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Evaluation Of The Prevalence Of Postpartum Depression In Women In Punjab's Patiala District Through Structural Equation Modeling

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ABSTRACT

Postpartum Depression (PPD) is a significant health obstacle for maternal care due to the wide reaching consequences on mothers and their children. In order to investigate the prevalence of PPD and associated risk variables, PLS-SEM (Partial Least Squares Structural Equation Modeling) was utilized by analysed women's data in District Patiala, Punjab. The findings indicated that among 400 new mothers, socioeconomic status and social network support are the primary risk factors for postpartum depression (PPD), while prior mental health conditions and pregnancy issues are secondary risk factors. The study found that the strongest predictors of PPD were having little family support and having a difficult financial situation. Furthermore, these PLS-SEM results show how the factors interact in a complex way, supporting each other through policy measures aimed to the improvement of mental health treatment and community development.

Keywords: *Postpartum Depression, Structural Equation Modeling, Maternal Health, Predictors, Punjab*

1. INTRODUCTION

The mood disorder known as Postpartum Depression affects women after childbirth to create significant distress marked by sadness and excessive anxiety and exhaustion (O'Hara & McCabe, 2013). After childbirth develops into an essential period which needs complete mental health attention for mothers alongside their newborns. The global prevalence of Postpartum Depression affects 10–20 percent of new mothers yet various economic levels and social structures contribute significantly to these differences (Fisher et al., 2012). The levels of PPD among women within Indian regions and other low and middle-income areas rise because of financial burdens and poor healthcare access as well as societal disapproval of mental wellness (Rahman et al., 2013).

Maternal mental health research in Punjab State has received limited attention from scholars although the state possesses strong healthcare advantages while employing Partial Least Squares Structural Equation Modeling (PLS-SEM) techniques and advanced statistical modeling approaches remain unpopular. Even though maternal healthcare services show improved delivery of service the mental health support for new mothers still lacks sufficient attention. The overall mental state of new mothers suffers from permanent social demands, preset gender norms and household arrangements that elevate their stress levels through the process of depression. People suffering from the condition face worsened symptoms because social support is minimal and few people understand the problem so most instances remain unidentified and untreated.

Several factors contribute to the onset of PPD, including socio-economic status, history of previous mental health, obstetric complications. Research has shown that financial instability is a big factor in increasing a new mother's stress levels which can increase risk for PPD (Goyal et al., 2010). Women with little family support are also more than likely to experience depressive symptoms (Dennis & Letourneau, 2007). However, these factors have a complex relationship and require a holistic analytical approach to really understand and identify effective predictors.

The aim of this study is to explore PPD determinants among women in Patiala District using PLS-SEM. Through the PLS-SEM approach, it is possible to understand multiple influencing variables from the socio-demographic, psychological and

obstetric perspective on how they contribute to PPD. The results of this research will be utilized to aid in the design of targeted interventions for early detection and management of postpartum depression in Punjab for improving maternal and child health outcomes in the region.

2. LITERATURE REVIEW

Extensive studies have been made regarding diverse persons and their factors that might contribute to the later severity of Postpartum Depression (PPD). Several papers from the literature have shown that there is a relationship between PPD and socio demographic, psychological and obstetric variables. The ability to know these factors is of prime importance to plan intervention.

Socioeconomic Determinants of PPD

A significant factor in maternal mental health outcomes is socioeconomic status (SES). Studies show that women who lower socioeconomic status background are at increased risk of PPD because of limiting financial constraints, lack of healthcare access and increased stress (Goyal et al, 2010). The link between financial instability with heightened anxiety surrounding child rearing and postpartum depressive symptoms may operate synergistically on postpartum depression. Lancaster et al (2010) conducted a study that was consistent with the findings as it reported a strong association between low income and increased PPD risk, thus indicating the importance of economic and social support systems for addressing this condition.

Social Support and Its Impact on PPD

A protective factor regarding PPD has been found as social support. Women who have strong social or familial support, less stress, and are better at handling postpartum problems are better off (Dennis & Letourneau, 2007). Many studies have shown that peer support groups and counseling services are effective in decreasing PPD symptoms (Dennis et al., 2009). Hodnett al (2011) confirmed a meta-analysis that the use of continuous support for women during pregnancy and postpartum was associated with lower rates of depression for supported women. It was found that improving community support structures might be a viable means of shielding against PPD risk.

Psychological Factors and Mental Health History

While there could well be biological and genetic factors in the cause of PPD, previous mental health issues, including a history of depression or anxiety, increase the chances of getting PPD (Stewart et al., 2016). Women who have a history of depression also are more prone to developing postpartum depressive symptoms (O'Hara & McCabe, 2013). But hormonal changes while pregnant and afterwards can cause other mental health conditions to worsen to PPD at severe levels. Stress inducing life events such as marital conflict or lack of emotional support also magnify the risk (Beck, 2001). Prenatal screening for depression may help identify at risk women and can serve as an early warning system before the condition progresses further.

