The prevalence of postpartum depressive symptoms in women from a public maternity hospital in Tucumán, Argentina at 4 weeks postpartum

By

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Abstract

The prevalence of postpartum depressive symptoms in women from a public maternity hospital in Tucumán, Argentina at 4 weeks postpartum

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Objective: The primary objective of our study is to investigate the prevalence of postpartum depression at 4 weeks postpartum in women from a public hospital in Tucuman, Argentina. Our secondary objective is to determine a relationship between postpartum depression and the associated sociodemographic, medical and obstetric factors.

Methods: We conducted an observational cross-sectional study that was carried out from March 17, 2016 to May 30, 2016 and from June 28, 2016 to July 29, 2016. There were 539 participants. Women were excluded if they: Were less than 18 years old, were located in the intensive care unit (ICU), gave birth to a stillborn or recent newborn that died during delivery, with a multiple gestation, had a recent newborn in the neonatal ICU, had a recent newborn with congenital abnormalities, or gave birth at gestational age less than 28 weeks old.

Results: Of the 539 participants, 167 (31.0%) had depressive symptoms. Important risk factors for developing PPD included employment status, education level, positive personal and family history of psychiatric illnesses, perceived social stresses such as poor patient-physician relationship or lack of childcare help, and giving birth to a female newborn.

Conclusion: The high prevalence of postpartum depression (31.97%) in Tucuman demonstrates that the public sector is twice that of the private sector in Buenos Aires. This study results shows that postpartum depression is a serious public health issue and further study is needed about the cultural acceptance of mental health and how to provide adequate follow-up or treatment in a low-resource setting.

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Background/Rationale

Postpartum depression (PPD) is a debilitating mental health disorder that can develop during pregnancy or within 12 months post-delivery [1, 2]. PPD manifests as sadness, irritability, dysphoria, anxiety, insomnia, and decreased concentration, which can in turn result in impaired mother-to-child bonding[3, 4], adverse child development[3], and even suicide[5] or infanticide[6]. Unfortunately, despite its negative impact on maternal and child health, PPD is often under-diagnosed and under-treated.

PPD is one of the most frequent maternal morbidities after delivery yet the prevalence rates of PPD have been difficult to compare across studies and countries. In a literature review, Halbreich et al reported that the PPD prevalence in 143 studies conducted in 40 countries, from low to high income, varied widely from 0% to 60%[7]. The discrepancies in reported prevalence rates can be attributed to multiple factors such as length of the postpartum period under evaluation and the method of assessment [8]. While differences in study design can account for the variance of PPD prevalence rates, several literature reviews regarding PPD across different cultures have shown that socioeconomic and cultural forces, such as different dialects, perception and stigma of mental health and the utilization of a “Western” screening tool in a non-Western country, can also be driving forces for the wide range of PPD prevalence rates [7, 9, 10].

Argentina’s healthcare system is comprised of 3 distinct sectors: the labor union, the private, and the public. Women who receive care from the public hospitals are more likely to belong to a lower-middle socioeconomic class. The public sector serves about 50% of the

population, including 38% who lack formal work or cannot afford private insurance and are not eligible to receive labor union insurance funds[11]. In regards to prevalence rates, Mathisen et al found that 37.2% of middle-class women receiving care in the labor union sector (N=86) had depressive symptoms at 6-week postpartum whereas, Rozic et al estimated a prevalence of 17.8% at 5 days postpartum in 398 women in the private sector. In the labor union sector, risk factors associated with PPD were cesarean section, pregnancy complications, labor complications, multiparty, and incomplete breast feeding[12]. Conversely, important risk factors for PPD in the private sector included personal history of PPD or depression, maternal age less than 25 years old, tobacco consumption and complications in recent newborn[13].

