1 **Psychosocial factors of antenatal anxiety and depression in Pakistan: Is social**

2 **support a mediator?**

3

4 Ahmed Waqas[1], Nahal Raza[1], Haneen Wajid Lodhi[1], Zerwah Muhammad[1], Mehak

5 Jamal[1], Abdul Rehman[2]

6

7 [1] CMH-Lahore Medical College and Institute of Dentistry, Shami Road, Lahore Cantt,

8 Pakistan

9 [2]Allama Iqbal Medical College, Lahore

10

11 Lead & corresponding author:

12 Ahmed Waqas, MBBS student (4th year)

13 Affiliated institute: CMH Lahore Medical College and Institute of Dentistry, Shami

14 Road, Lahore Cantt, Pakistan

15 Email address: ahmedwaqas1990@hotmail.com

16 Phone number: +92-0343-4936117

17 Address: House # 733, Street# 5, Overseas-A, Bahria Town, Lahore

18

24

25 MeSH terms: Sex discrimination; Social psychology; Mental illness; Sexism; Antenatal

26 depression

27

28 Original Article Word Count: 3517 words (provisional)

29 Abstract Word Count: 375 words

30

31

32

33

34

35

36

37

38

39

40

41

42

43

44

45

46

47

48   **Abstract**

49 **Introduction:**

50   Pregnancy is generally viewed as a time of fulfillment and joy; however, for many

51 women it can be a stressful event. In South Asia it is associated with cultural stigmas

52 revolving around gender discrimination, abnormal births and genetic abnormalities. It is

53 also associated with several psychiatric problems in women, most notably depression and

54 anxiety.

55 **Methodology:**

56   This cross-sectional study was done at four teaching hospitals in Lahore from

57 February, 2014 to June, 2014. A total of 500 pregnant women seen at hospital obstetrics

58 and gynecology departments were interviewed with a questionnaire consisting of three

59 sections: demographics, the Hospital Anxiety and Depression Scale (HADS) and the

60 Social Provisions Scale (SPS). All data were analyzed with SPSS v. 20. Descriptive

61 statistics were analyzed for demographic variables. Pearson's chi-squared test, bivariate

62 correlations and multiple linear regression were used to analyze associations between the

63 independent variables and scores on the HADS and SPS.

64 **Results:**

65   Mean age among the 500 respondents was 27.41 years (5.65). Anxiety levels in

66 participants were categorized as normal (145 women, 29%), borderline (110, 22%) or

67 anxious (245, 49%). Depression levels were categorized as normal (218 women, 43.6%),

68 borderline (123, 24.6%) or depressed (159, 31.8%). Inferential analysis revealed that

69 higher HADS scores were significantly associated with lower scores on the SPS, rural

70 background, history of harassment, abortion, cesarean delivery and unplanned

71 pregnancies (P < .05). Social support (SPS score) mediated the relationship between the

72 total number of children, gender of previous children and HADS score. Women with

73 more daughters were significantly more likely to score higher on the HADS and lower on

74 the SPS, whereas higher numbers of sons were associated with the opposite trends in the

75 scores (P < .05)

76 **Conclusion:**

77 Because of the predominantly patriarchal sociocultural context in Pakistan, the

78 predictors of antenatal anxiety and depression may differ from those in developed

79 countries. Rural women and working women had higher levels of antenatal anxiety and

80 depression, which contradicts earlier findings in western countries. Our study found that

81 higher numbers of daughters were associated with higher levels of depression and

82 anxiety, whereas sons had a protective influence. We therefore suggest that interventions

83 designed and implemented to reduce antenatal anxiety and depression should take into

84 account these unique factors operating in developing countries and patriarchal societies.

85

86

87

88

89

90

91

92

93

Introduction

94

In recent years much has been published on the psychological science of pregnancy.

95

Although pregnancy is generally viewed as a time of fulfillment and joy, for many

96

women it can be a stressful event. In our part of the world, South Asia, it is associated

97

with cultural stigmas revolving around gender discrimination, abnormal births and

98

genetic abnormalities. It is also associated with several psychiatric problems in women,

99

most notably depression and anxiety.

100

Around the globe, studies have shown a high prevalence of psychiatric illness in

101

pregnant women. Estimates of the prevalence of antenatal depression and anxiety vary.

102

Gaynes et al., in a systematic review of 109 articles published in English between 1980

103

and 2004, found that up to 13% of pregnant women suffer from major or minor

104

depression [1]. Faisal-Cury et al. reported a higher prevalence of depression (20%) and

105

anxiety (60%) among pregnant women in Sao Paulo, Brazil in 2007 [2]. Owing to gender

106

sensitivities in the cultural setting of South Asia, an especially high prevalence of

107

psychiatric illnesses in pregnant females has been reported. For example, a study in rural

108

Bangladesh in 2011 estimated an 18% prevalence of antenatal depression and a 29%

109

prevalence of antenatal anxiety, [3] and a 2006 study in Karachi, Pakistan reported a 34%

110

prevalence of antenatal depression [4].