Obstetric Complications and PPD

It has been well documented that obstetric complications are related to PPD. Miscarriages, difficult deliveries with C-sections, births before term, and even other delivery complications increase the chances of developing postpartum depressive symptoms (Fisher et al., 2012). As indicated by Beck's (2001) study, there was a substantial correlation between PPD prevalence and prolonged labor and birth trauma. Conflict free couple(s) can be provided pain management and postnatal care services which will mitigate these risks. The development of effective maternal healthcare policies aimed at postpartum recovery as well as maternal mental health trajectory following childbirth complications can mitigate long term consequences of childbirth related complication on maternal mental health.

Application of Structural Equation Modeling in PPD Research

The tool for investigating complex relationships of several predictor variables of PPD with one dependent variable is Structural Equation Modeling (SEM). Specifically, PLS-SEM is a feasible method for a small sample size and a non-normal distribution found in the health research (Hair et al., 2017). Previous to this, SEM had been also employed to examine the interaction of biological, psychosocial and social determinants of postpartum mental health. For instance, Lau and Wong (2018) employed SEM to study the key predicting PPD and uncover that social supply and financial security had been main determinants. The essay here uses PLS SEM in order to understand the subtle aspects of PPD risk factors that can help provide evidence based policy formulation.

3. METHODOLOGY

Study Design and Sample

This was a cross sectional study on 400 post-partum women attending healthcare facilities of Patiala District Punjab. The study was done with a quantitative approach using a structured questionnaire as the data collecting instrument. To represent different socioeconomic backgrounds, government and private hospitals as well as urban and rural populations, stratified random sampling was used. Eligible women were aged 18–45 years and included women six months postpartum, and were

willing to provide informed consent. The study excluded women with severe medical complications or pre-existing psychiatric disease (other than depression).

Data Collection

Healthcare professionals together with researchers performed direct interviews with study participants to gather information. Multiple sections appeared in the questionnaire as follows:

The first set of questions gathered demographic information about interview participants' ages accompanied by their educational attainment and employment situation and their income together with marital status.

- Social Support and Mental Health History: Presence of family and community support, history of mental health issues, and stressors during pregnancy.
- Obstetric Factors: Mode of delivery, complications during childbirth, and number of previous pregnancies.

Data collectors used the Edinburgh Postnatal Depression Scale (EPDS) for assessing postpartum depressive symptoms. Research indicated PPD when the Edinburgh Postnatal Depression Scale score reached or exceeded 13 points (Cox, Holden, &Sagovsky, 1987).

The Institutional Review Board provided ethical approval while participants granted their informed consent to participate in the study. The entire research procedure maintained confidentiality together with anonymous participation.

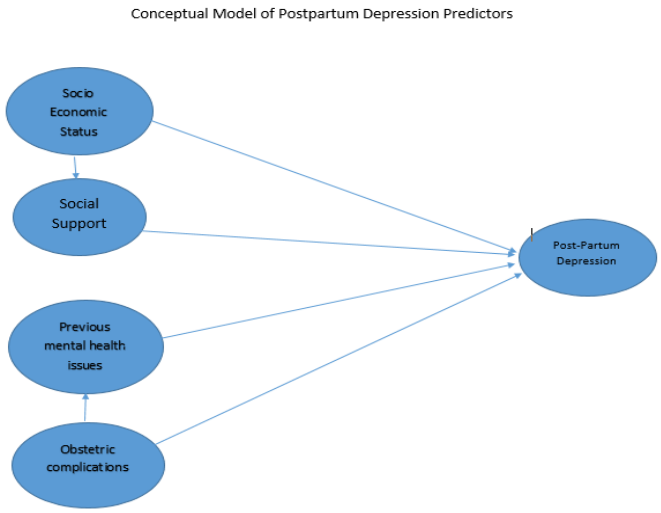
Statistical Analysis

The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 4 software. The analysis followed a two-step approach:

1. **Measurement Model Evaluation:**
    - Internal consistency reliability was assessed using Cronbach's alpha and Composite Reliability (CR).
    - Convergent validity was evaluated using the Average Variance Extracted (AVE).
    - Discriminant validity was tested using the Fornell-Larcker criterion and Heterotrait-Monotrait (HTMT) ratio.
2. **Structural Model Evaluation:**
    - Path coefficients were analyzed to assess direct and indirect relationships between predictors and PPD.
    - The coefficient of determination (R^2) was used to measure the variance explained in PPD by predictor variables.
    - The model fit was examined using the Standardized Root Mean Square Residual (SRMR), with values below 0.08 indicating a good fit.

Mediation effects were tested to examine whether social support or mental health history influenced the relationship between socioeconomic factors and PPD.