Despite previous studies conducted in the labor union and private sectors, minimal information is available regarding the prevalence of PPD in the Argentine public sector. Prevalence of PPD in the public sector is expected to be higher than the private sector due to the increased prevalence of risk factors (lower maternal age, multiparty, lower socioeconomic status (SES), and less access to health care) in this population [14]. Thus, the primary objective of our study is to estimate the prevalence of PPD using Edinburgh postpartum depression scale (EPDS) at 4 weeks postpartum in women who delivered in a public maternity hospital in Tucumán, Argentina. Our secondary objective is examine the association between PPD and sociodemographic, medical and obstetric factors.

Methods

Setting

This observational prospective cohort study was carried out from March to August 2016 at the Instituto Maternidad Provincial Nuestra Señora de las Mercedes, a public maternity hospital located in the city of San Miguel de Tucumán, the capital city of Tucumán

province. Approximately 9,000 deliveries per year occur in this maternity hospital, the referral ward for northwest Argentina [15].

Participants and Procedures

Women were eligible if they were 18 years or older and delivered a singleton live birth 28 weeks or over of gestational age in this participating maternity hospital during the study period. Women were excluded if they were in the intensive care unit (ICU), had a recent newborn in the neonatal ICU (NICU) or had a recent newborn with congenital abnormalities. Additionally, only women with complete data for variables of interest were included in analysis. To improve study retention, women were not invited to participate if they could not provide at least 2 sources of contact information (e.g. personal or relative's telephone number, home address) or resided more than 1 hour from the maternity hospital.

Trained research personnel reviewed the Labor and Delivery book daily from Monday to Saturday, with the exception of national holidays, to identify eligible candidates for our study. Potentially eligible women were approached by research personnel prior to discharge and eligible women were informed about the objectives of the study. Those agreeing to participate provided written informed consent and were formally enrolled in the study. Following enrollment, participants completed a baseline survey collecting sociodemographic information, personal or family psychiatric history and family planning, and pregnancy and birth experience. This baseline survey was completed at the hospital 1 to 2 days postpartum. Medical and obstetric factors, including past and current pregnancies, and neonatal data were collected from the participants' clinical paper records.

Approximately four weeks after delivery, a trained social worker conducted a home visit to complete the follow-up survey, which consisted of questions regarding the woman's postpartum experience at 4 weeks and the EPDS, measuring the mother's depressive

symptomatology. Participants were considered lost to follow-up if they could not be located after 2 home visits and/or? 3 phone calls. The 4-week postpartum follow-up was chosen based on the DSM-V definition (Diagnostic and Statistical Manual of Mental Disorders) of the postpartum period. A study by Cox et al also demonstrated a threefold increase in the rate of onset of depression one month after delivery [16].

Instrument

Edinburg Postnatal Depression Scale (EPDS)

Our primary outcome was PPD, as measured by the Edinburgh Postnatal Depression Scale (EPDS)[17] at 4 weeks postpartum. The EPDS is a 10-item self-reported questionnaire that measures depressive symptoms in the past 7 days. Each item is scored on a 4-point scale (0-3), with higher scores reflecting increasing severity of depressive symptoms. Due to its ease of use, sensitivity and specificity, the EPDS has been widely accepted as a useful and quick screening tool for PPD and has been validated across different cultures and languages [7, 9].

The EPDS has been validated in various Spanish-speaking countries [18-21]. Comparing all the available validated Spanish version, we adopted the Chile version because the language was most similar to that of Argentina. The Chilean version (100% sensitivity, 80% specificity and 37% positive predictive value considering a score of 10 or more as a positive screen) is applicable for a population of middle- and working-class women[21]. In line with this version, we defined a positive screening of PPD as an EPDS score of 10 or higher or a positive response to item 10, which indicates thoughts of self-harm. Women who screened “positive” or had thoughts of self-harm were referred to the appropriate mental health professional. Furthermore, adopting the same cut-off score permits the

comparison of PPD prevalence between the private sector and labor union in Buenos Aires and the public sector in Tucumán.

