

1 **Prevalence and risk factors of postpartum depression**
2 **among women living in urban slums of Dhaka, Bangladesh**

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25 **Abstract**

26 Postpartum depression (PPD) is a serious public health concern and known to have
27 the adverse effects on mother's perinatal wellbeing; and child's physical and cognitive
28 development. There were limited literatures on PPD in Bangladesh, especially in urban slum
29 context. The aim of this study was to assess the burden and risk factors of PPD among the
30 urban slum women. A cross-sectional study was conducted between November-December
31 2017 in three urban slums on 376 women within first 12 months of postpartum. A validated
32 Bangla version of Edinburgh Postnatal Depression Scale was used to measure the depression
33 status. Respondent's socio-economic characteristics and other risk factors were collected with
34 structured validated questionnaire by trained interviewers. Unadjusted Prevalence Ratio (PR)
35 and Adjusted Prevalence Ratio (APR) were estimated with Generalized Linear Model (GLM)
36 and Generalized Estimating Equation (GEE) respectively to identify the risk factors of PPD.
37 The prevalence of PPD was 39.4% within first 12 months following the child birth. Job
38 involvement after child delivery (APR=1.9, 95% CI= 1.1, 3.3), job loss due to pregnancy
39 (APR=1.5, 95% CI= 1.0, 2.1), perinatal and postnatal death (APR=1.4, 95% CI= 0.97, 2.0),
40 unintended pregnancy (APR=1.8, 95% CI= 1.3, 2.5), management of delivery cost by
41 borrowing, selling or mortgaging assets (APR=1.3, 95% CI= 0.94, 1.9), depressive symptom
42 during pregnancy (APR=2.5, 95% CI= 1.7, 3.8) and intimate partner violence (APR=2.0, 95%
43 CI= 1.2, 3.3), were identified as risk factors. PPD was not associated with poverty, mother in
44 law and any child related factors. The burden of postpartum depression is high in the urban
45 slum of Bangladesh. Maternal mental health services should be integrated with existing
46 maternal health services. Research is required for the innovation of effective, low cost and
47 culturally appropriate PPD case management and preventive intervention in urban slum of
48 Bangladesh.

49

50 **Introduction**

51 Postpartum depression (PPD) is a common, non-psychotic mood or mental disorder
52 which typically manifests in mothers within one year of delivery (first year postpartum) [1, 2].
53 Globally, the prevalence of PPD among mothers ranges from 0.5% to 60.8% [3]. In
54 comparison to women of developed countries, women of developing countries showed higher
55 rates of PPD [4]. A systematic review of 28 developed countries reported that the prevalence
56 PPD symptom (PPDS) was 6-13% among women in high income nations [5]. An independent
57 systematic review on low and middle income countries (LMIC) found the prevalence of
58 postpartum common mental disorder was approximately 20% [6]. Asian countries reported
59 between 3.5-63.3% prevalence rates of depression in postpartum women [7]. In India the
60 prevalence of depression varied from 11% to 16% within fourteen weeks of delivery [8].
61 Several studies conducted in rural Bangladesh found the prevalence of PPD ranged from 18%
62 to 35% among rural women [1, 2, 9].

63

64 There are various factors causing PPD that affects women of all ages, education
65 levels, races, and ethnicities [10]. Globally, preterm or low birth-weight infants,
66 unemployment, poor social or emotional support, housing problems, first-born child, sleep
67 disturbances, low self-esteem, antenatal depression or anxiety, history of domestic abuse,
68 major adverse life events in preceding one year, perfectionism and level of daily hassles are
69 strong predictors of PPD among women [11, 12]. The risk factors identified in the rural areas
70 of Bangladesh were low economic status, nutritional status, physical violence, domestic
71 quarrels with husband and in laws, stress, past mental and depressive symptoms during

72 pregnancy, perinatal death, poor relationship between husband and in laws, morbidity during
73 pregnancy, and current health condition [1, 2, 13, 14].

74

75 PPD has negative impacts on children's physical health. Existing literature of LMICs
76 suggests that PPD leads to poor infant feeding practices, consequently leading to malnutrition
77 and reduced physical growth [15, 16]. The effects of PDD are not limited to physical
78 symptoms but can also impact the mental health of the affected mothers' child. PDD leads to
79 the lower levels of interaction and bonding between the mother and child, which leads to
80 inadequate social, emotional and cognitive development of the child [17, 18]. Research also
81 suggested that repeated level of depression leads to high level of chronic stress at the later age
82 [17]. Further, PPD has a harmful impact on the family and social life [19].