111

Several studies have drawn attention to the adverse effects of antenatal anxiety

112

and depression in the developing child. These effects include preterm birth [5][6], low

113

birth weight [5][7], reduced cognitive ability and increased fearfulness [8], increased

114

incidence of respiratory and skin illnesses in early life [9] and elevated awakening

115

116 cortisol levels [10]. Moreover, in their literature review Kinsella et al. concluded that

117 fetal heart rate, activity, sleep patterns and movements, all indicators of neurobehavioral

118 development, were significantly affected by maternal stress, depression and anxiety [11].

119 Antenatal depression is also the strongest predictor of postnatal depression [12], which is

120 itself associated with several adverse effects in the infant.

121   In the past decade, research has actively focused on elucidating the underlying

122 causes of antenatal anxiety and depression. Antenatal depression has been found to be

123 associated with domestic violence [13][14], low social support [12][15][16], social

124 conflict [15], low income [16], antenatal anxiety [16][17], unwanted pregnancy [17][18],

125 history of depression [12][17][18] and previous prenatal loss [19][20], while antenatal

126 anxiety has been associated with less positive attitudes towards pregnancy, low income,

127 low educational level, low marital satisfaction, low social support, longer duration of

128 infertility and history of treatment failure with assisted reproductive technologies [21–

129 23]. Similar risk factors have been reported in various studies in Pakistan [24–26].

130   Because of the cultural and socioeconomic environment in various developing

131 regions of the world, several unique factors contribute to antenatal anxiety and depression

132 in these regions. South Asia is among the most densely populated and poorest regions in

133 the world, and it faces huge social, economic and health challenges. Most South Asian

134 societies are patriarchal and characterized by discrimination against women. It is

135 generally considered more desirable to have male offspring than female offspring

136 [27][28]. Owing to cultural stigmas and gender discrimination, males enjoy better access

137 to health facilities, education and employment. Qadir et al. have pointed out that this

138 gender disadvantage is strongly associated with psychological morbidity among women

139   in Pakistan [29]. Indeed, the prevalence of depression and stress in Pakistan has been

140   found to be far greater in women than in men [30]. Whether gender discrimination and

141   the preference for sons rather than daughters contribute to depression and anxiety among

142   pregnant women is not known, and to our knowledge, no study has been conducted to

143   clarify this relationship. Thus the purpose of our study was to bridge this gap in scientific

144   knowledge by investigating the factors associated with antenatal depression and anxiety,

145   with particular emphasis on the association between gender discrimination, the

146   preference for sons, and mental health in pregnant woman.

147

148   **Methodology**

149   This cross-sectional study was carried out at four teaching hospitals in Lahore from

150   February, 2014 to June, 2014: the teaching hospital of CMH Lahore Medical College and

151   Institute of Dentistry, Jinnah Hospital, Services Hospital and Lady Willingdon Hospital.

152   The study was approved by the Ethics Review Committee of CMH Lahore Medical

153   College and Institute of Dentistry, Lahore (CMH LMC).

154   Pregnant women who came to the obstetrics and gynecology departments

155   spontaneously for routine prenatal or perinatal care were included in this study. We

156   included only those women whose socioeconomic level was characterized as low or

157   lower-middle income.

158   The data were collected by convenience sampling since we could not ensure

159   random sampling due to lack of resources. Each woman was interviewed by one of four

160   fourth-year medical student enrolled at CMH LMC. All four students took part in a 2-day

161   interviewing skills workshop at the Department of Psychology, CMH LMC. The

162 workshop was run by experienced psychologists employed at this department. Training

163 was considered necessary due to the sensitive nature of the questions asked during the

164 questionnaire-guided interview.

165   The women were informed about the objectives of the survey and ensured

166 anonymity. Only women who were willing to participate in the survey were interviewed.

167 Written informed consent was provided by each of the 500 participants who agreed to

168 take part.

169   The questionnaire consisted of three sections: demographics, the Hospital Anxiety

170 and Depression Scale (HADS) [31] and the Social Provisions Scale (SPS) [32]. In the

171 demographics section, participants were asked about their age, ethnicity, education,

172 background, occupation, any history of miscarriage, abortion, harassment, number of

173 cesarean deliveries and whether their present pregnancy was planned or unplanned. The

174 total number of children, their gender and ages were also recorded.

175   The second part of the questionnaire consisted of the Urdu translation of the

176 HADS. According to a systematic review published in 2007, the HADS has been

177 rigorously evaluated for cross-cultural and criterion validity in Pakistan [33]. This

178 psychological instrument is widely used to screen for anxiety and depression. It consists

179 of two subscales designed for anxiety and depression separately. Each subscale yields a

180 score ranging from 0 to 21, with increasing scores associated with higher levels of

181 anxiety and depression. These scores are divided into three categories: 0–7 = normal, 8–

182 10 = borderline abnormal (borderline case) and 11–21 = abnormal (case).

183   The third part of the questionnaire consisted of the Urdu translation of the Social

184 Provision Scale [32]. This instrument assesses perceived social support and consists of 24

185 questions with a Likert-type, 4-point response scale ranging from 1 (strongly disagree) to

186 4 (strongly agree). Each statement describes an aspect of the participant's current social

187 network. This scale assesses six types of social relationships including guidance (advice

188 or information), reliable alliances (assurance that others can be counted on in times of

189 stress), reassurance of worth (recognition of one's competence), attachment (emotional

190 closeness), social integration (a sense of belonging to a group of friends), and

191 opportunities for nurturance (providing assistance to others) [32]. For the purpose of

192 analysis, the total SPS score can also be used.