Baseline characteristics

Self-reported variables collected at baseline included sociodemographic characteristics (level of education, birthplace, occupation, and with whom the mother lives), self-reported maternal and familial psychiatric history, family planning (whether this pregnancy was intended, mistimed or unwanted, using questions derived from the National Family Growth Survey[22]), and birth experience (hospitalization during pregnancy, if the woman heard her baby's first cry, and if the baby was brought to have skin to skin contact with the mother).

Medical, obstetric and neonatal variables

Upon survey completion, the interviewer extracted the following information from the mothers' paper hospital records: gestational history, history of chronic diseases, gestational age of first prenatal screening, total number of prenatal visits, complications during pregnancy, type of delivery and indications for cesarean delivery. Neonatal variables that were collected were APGAR score at 1 and 5 minutes, resuscitation requirements of the newborn, if the newborn was transferred to the ICU, gestational age at birth, birth weight and sex of the baby.

Postpartum Experience at 4 weeks

Data collected regarding maternal experience after birth included: if she received any help with the baby's care, and if so, from whom, if she was exclusively breastfeeding, if there were any complications with the baby or the mother immediately after delivery or during the period after discharge to the day of the interview, and if she experienced

disrespect from a healthcare professional during her hospital visit (defined as someone who made ironic, disqualifying or sarcastic comments to the woman or if the way the woman was attended to make her feel vulnerable, guilty or insecure).

Statistics

Sample Size

Taking into account a prior Argentine study[13] which found a prevalence of PPD of 17.8%, we determined the sample size required to estimate the prevalence of PPD with a desired precision of 5% at alpha=0.05 was 227 women. However, due to our strong interest in the secondary outcome of assessing the relationship between mode of delivery and PPD, we increased the sample size to have sufficient power to address this objective. Assuming an odds ratio (OR) of 1.4 between vaginal delivery and cesarean section with desired power=80% and alpha=0.05, 516 participants would be required. After adjusting for potential loss to follow up (10%), we targeted a sample size of 570 participants. (http://sampsize.sourceforge.net/iface/).

Data Analysis

A descriptive analysis of the maternal characteristics (sociodemographic, maternal medical and psychiatric history, and data from current pregnancy) was performed and the absolute number and proportion of women by variable of interest were reported. The prevalence of PPD and its precision (reported as 95% CI) was determined. Next, a bivariate analysis was performed to examine the relationship between PPD and covariates of interest; for each covariate category, the number and proportion of women with PPD was reported. Subsequently, crude ORs and 95% CIs were computed to measure the association between PPD and each covariate.

Finally, we conducted a multivariate analysis using hierarchical modeling. The relationship between PPD and the study variables was conceptually based on a theoretical model designed by the study investigators [23, 24].

According to this model, socio-demographic data may directly or indirectly determine all the other factors under study. The next hierarchical level comprises maternal medical history and maternal and familial psychiatric history, which can be partially explained by socio-demographic factors. The third level includes maternal medical data of the current pregnancy and the fourth level combines the experience of hospital stay and the recent newborn data. At the last level, the postpartum experience until 4 weeks may be affected by the preceding variables, and directly influence the PPD.

To create our model, we considered determinants of PPD to be those variables that showed a statistically significant association ($p<0.05$) with PPD in the bivariate analysis. In the first step of model building, the level of education of the woman was entered. Then, the variables in the second level were added; variables significant at the first level were kept in the model, regardless of whether the variables of the first level remained significant as subsequent levels were added to the model. At the second level, maternal history of depression was significant and total number of previous births was borderline significant in the bivariate analysis and thus both were added to the second level of the hierarchical model. A similar approach was used for the variables in the other levels. The reported adjusted ORs correspond to the level in which the risk factor of interest was first entered, and not from the final full model with all the variables. This prevents the mediating variables from removing some of the explanatory associations of the more distal determinants. Data was entered in the REDCap Software, Version 6.5.20 and analysis was performed using SAS 9.3. P-value <0.05 was considered statistically significant.