83

84 In Bangladesh, mental health is a neglected topic and there is very little research on
85 postpartum depression, especially on the prevalence and the risk factors of PPD. Only one
86 qualitative study of PPD in urban slum populations was found and it focused on the cultural
87 attitude towards PPD. Of the 36 women interviewed, 17 women were suffering from PPD
88 [20]. In this study women mentioned that financial crises, adverse life events, intimate partner
89 violence, health problems, and lack of practical social support were the reported causes of
90 postpartum emotional distress and sadness [20].

91

92 The population of urban Dhaka was estimated to be approximately 17 million in
93 2015 [21] and nearly one third of the population Dhaka city inhabit slums [22]. Within the
94 next 14 years the urban population will increase by 50% due to rapid urbanization [23]. The
95 status of PPD in women in urban slums has received less attention than the rural populations

96 of Bangladesh, furthermore the prevalence and associated risk factors for PPD in slum areas
97 were unknown. The objective of this proposed study was to assess the burden and risk factors
98 of PPD among women living in urban slums of Dhaka, Bangladesh.

99

100 **Materials and methods**

101 **Study design and setting**

102 A cross-sectional study was conducted in three selected large slums from different
103 geographical representative areas in Dhaka city. These slums included the Korail slum in
104 Gulshan, the Sattala slum in Mohakhali, and the Mohammadpur slum in Mohammadpur.
105 Three different slums were selected to address the lack of variation that could arise from
106 selecting only one slum population.

107

108 **Study participants, sample size and sampling strategy**

109 The study population was postpartum mothers with a child under the age of one year
110 living in urban slums. Considering 22% PPD prevalence in rural area of Bangladesh [1]; and
111 with 4.2% margin of error and 95% level of significance, the calculated sample size was 374.
112 We divided each slum into different sectors and visited all households of each sector and
113 searched the post-partum mothers according to our inclusion criteria. If mothers were found,
114 present and agreed to participate our study then we interviewed those mothers. We visited and
115 searched for study participants in all household of Sattala and Korail slum; and partially some
116 sectors of Mohammadpur slum; and ended up with 376 interviews of postpartum mothers.

117

118 **Data collection**

119 The data were collected between November and December 2017. The data collection team
120 included four research team members and four research assistants with backgrounds in social
121 sciences. Experienced research psychologist, gender experts and maternal and child health
122 (MCH) experts intensively trained the data collection team. Each day after data collection a
123 team meeting was held and filled questionnaires were cross-checked. Possible erratic
124 responses were identified, discussed and corrected.

125

126 **Outcome measure**

127 The Edinburgh Postnatal Depression Scale (EPDS) was used to detect depressive
128 symptoms during the postpartum period [24]. EPDS is a 10-item questionnaire assessing the
129 interviewee's depressive feelings from the seven days before the interview. The response of
130 the questions is scored from 0-3, with higher scores indicating higher levels of depressive
131 symptoms. The total EPDS score of a respondent can range from 0 to 30. Cox et al. (1987)
132 proposed a cutoff level ten (≥ 10) to reduce the detection failure of PPD. In Bangladesh, a
133 validation study showed 89% sensitivity, 87% specificity, 40% positive predictive value and
134 99% negative predictive value of using 10 as the cutoff score [25]. Another follow-up study of
135 EPDS usage in Bangladesh demonstrated good reliability with Cronbach's alpha 0.70 and
136 0.75 [2]. In this study greater than the 10 cutoff value of EPDS scale will be used to screen
137 PPD.

138

139 **Risk factors**

140 The validated tools of Bangladesh Demographic and Health Survey
141 (BDHS), Bangladesh Urban Health Survey (BUHS) and WHO Domestic Violence Against
142 Women were adapted to prepare our tools of the study. The data were collected in the
143 following manner for the analysis of risk factors.

144

145 **Socio-economic characteristics**

146 Socio-demographic information (age, age of marriage, educational status, income
147 generating activities before pregnancy and after pregnancy, etc) and household characteristics
148 (basic household construction, ownership, availability of toilet and water facilities, household
149 belongings, etc) were collected through face-to-face interviews using a standard validated
150 questionnaire. The wealth score of households were computed through principal component
151 analysis using household characteristics of respondents.