193   All data were analyzed with the SPSS (v. 20.) Frequencies and descriptive

194 statistics were analyzed for demographic variables and categories of the HADS subscales.

195 The data were plotted on a histogram to assess normality. Bivariate correlations were

196 used to identify associations between demographic characteristics, scores on the HADS

197 subscales and scores on the SPS. Linear regression was used to analyze associations

198 between the numbers of sons and daughters (as dichotomous variables) and depression

199 subscale scores. The dichotomous variable for number of sons was coded as pregnant

200 women with no sons (0) or with 1 or more sons (1). Similarly, the dichotomous variable

201 for number of daughters was coded as pregnant women with 0 or 1 daughter (0) or more

202 than 1 daughter (1). These dichotomous variables were entered in an initial regression

203 model (Model 1), then SPS scores were entered to analyze their effect on the variables in

204 the first model (Model 2).

205

206 **Results**

207   A total of 500 women participated in the survey. Their mean age was 27.41 years

208   (5.65), and their ethnic distribution was Punjabi 369 (73.8%), Urdu-speaking 110 (22%)

209   and other 21 (4.2%). Self-reported educational level was 85 (17%) illiterate, 315 (63%)

210   high school, 60 (12%) intermediate and 40 (8%) university-level. Most of the respondents

211   were housewives (441 women, 88.2%) and 59 (11.8%) were employed outside the home.

212   Most of the respondents had an urban background (208, 41.6%) followed by a rural (182,

213   36.4%) and semiurban background (110, 22%). Most respondents were from the lower-

214   middle (284, 56.8%), lower (148, 29.6%) or middle class (68, 13.6%). Their current

215   pregnancy was planned according to 135 respondents (27%) and unplanned according to

216   365 (73%). Previous miscarriage was reported by 44 women (8.8%), and previous

217   abortion by 110 (22%). Harassment had been experienced by 33 (6.6%) of the

218   respondents. The mean number of children in our sample of respondents was 1.5 (1.42).

219   A history of at least one episiotomy was reported by 81 women (16.2%), and a history of

220   at least one cesarean delivery was reported by 136 (27.2%).

221   On the HADS, the mean anxiety score was 9.71 (4.24) and the mean depression

222   scores was 7.85 (4.03). Mean score on the SPS was 72.3 (12.2). Anxiety levels in the

223   participants were categorized as normal in 145 (29%), borderline in 110 (22%) and

224   anxious in 245 (49%). Depression levels were categorized as normal in 218 women

225   (43.6%), borderline in 123 (24.6%) and depressed in 159 (31.8%). The chi-squared test

226   revealed significant associations between the participants' background and anxiety ($\chi^2 =$

227   43.69, df = 4) and depression ($\chi^2 = 83.19$, df = 4) (both P < .001). This reflects the fact

228   that anxiety was found in 123 (67.6%) of the rural women versus 83 (39.9%) of the urban

229   participants and only 39 (35.5%) of the women with a semiurban background. A similar

230   trend was found for depression, which was observed in 91 (50%) of the women from a

231   rural background, 40 (19.2%) of the urban and 28 (25.5%) of the semiurban women.

232   Bivariate correlation revealed a significant negative correlation between social

233   support and anxiety ($r = -.433$, $P < .001$) and between social support and depression ($r =$

234    $-.453$, $P < .001$). Point biserial correlation showed that the occupations of pregnant

235   women significantly correlated with anxiety ($r_{pb} = .17$) and depression ($r_{pb} = .16$) (both P

236    $< .001$). Employed women reported higher levels of anxiety and depression. A history of

237   harassment, miscarriage, abortion, the number of cesarean deliveries, number of

238   episiotomies and number of unplanned pregnancies were also significantly associated

239   with anxiety and depression (Table 1).

240   Significant associations were found between modes of delivery, scores on the

241   HADS anxiety and depression subscales, and SPS score (Table 2). Increasing numbers of

242   cesarean deliveries were associated with higher SPS scores (rho = .13, $P < .01$), and

243   increasing numbers of episiotomies were associated with lower SPS scores (rho = $-.10$, P

244    $< .05$).

245   Linear regression was used to test whether the number of daughters and sons (as

246   dichotomous variables) and scores on social provisions scale (SPS) successfully predicted

247   scores on the HADS depression subscale (Table 3). For this purpose, two models were

248   created. In the first model (Model 1) the numbers of sons and daughters were entered as

249   predictors. This model yielded statistically significant results ($P < .01$) that explained

250   2.2% of the variation in the depression subscale scores. The number of daughter was

251   associated positively with the scores whereas the number of sons was associated

252   negatively with them.

253   When SPS scores were entered into model 2 along with the previously identified

254   predictors (numbers of daughters and sons), the effect size of the model (R^2) increased to

255   .213, i.e., model 2 explained 21.3% of variation in HADS depression subscale scores.