Ethics

The protocol, study instruments and informed consents were approved by the ethics committee of the University of North Carolina at Chapel Hill (Chapel Hill, NC, USA) and the local ethics committee, El Centro de Educación Médica e Investigaciones Clínicas (CEMIC; Buenos Aires, Argentina).

Results

1042 women were screened consecutively and of those, 706 met the initial inclusion criteria (see Figure 1). Subsequently, an additional 119 were excluded for the following reasons: did not have at least 2 sources of contact information (n=1), lived more than 1 hour from the maternity hospital (n=42), were discharged before study personnel could invite them (n=5), refused or could not provide consent (n=10), were unable to be located (n=53), or were not invited because the desired sampled size had been reached (n=8). In total, 587 women enrolled in the study and completed the initial interview. Four women were later excluded because their newborn was later transferred to the ICU prior to discharge. Of those enrolled, 559 women completed the home visit interview (95.9% follow-up rate). Of the 28 women lost to follow up, 4 refused to participate in the follow-up, 6 moved outside the city and 18 could not be located. Twenty additional women were excluded due to incomplete data, leaving a total of 539 participants for analysis.

Socio-demographic characteristics, maternal medical, psychiatric and obstetric history

The socio-demographic characteristics of participants are displayed in Table 1. Few participants were young (11.7% 18-19 years old) or old (8.7% 35 years or older). Most had at least some (32.7%) or completed secondary education or higher (44.1%). All but 4

participants (0.7%) were born in Argentina. The majority had a stable partner (72.0%) while some were married (11.7%) or single or separated (16.3%). The majority (85%) of women were housewives while the rest were either students (5.9%) or held a dependent job (4.3%) or independent job (4.6%). Only 1 respondent (0.2%) lived alone; the majority either lived with a partner (42.9%), with parents (36.0%), or with others (21%). 32.7% were nulliparous. Most did not suffer from chronic diseases (88.7%). Regarding maternal psychiatric history, a self-reported family history of depression was most prevalent in our participants (15.4%), followed by self-reported personal history of depression (11.9%). 43.8% of the pregnancy were unwanted where as 46.8% were planned. 28.8% experienced some complications during pregnancy.

Prevalence of PPD

Using a cut off score of 10 or more, overall prevalence of PPD was 31.0% (95% CI 27.1-35.1). 18.4% (95% CI 15.1%-21.6%) scored 13 or higher, indicating increased severity of depressive symptoms. 6.3% of women responding having thoughts of self-harm (item 10).

Sociodemographic data associated with PPD

Results of the bivariate analysis and hierarchical model are shown in Table 3. In unadjusted logistic regression analyses, women with dependent jobs (crude OR 3.73, 95% CI 0.96-14.5) were most likely to have PPD, followed by being housewives (crude OR 3.40, 95% CI 1.17-9.86), though the result was only significant for housewives. Depression was inversely related to education level, with women with incomplete primary (crude OR 2.43, 95% CI 1.13-5.22) followed by complete primary (crude OR 2.28, 95% CI 1.38-3.77) more likely to have depression compared to women with higher levels of education.

Maternal medical and psychiatric factors associated with PPD

In bivariate analysis, women with more previous births were at higher risk of PPD, though the relationship was only significant when comparing women with more than 2 previous births (OR 2.36, 95% CI 1.36-4.09) to women with no previous births. However, the result was insignificant after adjustment. Women with reporting a personal history of depression (crude OR 4.23, 95% CI 2.46-7.27), history of depression in previous pregnancies (crude OR 3.04, 95% CI 1.56-5.92), history of postpartum depression (crude OR 1.78, 95% CI 0.90- 3.50), family history of depression (crude OR 1.78, 95% CI 1.10-2.88) or family history of psychiatric illness (crude OR 1.99, 95% CI 1.02-3.91) were shown to have an increased risk for PPD, though history of postpartum depression did not show statistical significance. Personal history of depression remained significant in the hierarchical model, though the relationship was somewhat attenuated (adjusted OR 3.78, 95% CI 2.16-6.59) after controlling for number of previous birth and level of education.