152

153 **Pregnancy related factors**

154 Obstetric, reproductive, and child characteristics such as the number of children,
155 history of miscarriage and child death, pregnancy intention, age and sex of last child, reported
156 gestational age and child birth weight, neo-natal complications, ANC and PNC information,
157 mode of delivery (caesarean or normal), cost of delivery, and delivery cost management were
158 collected through standard questions. Gestational ages less than 37 weeks were categorized as
159 pre-term births and birth weights less than 2.5 kg was considered to be low birth weights.

160

161 Each respondent was asked whether she had experienced at least one depressive
162 symptom of EPDS scale during pregnancy period. If their response was positive then we

163 categorized them as depressive symptom started to develop from pregnancy period. We also
164 asked respondents whether family, work or any other form mental stress took place during
165 pregnancy period. This was characterized as perceived antenatal stress.

166

167 **Family support and intimate partner violence**

168 Women's experience of intimate partner violence (IPV) was collected using the
169 domestic violence module of WHO's multicounty study which included Bangladesh [26]. The
170 study divided intimate partner violence into three categories; psychological, physical and
171 sexual. Each respondent was asked if they any type of IPV during their last pregnancy and 12
172 months before the conception.

173

174 Family support was measured by assistance level of mother in law and husband in
175 taking care of children and helping in household chores. This was assessed through likert
176 scale (always, often, sometime, rarely and never). Relationship with husband was assessed by
177 asking the sharing status of personal feelings to husband with similar likert scale.

178

179 **Data analysis**

180 We calculated the descriptive statistics of respondents' background characteristics,
181 PPD status, and other relevant variables. Then we conducted a series of cross-tabulation
182 including the chi-square test to assess the bivariate relationship of PPD and relevant risk
183 factors (p-value of chi square test was not reported in the data table). Simultaneously,
184 Prevalence Ratio (PR) among the different category of risk factors was calculated using
185 Generalized Linear Model (GLM) with poisson family and log link.

186

187 Risk factors identified in the bivariate analysis were analyzed in the multivariate
188 model. Risk factors were added to the multivariate model according to the strength of
189 association in bivariate analysis. Moreover, multi-collinearly and overlapping nature among
190 the variables were considered for selection of risk factors in the multivariate model. Adjusted
191 analysis (clustering and confounder adjustment) was conducted using the Generalized
192 Estimating Equation (GEE). Statistical software STATA version 13 was used in data analysis.

193

194 **Ethical consideration**

195 Prior to the study, ethical approval was taken from the Ethical Review Committee,
196 JPGSPH. Participants were recruited after reading the full statement of consent and signing
197 the Bangla written consent. We referred the depressed mothers or who had the thought of
198 harming herself to the Government's National Mental Institute of Bangladesh.

199

200 **Results**

201 Among the post-partum mothers 25% were adolescents and 32% were illiterate or
202 with just enough skills to sign their names. On the other hand, 15% of mothers attained a
203 secondary level of education and only 1.6% of mothers received a higher education.
204 Approximately half, (48.7%) were first time mothers and 20% had three or more children. The
205 mean number of household members was 4.5 and most of the families (84%) resided in one
206 room. Only 7.7% of mothers were working after delivering their child, but before their most
207 recent pregnancy around 50% of mothers engaged in income generating activities. Among the
208 respondents we interviewed, 22.6% experienced the death of one of their children, or

209 miscarriage, or stillbirth and 68% of respondents planned their most recent pregnancy. About
 210 69% of mothers faced intimate partner violence before their last pregnancy, and 48% faced it
 211 during the pregnancy period as well (Table 1).