A conceptual diagram illustrating the hypothesized relationships between predictor variables and PPD was developed using SmartPLS



4. RESULTS AND DISCUSSION

Prevalence of PPD

Out of 400 respondents, 36% exhibited EPDS scores indicative of PPD. The prevalence was significantly higher among women from lower socioeconomic backgrounds ($p < 0.001$), those who reported inadequate social support ($p < 0.01$), and those with a history of mental health issues ($p < 0.05$). Women who experienced obstetric complications, such as preterm labor or emergency C-sections, also showed higher PPD prevalence.

Structural Model Analysis

The PLS-SEM analysis revealed the following significant relationships:

- **Economic instability → PPD ($\beta = 0.42$, $p < 0.001$):** Women facing financial difficulties had a higher risk of developing PPD.
- **Social support → PPD ($\beta = -0.38$, $p < 0.001$):** Increased social support reduced the likelihood of experiencing PPD.
- **Previous mental health issues → PPD ($\beta = 0.31$, $p < 0.01$):** Women with a history of depression or anxiety were more prone to PPD.
- **Obstetric complications → PPD ($\beta = 0.29$, $p < 0.01$):** Difficult childbirth experiences were associated with increased PPD risk.

The R^2 value of 0.47 suggests that 47% of the variance in PPD can be explained by these predictors. The SRMR value of 0.06 indicates a good model fit.

Mediation Analysis

Mediation analysis was conducted to explore whether social support or previous mental health history influenced the relationship between socioeconomic factors and PPD. The results indicated that:

- **Social support partially mediated** the relationship between economic instability and PPD ($p < 0.05$), suggesting that financial stress indirectly affects PPD through reduced support networks.
- **Mental health history mediated** the association between obstetric complications and PPD ($p < 0.01$), highlighting that women with prior mental health issues were more affected by childbirth complications.

This study is in agreement with previous literature that economic stability and social support are key to reducing PPD risk. As has been reported in similar studies (Lancaster et al. 2010; Dennis & Letourneau 2007), financial hardship and lack of emotional support are known to lead to higher levels of postpartum depressive symptoms. This is consistent with previous research on the role of previous mental health conditions (O'Hara & McCabe, 2013) and the importance of performing early mental health screening during pregnancy.

With regard to healthcare policies in Punjab, these results take a considerable significance. Reducing the incidence of PPD is possible with the integration of routine mental health screening into maternal healthcare services, provision of financial aid programs for the low income mothers, and establishing community based support networks. In this study, PLS-SEM is utilized as a robust data driven basis to understand the relationships between these predictors, which provides a Cassandran approach to the policy formulation.

5. CONCLUSION AND RECOMMENDATIONS

Based on gathering of data and its analysis, this study reflects the important fact that postpartum depression is rampant among women in Patiala District of Punjab. This, confirms, strong determinants of PPD are found to be socioeconomic instability, lack of social support, history of mental health issues and obstetric complications. In this, the PLS-SEM model successfully captures the intricacies between these variables with an explanation of 47% of variances in PPD. The results confirm that it is critical to intervene with measures to prevent postpartum depression risks in vulnerable populations. Its aim is to address financial instability, improve social support systems andIVO early screening programs, to significantly reduce PPD incidence and so improve maternal and child health outcomes.

Recommendations

The following recommendations are made based on the study findings.

1. **Integration of Mental Health Screening in Maternal Healthcare**: There should be routine mental health assessments incorporated for antenatal and postnatal care. Healthcare professionals would be trained to recognize early signs of PPD and their interventions would be appropriate.
2. **Strengthening Social Support Systems:** Thus, there should be establishment of community based support groups

for new mothers to provide emotional and psychological assistance. Therefore, family counseling programs should be promoted to help postpartum women get some familial support.

3. **Financial Assistance and Employment Support:** Therefore, government policies will encourage programs to give financially disadvantaged mothers financial aid. The policies in workplaces should encourage flexible arrangements for postpartum women and accommodate for extension of maternity leave.
4. **Targeted Interventions for High-Risk Groups:** Mental health mothers and mothers with recent obstetric complications should be treated with special attention. There should be such counseling and psychological support services provided to high risk individuals.
5. **Public Awareness Campaigns:** PPD should be seen as the health issue and suitable avenues such as offering awareness programs should be taken up to educate women and families on PPD symptoms, treatment options and coping mechanisms available. It will help reduce stigma attached to postpartum depression and subsequently push affected women to seek medical care at the earliest.
6. **Further Research and Policy Development:** longitudinal studies of the long term effects of PPD on maternal and child health should be undertaken. There must be policies developed with evidence based research on how to improve mental healthcare services that women can take advantage of after a delivery.

These recommendations can be put into place which can help in forming a united action plan to reduce postpartum depression in Patiala District and other regions. Better health outcomes in terms of mothers and their children will be ensured if the socioeconomic, psychological, and healthcare related factors that influence PPD are addressed.

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