] revealed lower results (33.4% and 33.2% respectively). Nearly similar results were found in a study conducted in Bahrain 2012 and another one in the USA 2007 when the prevalence of PPD was (37.1% and 39% respectively) [19], [20].

Lower results observed in a number of studies as, a Chinese study 2014 (27.3%) [21], Canadian study in 2005 where PDD was ranging between 10% and 20% [22]. An American study in 2006 reported a prevalence of PPD was 15.4% and the mean prevalence rate in the United Kingdom was 12.8% [23]. These

wide differences in the results obtained from different studies might be attributed to the tools and timing of the PPD survey in each study (might obtained in an earlier or late time) [24] and might be attributed to the possible contribution of socioeconomic differences between different populations.

Another significant determinant was the family income as about half of women with PPD had insufficient income (48.5%). This was agreed to a study in Japan (2011) which showed that income from employment status was associated with a reduced risk of PPD [25]. Also another study conducted in Taiwan (2012) showed that low income is associated with the risk of PPD, which agreed to that noticed in the current study [26] and finally to American study in 2007 which revealed that women with high income (\$70,000 annually) had four times lower risk of developing PPD than women with low incomes [27]. This might be attributed to limited financial means for domestic's needs especially infant requirements provide a high amount of stress for the mother, which can lead to depression.

More than half of mothers (58.5%) complained from PPD had children suffered from neonatal complications; making neonatal complications as one of the significant determinant of PPD. This is consistent with studies in India (2014) [28] and Sweden (2008). They found that neonatal complications like severe birth asphyxia, preterm birth, and perinatal death were significantly related to risk of PPD [29]. These neonatal complications might create a considerable sense of fear in those mothers from losing the child that make her at risk for PDD development. This factor was a significant, independent and un-confounded risk factor for PPD.

Those mothers who had a history of infertility and pregnancy complications (44.5% and 44% respectively) were significantly associated with increased prevalence of PPD. Different results observed in a local study in Iraq 2015 [30] in which 60% had history of infertility most of them had primary infertility and 8% had early pregnancy complications. Our results are in agreement with two Australian studies, one in 2012 and the other done in 2013 [31] and also similar to a Canadian study in 2004 [32]. The considerable sense of fear from losing the child might have explained the association with PPD.

Less than half of participants (42.9%) who didn't want the last pregnancy were significantly complained from PPD. This was similar to the finding noticed in an Iranian study in 2014 where they found a significant relationship between unplanned pregnancy and PPD [33]. Similarly, findings were reported from study in USA (2006) [34]. Pregnancy and childbirth as pathological stress are known to human. But, if the pregnancy is unplanned, the problems get complicated as unwanted pregnancy can lead to a state of rejection of baby and followed by many psychological and physical problems to the mother.

PPD was found to be associated with family support. PPD in the current study noticed in 50.7% of participants who had inadequate family support (parents or husbands). Similar results were concluded by Canadian researchers in their study in 2010 who noticed that lack of postnatal family care is an important risk factor of PPD [35]. Similar findings were reported in a study on Chinese women in Canada in 2011 [36]. This might emphasize the importance of the relationship with the husband and its role in postpartum disorders, especially depression. This factor was a significant, independent and un-confounded risk factor for PPD. In addition, more than half of participants who had emotional problems or domestic violence with their husbands or other close relatives (51.4%) were significantly suffered from PPD. This is in agreement with two studies conducted in India (2014) [28] and UK 2012 [31] which reveals that marital discord or intimate partner violence has negative impact on postpartum mental health. In Sweden (2005) they found that single mothers or those women not in contact with the father of the child are at increased risk of PPD [37]. This factor was a significant, independent and un-confounded risk factor for PPD.

Previous depression or anxiety was a significant determinant of PPD in this study as 58.5% of the participants who had a history of depression or anxiety before or during the pregnancy suffered from PPD. Previous history of depression or anxiety is among the factors that are associated with a higher risk of PPD as reported in study conducted in Canada 2011 where they found that a history of depression and anxiety predicted women to be at an increased risk of PPD development [38]. Other study done in Iran 2009 also considered history of depression or anxiety as a powerful factor in PPD [39]. The occurrence of mental disorders such as depression during pregnancy is a powerful factor in predicting PPD as stated by a study conducted in the USA 2010 [40].

Finally, positive family history of mental disorders was significantly associated with PPD, where 70.3% of those with positive family history developed PPD later. This is similar to a study done in Saudi Arabia in 2014 that found family history of depression as the strongest predictor of PPD [41]. A study in India (2014) revealed a completely different result as considered family history of psychiatric disorder as a non-significant factor [28]. This factor was a significant, independent and un-confounded risk factor for PPD.

## 5. CONCLUSIONS

1. More than one third of newly delivered mothers were complaining of PPD.
2. The most vulnerable mothers to PPD were those who had:
  - a. Born children suffering from neonatal complications
  - b. Symptoms of depression or anxiety before or during the pregnancy
  - c. Inadequate family care
  - d. Pregnancy complications
  - e. Family history of mental disorders
  - f. Family discord or domestic violence

## 6. RECOMMENDATIONS

- Spreading of community awareness for mental health concepts on a wider scale.
- Promotional and preventive interventions to reduce the prevalence of PPD through:
  - o Emphasize the importance of the counseling before the marriage as well as before and during the pregnancy and educate the couples on the importance of family planning
  - o Mental health assessment of mothers through the antenatal care program in PHCCs.
  - o Early detection of mental disorders among the most vulnerable mothers and activating the referral system to Psycho-social Health Units in PHCCs to provide the necessary managements.
  - o Family education about providing adequate health care to the mother and her child during and after the pregnancy.
- Integrating mental health care into maternal and child health programs at primary and secondary level of health care
- Integrating mental health services with governmental and non-governmental institutions to promote women's empowerment programs.
- Insure woman's rights and reduce all types of violence like physical, psychological, sexual, and economical.

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