212 **Table 1: Respondent's characteristics**

Indicators	n(%), Mean±SD (N=376)
Respondent's age	
13-19	85 (25.2)
20-29	208 (61.7)
30-49	44 (13.1)
Education of respondent	
No education/signed only	119 (31.7)
Primary	193 (51.3)
Secondary or higher	64 (17.0)
No of children	
1	183 (48.7)
2	118 (31.4)
3+	75 (20.0)
Mean number of household members	4.5± 0.09
No of living room	
1	315 (83.8)
2+	61 (16.2)
Currently working	29 (7.7)
Job involvement before pregnancy	187 (49.7)
Job loss due to pregnancy	164 (47.3)
Perinatal death	85 (22.6)
Intended pregnancy	254 (67.6)
Gestational age	
Pre-term birth	58 (15.8)
Term birth	309 (84.2)
Birth weight of last child	
Low birth weight	161 (47.9)
Normal weight	175 (52.1)
Neo-natal complications	78 (21.7)
Cost of child delivery managed by borrowing/sold asset/mortgage	96 (25.5)
Intimate partner violence before last pregnancy*	259 (69.1)

Intimate partner violence during last pregnancy*	179 (47.7)
Postpartum depression status	148 (39.4)
At least one depressive symptom reported to develop during pregnancy	189 (50.3)
Perceived antenatal stress	143 (38.0)

213 *At least one type of psychological, physical or sexual violence

214

215 **Prevalence of postpartum depression**

216 After administration of EPDS scale, 148 (39.4%) mothers out of 376 mothers were
 217 found having postpartum depression. About 50% mothers reported at least one symptom of
 218 EPDS scale developed during pregnancy period and 38% reported any family, working and
 219 other form of mental stress during the pregnancy period (Table 1).

220

221 **Potential risk factors of postpartum depression**

222 The potential risk factors of postpartum depression were organized in following
 223 categories: socio-economic factors; pregnancy related factors and family support and intimate
 224 partner violence (Table2).

225 **Table 2: Bivariate and multivariable association of postpartum depression with socio-**
 226 **economic factors, pregnancy related factors, and family support and intimate partner**
 227 **violence**

Indicators	n	Depressed (%)	Prevalence Ratio (PR) (95% CI)	p-value	Adjusted Prevalence Ratio (APR) [‡] (95% CI)	p-value
Socio-economic factors						
Respondent's age						
13-19	85	32.9	1			

20-29	208	42.3	1.3 (0.8,2.0)	0.249		
30-49	44	54.6	1.7 (0.9,2.6)	0.070		
Wealth quintile						
Poorest	76	40.8	1.2 (0.7, 2.1)	0.453		
Poor	75	49.3	1.5 (0.9, 2.5)	0.130		
Medium	75	34.7	1.0 (0.6, 1.8)	0.889		
Rich	75	38.7	1.2 (0.7, 2.0)	0.587		
Richest	75	33.3	1			
Education of respondent						
No education/signed only	119	48.7	1.8 (1.1,3.2)	0.028	1.2 (0.7,2.1)	0.559
Primary	193	37.8	1.4 (0.8,2.4)	0.189	0.9 (0.5,1.6)	0.687
Secondary or higher	64	26.6	1		1	
Current profession						
Working	29	62.1	1.7 (1.0,2.7)	0.045	1.9 (1.1,3.3)	0.020
Not working	347	37.5	1		1	
Job loss due to pregnancy						
Yes	164	45.7	1.5 (1.1,2.2)	0.018	1.5 (1.0,2.1)	0.040
No	183	30.1	1		1	
No of children						
1	183	33.9	1		1	
2	118	39.8	1.2 (0.8,1.7)	0.403	1.0 (0.7,1.5)	0.982
3+	75	52.0	1.5 (1.0,2.3)	0.036	0.96 (0.6,1.5)	0.843
Pregnancy related factors						
Perinatal and postnatal death						
Yes	85	50.6	1.4 (.98,2.0)	0.062	1.4 (0.97,2.0)	0.073
No	291	36.1	1		1	
Pregnancy type						
Intended pregnancy	254	29.9	1		1	
Unintended pregnancy	122	59.0	2.0 (1.4,2.7)	<0.001	1.8 (1.3,2.5)	0.001
Gestational age						
Pre-term birth	58	48.3	1.3 (0.8,1.9)	0.265		
Term birth	309	38.2	1			
Birth weight of last child						
Low birth weight	161	42.2	1.1 (0.8,1.5)	0.627		