256   However, SPS scores exerted a strong controlling effect on other predictors, consequently

257   decreasing the **B** values of the number of daughter and sons. The inclusion of SPS scores

258   in model 2 also rendered the association between the number of daughters and HADS

259   depression subscale scores non-significant.

260   Bivariate correlations revealed that the total number of children ($r = .096$, $P < .05$)

261   and number of daughters ($r = .128$, $P < .01$) were associated with high anxiety subscale

262   scores. The number of daughters also showed a negative association with scores on the

263   social support scale ($r = -.103$, $P < .05$).

264   The point biserial correlation was significant between the total number of

265   daughters and reported harassment ($r_s = .11$, $P < .05$).

266

267   **Discussion**

268 Our study showed a high prevalence of both antenatal depression (31.8%) and anxiety

269 (49%), which is in consonance with earlier studies conducted in Pakistan [4][25]. By

270 comparison, studies from developed western countries generally report lower prevalences

271 [34]. These results underscore the importance of prenatal depression and anxiety as a

272 major public health problem in our country. To address this grave situation, effective

273 screening and intervention methods should be planned.

274   Studies in western countries generally report a higher incidence of psychiatric

275 disorders in urban populations than rural populations [35]. In contrast, our study found

276 almost twice the prevalence of antenatal depression and anxiety among rural women as

277 among urban and semiurban women. This apparent contradiction may be explained by

278 the unique environmental factors that pregnant women are exposed to in developing

279 South-East Asian countries. In the cultural context of Pakistan, several social factors are

280 worth mentioning. First, there is a very large gap in the standards of living and available

281 facilities between rural and urban communities in developing countries, whereas this gap

282 is not as large in developed countries. In Pakistan, rural areas lack several basic

283 necessities of life including health services, water sanitation, gas, electricity and higher

284 educational facilities [36]. Furthermore, gender discrimination, while common

285 throughout the country, is especially evident in rural communities. Rural women are less

286 independent and play a lesser role in decision making than urban women. Rural settings

287 also have an adverse effect on the mental health of pregnant women [37]. These factors,

288 in our opinion, are important contributors to the greater depression and anxiety among

289 pregnant women in rural settings in our country. Our findings are consistent with the

290 results from two studies of pregnant women in Sindh province, Pakistan, one in a rural

291 community and the other in an urban community. This study found a significantly higher

292 prevalence of depression among rural pregnant women (60%) [26] than in urban pregnant

293 women (39.4%) [38]. Developmental programs in rural communities may help reduce

294 psychological morbidity in rural pregnant women.

295   An important risk factor for antenatal depression and anxiety in our study was low

296 social support. Pregnant women who perceived low social support had higher rates of

297 both depression and anxiety, and vice versa. This finding has been consistently reported

298 in studies of predictors of antenatal depression and anxiety throughout the world

299 [15][22]. The association between social support and psychological morbidity is hardly

300 surprising since social support has been found to be connected to depression and anxiety

301 not just among pregnant women but in the general population as well [39]. The exact

302 mechanism by which social support affects depression and anxiety remains obscure.

303 However, it is known that low social support can give rise to a sense of isolation and

304 loneliness, which are both strongly associated with poor mental health [40]. In

305 developing countries like Pakistan, low social support is a particular problem, as

306 demonstrated by the fact that it was the strongest predictor of antenatal depression and

307 anxiety in our study (r value of 0.453 for depression and 0.433 for anxiety). The causes of

308 low social support differ in urban and rural communities of Pakistan. Among urban

309 women, the most common causes include verbal and physical abuse by the husband or in-

310 laws, societal restrictions on women, and living in joint family systems [38]. Among rural

311 women, low social support has been found to result from lack of care by the husband,

312 large age differences between the husband and wife, and greater numbers of children

313 [26]. Many of these factors, which seldom occur in developed countries, highlight the

314 need for society-specific interventions in to improve social support and consequently the

315 mental health of pregnant women in Pakistan and elsewhere.

316   An interesting finding in our study was the correlation between the occupation of

317 pregnant women and antenatal depression and anxiety. In contrast to studies in western

318 populations, which mention employment as a strong protective factor against major

319 depression in pregnancy [41], our study found that pregnant women employed outside the

320 home were actually more depressed and anxious than housewives. A study in Karachi,

321 Pakistan also apparently contradicts our findings by concluding that housewives, in

322 general, are more depressed than working women [42]. Several factors might explain this

323 contradiction. Most of these studies mention education as an important protective factor

324 against antenatal anxiety and depression. Therefore, the lower educational level of

325 housewives compared to working women was associated with higher levels of anxiety

326 and depression. However, our study included respondents from low and lower-middle

327 socioeconomic classes, and 54% of the women in our sample were educated to less than

328 the 10th grade level. So even most of the working women may not have been educated

329 highly enough for their employment status to have a positive effect on their mental

330 health. Secondly, in recent years inflation has increased and socioeconomic conditions

331 have deteriorated in Pakistan, and these changes have led to increased stress and the

332 pressures on working women to meet the economic needs of their household. It is also

333 well documented that greater work stress can precipitate anxiety and depression in

334 employed men and women [43]. This increased stress, combined with the demands of