Maternal medical factors of current gestation associated with PPD

Results of data concerning the women's current pregnancy are shown on Table 6. Unwanted or unintended pregnancy, gestational age at first prenatal visit, number of prenatal checks or complications during pregnancy showed no significant association with PPD in the bivariate analysis.

Experience of hospital stay and newborn data associated with PPD

Results related to women's experience at the hospital and to health/characteristics of the newborn are presented on table 7 and 8. Results for postpartum women who received ironic, disqualifying or joking comments made by a healthcare professional (crude OR 3.32, 95% CI 1.45-7.65) or felt vulnerable, guilty or insecure (crude OR 3.26, 95% CI 1.74-

6.11) had a significantly higher risk of PPD in the bivariate model. Women giving birth to a female newborn (crude OR 1.56, 95% CI 1.08-2.26) were also found to have significant positive association with PPD. In the hierarchical model, these results remained significant in the hierarchical model when adjusting for level of education, number of previous births, maternal history of depression, and these 3 variables. The relationship, however, for perceived negative comments or feelings of insecurity was slightly weakened (adjusted OR 2.91, 95% CI 1.15-7.36; adjusted OR 3.21, 95% CI 1.62-6.37, respectively), but for having a female newborn, it was somewhat increased (adjusted OR 1.60, 95% CI 1.07-2.38). Other variables in Table X showed no significance.

Postpartum experience associated with PPD

Results related to the women's postpartum experience are presented in table 9. In bivariate analysis, mothers who received no help with baby care were most likely to have PPD (crude OR 3.97, 95% CI 1.96-8.02), followed by women who received help from only her mother (crude OR 2.08, 95% 1.08-4.01) when compared to women with help from both her partner and her mother. Similar results were found in with the hierarchical model. Breastfeeding, complications of the newborn or the mother after discharge showed no association with PPD.

Discussion:

In our study of postpartum Argentinean women in the public sector, nearly a third of the women surveyed scored 10 or higher on the EPDS, indicating that these women are at significant risk for developing PPD. Important risk factors for developing PPD included employment status, education level, positive personal and family history of psychiatric illnesses, and perceived social stresses such as poor patient-physician relationship or lack of

childcare help.

Comparing to the previous studies of prevalence of PPD in Argentina, we found that prevalence of depressive symptoms is higher in the public sector compared to the private sector but less than those in the labor union. While this confirmed our hypothesis that the prevalence in the public sector would be higher than in the private sector, the same was not true in the labor union sector. Possible explanations for the discrepancy include differences in time frame used to measure PPD, socio-cultural factors and sample sizes. Moreover, our reported prevalence is higher than the pooled prevalence of PPD, 19.0%, within a meta-analysis that included 53 studies and represented 23 low-income and middle-income countries [25].

Employment status may also be another important risk factor for PPD. In our study, women who held dependent jobs were most likely to have PPD, followed by being a housewife; however, the association was only significant for being a housewife (with students as the referent group). Our results are inconsistent with a systematic review that showed being economically advantaged or having a permanent or a secure job was a protective factor against PPD [26]. In general, people in dependent jobs tend to have less personal control of their work-life environment. In transitioning to motherhood, these women likely have less time to care for their newborn and may struggle to balance both work and being a new mother. This rationale may explain why women in dependent jobs, in this present study, had the highest risk for PPD. Regarding the findings for housewives, dependence on one source of income from a family member would be likely cause additional financial stress, such as inability to pay for basic needs, leading to poorer mental health outcomes[27]. Thus, it appears that the nature of one's occupation and the level of

burden could potentially be influential factors in the association between occupational status and PPD.

Higher educational attainment can serve as a protective factor for PPD [26, 28] as low education level may reflect a person's social circumstances, access to healthcare services and opportunities for economic mobility. In our study, mothers with a primary level education or less were more likely to have depression compared to the mothers with higher education. This may provide a possible explanation as to why students in our study were least likely to have PPD. Thus, it does appear that low educational attainment have a high risk of PPD.