Normal weight	175	38.9	1			
Neo-natal complications						
Yes	78	46.2	1.2 (0.9,1.8)	0.254		
No	281	37.0	1			
Child delivery cost management by borrowing/sold asset/mortgage						
Yes	96	55.2	1.6 (1.2,2.3)	0.005	1.3 (0.94,1.9)	0.108
No	280	33.9	1		1	
Perceived antenatal stress						
Yes	143	65.7	2.8 (2.0,4.0)	<0.001		
No	233	23.2	1			
At least one depressive symptom reported to develop during pregnancy						
Yes	189	61.4	3.6 (2.4,5.3)	<0.001	2.5 (1.7,3.8)	<0.001
No	187	17.1	1		1	
Family support and intimate partner violence						
Mother-in-law take care of child and help in household work						
Always/Often	64	40.6	1			
Sometimes/Rarely/ Never	17	64.7	1.6 (0.8,3.2)	0.196		
Husband take care of child and help in household work						
Always/Often	230	36.5	1			
Sometimes /Rarely/Never	108	50.0	1.4 (0.97,1.9)	0.072		
Share personal feelings with husband						
Always/Often	271	33.2	1			
Sometimes/ Rarely/ Never	67	71.6	2.2 (1.5,3.1)	<0.001		
Intimate partner violence before last pregnancy						
Yes	259	49.4	3.0 (1.9,4.9)	<0.001		
No	116	16.4	1			
Intimate partner violence during last pregnancy						

Yes	179	55.3	2.3 (1.6,3.2)	<0.001		
No	196	24.5	1			
Intimate partner violence before or during pregnancy period						
Yes	260	49.6	3.0 (1.9,4.9)	<0.001	2.0 (1.2,3.3)	0.009
No	116	16.4	1		1	

228 [‡]Estimates adjusted for clustering at slum level and wealth score

229

230 **Bivariate risk factor analysis**

231 **Socio-economic factors**

232 Postpartum depression among the women of urban slum was not associated with
 233 respondent age and wealth quintile($p>0.05$).The prevalence of postpartum depression was
 234 higher in the uneducated group of women (49%) compare to the women (26%) who
 235 completed the secondary of higher level of education($PR=1.8$, $p=0.028$, 95% CI= 1.1,
 236 3.2).The prevalence of depression was more common in currently employed mothers
 237 comparing unemployed mothers ($PR=1.7$, $p=0.045$, 95% CI= 1.0, 2.7).The likelihood of
 238 depression among the mothers who worked before pregnancy but left their work due to
 239 pregnancy is also higher than the likelihood of depression in other groups of mothers ($PR=1.5$,
 240 $p=0.02$, 95% CI= 1.1, 2.2).

241

242 **Pregnancy related factors**

243 Respondents who experienced perinatal or postnatal death (child death, miscarriage
 244 or still birth) had a higher prevalence of postpartum depression ($PR=1.4$, $p=0.06$, 95% CI=
 245 .98, 2.0).Unplanned pregnancy was a major factor of postpartum depression among the study
 246 participants($PR=2.0$, $p<0.001$, 95% CI= 1.4, 2.7).Postpartum depression were not correlated

247 with factors related to the child such as preterm birth ($p=0.265$), low birth weight child
248 ($p=0.627$) and neonatal complication ($p=0.254$). However, the prevalence of depression was
249 60% higher for mothers, whose family arranged the delivery cost by borrowing, selling or
250 through mortgage assets ($p=0.005$). Perceived antenatal stress (family, working or any other
251 mental stress) during pregnancy was another strong predictor of PPD (PR=2.8, $p<0.001$, 95%
252 CI= 2.0, 4.0). PPD was most common among the mothers who had at least one EPDS
253 depressive symptom developed during pregnancy period (PR=3.6, $p<0.001$, 95% CI= 2.4,
254 5.3).

255

256 **Family support and intimate partner violence**

257 Maternal depression was not associated with mother-in-law's support in slum area
258 ($p=0.196$), but depression was fairly associated with the practical support of husband
259 ($p=0.072$). The prevalence of depression was more than two times higher for women who
260 sometimes/never/rarely shared their personal feelings with their husband in comparison to the
261 women who always or often shared their personal feelings with their husband
262 (PR=2.2, $p<0.001$, 95% CI= 2.0, 4.5). Similarly, PPD was most common for women who faced
263 the intimate partner violence both before their recent pregnancy and during the pregnancy
264 period (IPV before pregnancy: PR=3.0, $p<0.001$, 95% CI= 1.9, 4.9) (IPV during pregnancy:
265 PR=2.3, $p<0.001$, 95% CI= 1.6, 3.2).