335 pregnancy, might be responsible for greater depression and anxiety in working women

336 compared to housewives, who are relatively protected from work stress. Finally, another

337 factor might also be operative in the social environment of our country. In many orthodox

338 Pakistani families, most of which belong to lower and lower-middle social classes,

339 working women are highly stigmatized. In this socioeconomic setting, the home is

340 considered the appropriate place for women, and being an obedient wife and a loving

341 mother are considered their appropriate roles. Negative attitudes among relatives towards

342 their work might contribute to depression and anxiety among working pregnant women

343 from the lower and lower-middle social classes who participated in our study;

344 housewives, in contrast, were protected from such discrimination. Nevertheless, more

345   research is required to clarify the relationship between employment outside the home and

346   antenatal depression and anxiety, especially in the cultural environment in Pakistan.

347   In this study a history of one or more episiotomies and cesarean deliveries was

348   associated with a high incidence of antenatal anxiety and depression. This is in

349   accordance with a study by Kuo S-Y et al. which showed that more than one third of the

350   women undergoing elective cesarean delivery suffered from anxiety, whereas only one

351   fourth of the women had depression several months after the procedure [44]. Although

352   the increasing prevalence of cesarean delivery is a major public health concern in many

353   countries, it is one of the most common obstetric procedures in South Asia. Antenatal

354   anxiety and depression in pregnant women because of a previous cesarean delivery or

355   episiotomy may be due to concerns about her own health, fear regarding the well-being

356   of her developing child and fears regarding another invasive procedure requiring stressful

357   measures such as anesthesia and a relatively large incision. However, there was a

358   significant difference between the incidence of anxiety and depression between women

359   who had undergone at least one caesarean delivery, episiotomy or normal vaginal

360   delivery. In Pakistan, women from low socioeconomic backgrounds generally tend to

361   avoid hospital deliveries because of sociocultural norms (e.g., the belief that vaginal

362   delivery creates an emotional bond with the baby), the large expense, fear of the

363   procedure or of postoperative infection, and insufficient knowledge [45]. Women prefer

364   vaginal deliveries at home in the care of untrained health care professionals called "dai",

365   and often seek care at hospital emergency departments only for life-threatening

366   complications. In our society, caesarean delivery is usually termed a "bara operation" (a

367   "big operation") due to fears and associated sociocultural norms that reinforce negative

368   attitudes towards this mode of delivery. Therefore, women with a history of at least one

369   cesarean delivery enjoy significantly higher social support compared to those who have

370   undergone episiotomies and normal vaginal deliveries.

371   Other factors such as harassment, a history of abortion and the unplanned vs.

372   planned nature of the pregnancy were also significantly associated with antenatal anxiety

373   and depression, and have been identified repeatedly in earlier studies [15][17][20].

374   A novel and important finding in our study is the relationship between the gender

375   of previous children and the level of antenatal depression and anxiety. Having daughters

376   was significantly associated with antenatal depression and anxiety, whereas having sons

377   was a protective factor. Social support mediated this relationship. These results make

378   sense when we take into account the issue of gender discrimination and the preference for

379   male children in South Asia. In Pakistan the family system is predominantly patriarchal.

380   Women are treated as second-class citizens and denied their social rights. Among the

381   consequences of this social structure are honor killings, the bride price and dowry, the

382   disputed status of female testimony, forced marriages and denial of a woman's right to

383   have a career. Parents view their sons as bread-earners and agents of continuation of the

384   family name, and view their daughters as an economic burden. This is partly due to the

385   tradition of providing a large dowry when a daughter marries, especially in India and

386   Pakistan. The dowry may be in the form of land, money, jewelry or household items. In

387   many wedding ceremonies the dowry is displayed and announced by the bride's family.

388   A bridal dress in Pakistan, for instance, can cost up to half a million rupees (US$ 8380),

389   and the whole event can cost up to 20 million rupees (US$ 335,000) [46], most of the

390   expenses being paid by the bride's family. It is probably for these reasons that the rates of

391   female feticide are alarmingly high in the region [47].

392   Even after birth, sons are given preference over daughters with respect to access

393   to health care and educational opportunities [48]. In this context, the relationship between

394   higher rates of depression and anxiety among pregnant women with more daughters

395   makes perfect sense. Considering societal pressures, pregnant women who have already

396   given birth to one or more daughters are not only concerned about their future offspring's

397   gender, but are also subject to harassment, taunting and stigmatization by their family and

398   relatives. This highlights how the unique social conditions in Pakistan arising from

399   gender discrimination against females give rise to a significant and previously

400   unacknowledged predictor of antenatal depression and anxiety, i.e., the gender of

401   previous children. We encourage more research to further investigate this novel

402   association. Widespread social and educational reforms designed to reduce gender

403   discrimination may help to decrease the influence of this factor on the psychological

404   well-being of women of child-bearing age.