266

267 **Multivariable risk factor analysis**

268 After inclusion of all relevant factors in multivariate regression model, the risk
269 estimates slightly reduced but remained significant for current job involvement, job loss due
270 to pregnancy, unintended pregnancy, development of depressive symptoms during pregnancy

271 period, and intimate partner violence. In the full model, the adjusted prevalence of depression
272 was almost 2 times higher (APR=1.9, p=0.02, 95% CI=1.1, 3.3) for those who had some form
273 of employment, 50% higher for those who quit their job due to pregnancy (APR=1.5, p=0.04,
274 95% CI=1.0, 2.1). For the postpartum mothers who conceived unintentionally the adjusted
275 prevalence of depression was 80% higher (APR=1.8, p=0.001, 95% CI= 1.3, 2.5). The
276 adjusted prevalence of postpartum depression was about 2.5 times higher among the women
277 who reported to develop the depressive symptom during the pregnancy period (APR=2.5,
278 p<0.001, 95% CI= 1.7, 3.8). The adjusted prevalence of depression was 2 times higher
279 (APR=2.0, p=0.009, 95% CI= 1.2, 3.3) among the postpartum mothers who faced intimate
280 partner violence before child birth.

281

282 However, other risk factors, i.e., delivery cost management by borrowing/sold
283 asset/mortgage (APR=1.3, 95% CI=.94, 1.9) and perinatal and postnatal child death
284 (APR=1.4, 95% CI=.97, 2.0) were closely significant at 5% level of significance, which may
285 be significant for larger samples of postpartum mothers in urban slum.

286

287 **Discussion**

288 This study explored the burden of postpartum depression and the associated factors in
289 slum areas. Our study results show that about 40 women out of 100 women were suffering
290 from PPD and the associated risk factors were current job involvement, job loss due to
291 pregnancy, perinatal and postnatal death, unintended pregnancy, cost of delivery managed
292 from borrowing/selling asset/mortgage, depressive symptom during pregnancy period,
293 perceived antenatal stress, poor marital relationship with husband, and intimate partner
294 violence.

295

296 The burden of PPD in women who inhabited slums was higher in comparison that of
297 postpartum mothers living in rural areas [1, 2, 9]. Existing mental disorder data of urban slum
298 women also suggested the higher level of mental disease burden in slum area. In one recent
299 study at an urban slum, Khan et al. found that 46% mothers with children under the age of
300 five suffered from common mental disorders [27].

301

302 Half of our respondents had been involved in income generating activities before the
303 pregnancy, while only six percent of survey respondents were involved in income generating
304 activities during the postpartum period. Depression was more common for the women who
305 worked but quit job due to pregnancy. There was the scarcity of data about the postpartum
306 mental health and unemployment in low income countries. In a study of Canadian postpartum
307 mothers, depression was less common in women who were in maternity leave [28]. Similarly,
308 an Australian study found the evidence that paid maternal leave was beneficial for post-
309 partum health and wellbeing [29]. In Bangladesh Labour Law there is a provision for paid
310 maternity leave [30]. A strict implementation of clause 45 to 50 of the Bangladesh Labour
311 Law might improve the postpartum mental health of slum working women.

312

313 Postpartum depression was also high among mothers who were working after child
314 delivery. This was because with the professional working stress, taking care of new child
315 added additional stress to women. These multiple roles led to role overload that could have
316 negative effects on psychological well-being of postpartum mother [28, 31]. Some
317 government oversight of maternity schemes for postpartum women, especially for the women
318 working in slum areas, might improve the postpartum mental wellbeing of slum women.

319

320 PPD was not associated with household economic status within slum areas. This
321 result contradicts the PPD findings within the rural context of Bangladesh [2, 14]. The
322 possible explanation could be the people of slum area were concerned with immediate
323 economic survival [32] rather than long term economic stability (measured by the wealth
324 index).

325

326 However, debt and sudden financial hardship of family may affect the postpartum
327 mental health of women [33, 34]. Depression was higher for women, whose child delivery
328 cost was managed by borrowing, selling assets or through mortgages. The findings of recent
329 national maternal mortality survey revealed that private sector delivery has increased several
330 fold and has the highest delivery cost [35]. To minimize the costs of delivery, necessary steps
331 are needed to promote deliveries in public and NGOs facilities.