405

406   **Conclusion**

407   In the context of the predominantly patriarchal sociocultural setting that characterizes

408   Pakistan, the predictors of antenatal anxiety and depression may well differ from those in

409   developed countries. Rural women and working women in our sample of participants had

410   higher levels of antenatal anxiety and depression, which contrasts with studies from

411   western countries. Our study found that higher numbers of daughters were associated

412   with higher levels of depression and anxiety, whereas higher numbers of sons had a

413 protective influence. We therefore suggest that interventions designed and implemented

414 to reduce antenatal anxiety and depression should take into account these unique factors

415 operating in developing countries and patriarchal societies.

416

422

423 **References**

424 1.   Gaynes BN, Gavin N, Meltzer-Brody S, Lohr KN, Swinson T, et al. (2005)
425 Perinatal depression: prevalence, screening accuracy, and screening outcomes. Evid Rep
426 Technol Assess (Summ): 1–8.
427 2.   Faisal-Cury a, Rossi Menezes P (2007) Prevalence of anxiety and depression
428 during pregnancy in a private setting sample. Arch Womens Ment Health 10: 25–32.
429 doi:10.1007/s00737-006-0164-6.
430 3.   Nasreen HE, Kabir ZN, Forsell Y, Edhborg M (2011) Prevalence and associated
431 factors of depressive and anxiety symptoms during pregnancy: a population based study
432 in rural Bangladesh. BMC Womens Health 11: 22. doi:10.1186/1472-6874-11-22.
433 4.   Hamirani MM, Sultana A, Ibrahim Z, Iqbal H, Sultana S (2006) Frequency of
434 prenatal depression in second and third trimesters of pregnancy in karachi : a hospital
435 based study. J Liaquat Uni Med Heal Sci 5(3): 106–109.
436 5.   Dunkel Schetter C, Tanner L (2012) Anxiety, depression and stress in pregnancy:
437 implications for mothers, children, research, and practice. Curr Opin Psychiatry 25: 141–
438 148. doi:10.1097/YCO.0b013e3283503680.
439 6.   Sanchez SE, Puente GC, Atencio G, Qiu C, Yanez D, et al. (2013) Risk of
440 spontaneous preterm birth in relation to maternal depressive, anxiety and stress
441 symptoms. J Reprod Med 58: 25–33.
442 7.   Rahman a, Bunn J, Lovel H, Creed F (2007) Association between antenatal
443 depression and low birthweight in a developing country. Acta Psychiatr Scand 115: 481–
444 486. doi:10.1111/j.1600-0447.2006.00950.x.
445 8.   Bergman K, Sarkar P, O'Connor TG, Modi N, Glover V (2007) Maternal stress
446 during pregnancy predicts cognitive ability and fearfulness in infancy. J Am Acad Child
447 Adolesc Psychiatry 46: 1454–1463. doi:10.1097/chi.0b013e31814a62f6.

448   9.   Beijers R, Jansen J, Riksen-Walraven M, de Weerth C (2010) Maternal prenatal
449   anxiety and stress predict infant illnesses and health complaints. Pediatrics 126: e401–9.
450   doi:10.1542/peds.2009-3226.
451   10.   O'Connor TG, Ben-Shlomo Y, Heron J, Golding J, Adams D, et al. (2005)
452   Prenatal anxiety predicts individual differences in cortisol in pre-adolescent children.
453   Biol Psychiatry 58: 211–217. doi:10.1016/j.biopsych.2005.03.032.
454   11.   Kinsella MT, Monk C (2013) Impact of maternal stress, depression & anxiety on
455   fetal neurobehavioral development. Clin Obs Gynecol 52: 1–15.
456   doi:10.1097/GRF.0b013e3181b52df1.Impact.
457   12.   Dayan J, Creveuil C, Dreyfus M, Herlicoviez M, Baleyte J-M, et al. (2010)
458   Developmental model of depression applied to prenatal depression: role of present and
459   past life events, past emotional disorders and pregnancy stress. PLoS One 5: e12942.
460   doi:10.1371/journal.pone.0012942.
461   13.   Mezey G, Bacchus L, Bewley S, White S (2005) Domestic violence, lifetime
462   trauma and psychological health of childbearing women. BJOG 112: 197–204.
463   doi:10.1111/j.1471-0528.2004.00307.x.
464   14.   Rodriguez MA, Heilemann M V, Fielder E, Ang A, Nevarez F, et al. (2008)
465   Intimate Partner Violence, Depression, and PTSD Among Pregnant Latina Women. Ann
466   Fam Med Vol 6: 44–52. doi:10.1370/afm.743.INTRODUCTION.
467   15.   Westdahl C, Milan S, Magriples U, Kershaw TS, Rising SS, et al. (2008) Social
468   Support and Social Conflict as Predictors of Prenatal Depression. Obs Gynecol 110: 134–
469   140.
470   16.   Leigh B, Milgrom J (2008) Risk factors for antenatal depression, postnatal
471   depression and parenting stress. BMC Psychiatry 8: 24. doi:10.1186/1471-244X-8-24.
472   17.   Lancaster CA, Gold KJ, Flynn HA, Yoo H, Marcus SM, et al. (2010) Risk factors
473   for depressive symptoms during pregnancy: a systematic review. Am J Obs Gynecol 202:
474   5–14. doi:10.1016/j.ajog.2009.09.007.
475   18.   Rich-Edwards JW, Kleinman K, Abrams A, Harlow BL, McLaughlin TJ, et al.
476   (2006) Sociodemographic predictors of antenatal and postpartum depressive symptoms
477   among women in a medical group practice. J Epidemiol Community Health 60: 221–227.
478   doi:10.1136/jech.2005.039370.
479   19.   Koleva H, Stuart S, O'Hara MW, Bowman-Reif J (2012) Risk factors for
480   depressive symptoms during pregnancy. Arch Womens Ment Heal 14: 99–105.
481   doi:10.1007/s00737-010-0184-0.
482   20.   Blackmore ER, Côté-Arsenault D, Tang W, Glover V, Evans J, et al. (2011)
483   Previous prenatal loss as a predictor of perinatal depression and anxiety. Br J Psychiatry
484   198: 373–378. doi:10.1192/bjp.bp.110.083105.
485   21.   Gurung R a. R, Dunkel-Schetter C, Collins N, Rini C, Hobel CJ (2005)
486   Psychosocial Predictors of Prenatal Anxiety. J Soc Clin Psychol 24: 497–519.
487   doi:10.1521/jscp.2005.24.4.497.
488   22.   Chan CY, Lee AM, Lam SK, Lee CP, Leung KY, et al. (2013) Antenatal anxiety
489   in the first trimester : Risk factors and effects on anxiety and depression in the third
490   trimester and. OJPsych 2013: 301–310.
491   23.   Hashemieh C, Neisani Samani L, Taghinejad H (2013) Assessment of anxiety in
492   pregnancy following assisted reproductive technology (ART) and associated infertility