332

333 In rural area of Bangladesh, association of postpartum depression with unintended
334 pregnancy was found in bivariate analysis, but the association disappeared in multivariate
335 regression analysis [1, 2, 13]. However, in the urban slum context, the unintended pregnancy
336 was an independent risk factor for PPD. The association of PPD with unintended pregnancy
337 persisted even after controlling other risk factors in the multivariate model. An unmet need of
338 contraceptives was found in both urban and rural areas [36]. A patient centred approach and
339 providing comprehensive information and access to contraceptive options may helpful for
340 controlling the unintended pregnancy [37].

341

342 Among the obstetric factors assessed in our study, a history of perinatal and postnatal
343 child death was associated with postpartum depression; a finding that was consistent with
344 those of other studies [1, 38, 39]. The fear of a repeat occurrence of a miscarriage, stillbirth, or
345 child death are thought to be a contributory factors of depression in the antenatal, postnatal
346 period, or in both periods. The recommended number of antenatal care (ANC) and postnatal
347 care (PNC) visits may reduce the perinatal and postnatal child death; and consequently reduce
348 PPD rates in subsequent pregnancies. Healthcare providers should consider the history of
349 earlier loss as a factor of increased vulnerability of depression during the next pregnancy and
350 early postpartum period [40].

351

352 Depressive symptom during pregnancy was mostly associated with postpartum
353 depression, similar to the findings of other studies [1, 5, 41]. Perceived family, working, and
354 any other mental stress during pregnancy was also associated with PPD like other findings
355 [42, 43]. Perceived antenatal stress may contribute to development of depressive symptoms in
356 the antenatal period [44]. These findings highlighted PPD is not only a matter of postpartum
357 period and noted the importance of intervention in the prenatal period to prevent PPD [41,
358 42].

359

360 Intimate partner violence (IPV) is the one of the most important risk factors found in
361 our study, which was consistent with most of the literature of postpartum depression [2, 13,
362 45-50]. In a recent study of Bangladesh, Ziaie found that all forms of domestic violence were
363 strongly associated with higher levels of emotional distress during the pregnancy period as
364 well [51]. In our study, we also found that poor marital relationship (sharing personal feelings
365 and practical support in household work) with husbands was a strong predictor of PPD,

366 consistent with the findings of other studies [1, 52]. IPV and poor marital relationship might
367 be associated with each other [53]. Therefore, these findings suggested that couples focused
368 intervention from the prenatal period may reduce the risk of PPD.

369

370 **Strengths and limitations**

371 The main strength of the study was the study focused the rapid increasing segment of
372 urban population of Bangladesh with a large sample size. To our knowledge it was the first
373 study to assess the prevalence and risk factors of postpartum depression in urban slum of
374 Bangladesh. In addition, the study included the wide range of risk factors found in the
375 postpartum literatures of Bangladesh and similar context. Most importantly, the study used the
376 repeatedly validated Bangla version of instruments and scale which was nationally and
377 internationally recognized and widely used.

378 The study had some limitations worth to acknowledge. The design of the study was
379 cross-sectional and therefore could not measure the incidence of PPD. Data about most of the
380 risk factors were collected from mother's recall, which may lead to under or over reporting of
381 symptoms. However, data collectors were intensively trained on the interview techniques to
382 reduce the recall bias. Some working mothers may not be reached due to strict data collection
383 timeline and not having schedule of household revisit. We tried to overcome this constraint by
384 extending the data collection time beyond the office hour and collecting data in weekend as
385 well.

386

387 **Conclusions**

388 The higher prevalence of PPD suggested the importance of mental health support
389 system for the low income women in slum area. Maternal mental health services should be
390 integrated with existing maternal health services. The primary maternal health care staffs
391 could be provided the basic PPD screening and its primary management training, so that they
392 can refer the PPD cases for appropriate mental health services when needed. They are also
393 needed to educate about the contextually relevant risk factors of PPD as part of the training
394 component. Additionally, the existing maternal health services in slum area should be
395 strengthened and pro-poor friendly.

396 Moreover, research is required to develop the low cost non-pharmacological
397 management of PPD cases in the informal settlement of urban poor. In addition to that,
398 research for developing the culturally appropriate preventive interventions to control the risk
399 factors should be undertaken in the urban slum of Bangladesh.

400

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560

561 **Supporting information**

562 **S1 File. Data file.**

563 (DTA)

564