493   factors in women commencing treatment. Iran Red Crescent Med J 15: e14465.
494   doi:10.5812/ircmj.14465.

495   24.   Karmaliani R, Asad N, Bann CM, Moss N, McClure EM, et al. (2013) Prevalence
496   of Anxiety, Depression and associated factors among Pregnant Women of Hyderabad,
497   Pakistan. Int J Soc Psychiatry 55. doi:10.1177/0020764008094645.

498   25.   Ali NS, Azam IS, Ali BS, Tabbusum G, Moin SS (2012) Frequency and
499   associated factors for anxiety and depression in pregnant women: a hospital-based cross-
500   sectional study. ScientificWorldJournal 2012: 9 pages. doi:10.1100/2012/653098.

501   26.   Zahidie A, Kazi A, Fatmi Z, Bhatti MT, Dureshahwar S (2011) Social
502   environment and depression among pregnant women in rural areas of Sind , Pakistan. J
503   Pak Med Assoc 61: 1–3.

504   27.   Zubair F, Dahl E, Sher Shah S, Ahmed M, Brosig B (2007) Gender preferences
505   and demand for preconception sex selection: a survey among pregnant women in
506   Pakistan. Hum Reprod 22: 605–609. doi:10.1093/humrep/del409.

507   28.   Fuse K (2010) Variations in attitudinal gender preferences for children across 50
508   less-developed countries. Demogr Res 23: 1031–1048. doi:10.4054/DemRes.2010.23.36.

509   29.   Qadir F, Khan MM, Medhin G, Prince M (2011) Male gender preference, female
510   gender disadvantage as risk factors for psychological morbidity in Pakistani women of
511   childbearing age - a life course perspective. BMC Public Health 11: 745.
512   doi:10.1186/1471-2458-11-745.

513   30.   Husain N, Creed F, Tomenson B (2000) Depression and social stress in Pakistan.
514   Psychol Med 30: 395–402.

515   31.   Mumford DB, Tareen IAK, Bajwa MAZ, Bhatti MR, Karim R (1991) The
516   translation and evaluation of an Urdu version of the Hospital Anxiety and Depression
517   Scale. Acta Psychiatr Scand 83: 81–85. Available: http://dx.doi.org/10.1111/j.1600-
518   0447.1991.tb07370.x.

519   32.   Rizwan M, Syed N (2010) Urdu Translation and Psychometric Properties of
520   Social Provision Scale. Int J Eductional Psychol Assess 4: 33–47.

521   33.   Ahmer S, Faruqui R a, Aijaz A (2007) Psychiatric rating scales in Urdu: a
522   systematic review. BMC Psychiatry 7: 59. Available:
523   http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2186305&tool=pmcentrez&r
524   endertype=abstract. Accessed 22 August 2014.

525   34.   Witt WP, Street NW, Hagen EW, Wichmann MA (2011) The prevalence and
526   determinants of antepartum mental health problems among women in the USA: a
527   nationally representative population-based study. Arch Womens Ment Heal 13: 425–437.
528   doi:10.1007/s00737-010-0176-0.

529   35.   Peen J, Schoevers R a, Beekman a T, Dekker J (2010) The current status of urban-
530   rural differences in psychiatric disorders. Acta Psychiatr Scand 121: 84–93.
531   doi:10.1111/j.1600-0447.2009.01438.x.

532   36.   Rahman AUR, Hayat Y, Habib Z, Iqbal J (2011) Rural-urban disparities in khyber
533   paktunkhwa pakistan. Sarhad J Agric 27: 477–483.

534   37.   Rahman A (2007) Challenges and opportunities in developing a psychological
535   intervention for perinatal depression in rural Pakistan--a multi-method study. Arch
536   Womens Ment Health 10: 211–219. doi:10.1007/s00737-007-0193-9.

537   38.   Kazi A, Fatmi Z, Hatcher J, Kadir MM, Niaz U, et al. (2006) Social environment
538   and depression among pregnant women in urban areas of Pakistan: importance of social
539   relations. Soc Sci Med 63: 1466–1476. doi:10.1016/j.socscimed.2006.05.019.
540   39.   Grav S, Hellzèn O, Romild U, Stordal E (2012) Association between social
541   support and depression in the general population: the HUNT study, a cross-sectional
542   survey. J Clin Nurs 21: 111–120. doi:10.1111/j.1365-2702.2011.03868.x.
543   40.   Cacioppo JT, Hughes ME, Waite LJ, Hawkley LC, Thisted R a (2006) Loneliness
544   as a specific risk factor for depressive symptoms: cross-sectional and longitudinal
545   analyses. Psychol Aging 21: 140–151. doi:10.1037/0882-7974.21.1.140.
546   41.   Fall A, Goulet L, Vézina M (2013) Comparative study of major depressive
547   symptoms among pregnant women by employment status. Springerplus 2: 201.
548   doi:10.1186/2193-1801-2-201.
549   42.   Soomro RH, Riaz F, Naved S, Soomro FH (2012) Comparative Analysis of
550   Depression among Housewives and Working Women in Bilal Colony of Kornagi Area
551   Karachi. IJCRB 3: 354–359.
552   43.   Melchior M, Caspi A, Milne BJ, Danese A, Poulton R, et al. (2007) Work stress
553   precipitates depression and anxiety in young, working women and men. Psychol Med 37:
554   1119–1129. doi:10.1017/S0033291707000414.
555   44.   Kuo S-Y, Chen S-R, Tzeng Y-L (2014) Depression and anxiety trajectories
556   among women who undergo an elective cesarean section. PLoS One 9: e86653.
557   doi:10.1371/journal.pone.0086653.
558   45.   Nisar N, Sohoo NA, Memon A (2009) Knowledge , Attitude and Preferences of
559   Pregnant Women towards Modes of Delivery. JLUMHS 8: 228–233.
560   46.   Tohid O (2004) Pakistan's novel attack on poverty: ban wedding feasts -
561   CSMonitor.com.
562   47.   Abrejo FG, Shaikh BT, Rizvi N (2009) "And they kill me, only because I am a
563   girl"...a review of sex-selective abortions in South Asia. Eur J Contracept Reprod Health
564   Care 14: 10–16. doi:10.1080/13625180802518231.
565   48.   Alam A (2011) Impact of Gender Discrimination on Gender Development and
566   Poverty Alleviation. Sarhad J Agric 27: 329–339.
567

568

569

570

571

572

573

574

575

576   Table 1. Significant correlations between socioeconomic and obstetric variables with

577   anxiety and depression in pregnant women (N = 500) surveyed in Lahore, Pakistan, in

578   2014

Variable	Anxiety	Depression
Social support	$-.43^3$	$-.45^3$
Occupation	$.17^3$	$.16^3$
Harassment	$.13^2$	$.10^1$
Abortion	$.10^1$	$.10^1$
Unplanned pregnancy	$.23^3$	$.28^3$
Cesarean delivery	$-.09^4$	$-.13^2$
Episiotomy	$.15^3$	$.10^1$
Vaginal delivery	$.10^1$	.07

579   ^{1} P < .05, ^{2} P < .01, ^{3} P < .001, ^{4} Marginally significant

580

581

582

583   Table 2. Associations between modes of delivery and scores on the Hospital Anxiety and

584   Depression Scale in pregnant women (N = 500) surveyed in Lahore, Pakistan, in 2014

Mode	Anxiety				Depression			
	Normal	Borderline	Anxious	χ^2	Normal	Borderline	Depressed	χ^2
Episiotomy	18 (22%)	8 (9.9%)	55 (67.9%)	15.3[3]	27 (33.3%)	20 (24.7%)	34 (42%)	5.48[4]
Cesarean delivery	51 (37.5%)	29 (21.3%)	56 (41.2%)	7.02[1]	73 (53.7%)	32 (23.5%)	31 (22.8%)	9.20[2]

585   [1] P < .05, [2] P < .01, [3] P < .001, [4] Marginally significant

586

587

588

589

590

591

592

593

594

595

596

597

598

599   Table 3. Multiple linear regression model for variables associated with scores indicating

600   depression on the Hospital Anxiety and Depression Scale in pregnant women (N = 500)

601   surveyed in Lahore, Pakistan, in 2014

Model	Predictor	B	Standard error (B)	Beta
Model 1 $R^2 = .022$	Number of sons	-.982	.366	-.121[3]
	Number of daughters	1.015	.424	-.108[2]
Model 2 $R^2 = .213$	Number of sons	-.661	.329	-.081[1]
	Number of daughters	.524	.383	.056
	Social support (SPS)	-.146	.013	-.442[3]

602   [1] $P < .05$, [2] $P < .01$, [3] $P < .001$, [4] Marginally significant

603

604

605

606

607