Two meta-analysis studies have shown that previous experience with depression at any point in time confers a risk for PPD [8, 29]. Thus, it was not surprising that history of depression had the strongest correlation with PPD in our study. Moreover, a family history of depression and psychiatric illness were associated with an increased risk for developing PPD in our study. For example, a prospective cohort study of a high-risk sample (n=63) during and after pregnancy reported that a positive family history was associated with the development of PPD, despite the use of medication [30]. Our results corroborate the evidence that genetic susceptibility can play a strong role in the development of mental illness.

Surprisingly, we did not find significant associations for risk factors related to maternal obstetric history and characteristics of the current pregnancy, though our adjusted results did show a non-significant trend for increasing risk of PPD with more previous births. Previous literature had shown that multiparty was significantly associated with PPD [12, 31, 32] while other studies concurred with our results [33, 34]. Potential reasons for the

discrepancy include differences in study methodology and psycho-social and cultural circumstances among the study population.

We also found that poor inter-relationship among providers and patients (characterized by comments from a healthcare professional directed towards the mother that made her feel vulnerable, guilty or insecure, or were perceived as ironic, disqualifying, or disrespectful) negatively impacts a woman's emotional well-being. Feeling lonely or unattended or the lack of personal engagement by a healthcare professional caused some of the participants to feel vulnerable. A previous qualitative study revealed that a lack of empathy or genuine interest from healthcare professional can make mothers feel disempowered and isolated and lower their self-esteem[35], resulting in an increased susceptibility to PPD. Healthcare providers can play an important role in being the first to recognize poor emotional well-being in mothers, especially those with already inadequate social support. Unfortunately, studies regarding the association of PPD and physician-patient interaction are still scarce.

The demands of childcare in the first postpartum month can be an overwhelming period for the mother, especially without a partner's support. Our study found that women who received no help with baby care were at highest risk of postpartum depression, followed by women who received help from only their mother. A meta-analysis conducted by Beck[29] found a moderate effect size of childcare stress on PPD. Examples of childcare stress include infant with health complications or problems relating to feeding and sleeping. Such stress can induce fatigue, anxiety and sleep disturbance in the mother. Unfortunately, our survey was unable to delineate "no help with baby care" as meaning a partner that was neglectfully absent or unable to help due to work day responsibility. Logsdon et al

discussed how despite having an additional aid in childcare, the mother's mother participation in childcare can generate discord through 'ambiguity with authority' and 'boundary confusion.' Similarly, in our study, women who had help from mother were associated with higher risk of PPD. The struggle of household authority among two competing mother figures can cause added emotional distress, and thus, the respondents may have felt undermined in their role as a mother. Having a female newborn also presented a risk for PPD. Little evidence exists about gender bias and its implications on mental health outcome in Argentina; however, preferences for son are entrenched in many other countries, such as China and India [37, 38]. In recent news, Argentinian women have been struggling with gender violence and inequality. As a consequence, this may reflect the possible emotional distress and societal stigma that mothers face with when having a female newborn.

In comparing risk factors for PPD in Argentina between sectors, while personal history of depression is also a risk factor for the private and the public sector, we found no other common risk factors for PPD among all three sectors. The lack of common risk factors may be related to the vast differences between the study populations between sectors. Surprisingly, perinatal complications such as complications during pregnancy, complications of the mother and the baby immediately after delivery or after discharge were found not to be significantly associated with PPD. This is inconsistent with other studies that found pregnancy and delivery complications were significant risks for the development of PPD [12, 39].

Strengths and Weaknesses

Our study had a number of strengths. We were able to minimize the potential for

selection bias by designing a consecutive cohort study where we recruited women within 1-2 days postpartum at the hospital and carried out a 4 week home visit follow up. Because we recruited women at the hospital and achieved a high four-week follow-up rate, our sample population is more representative of the general population than conducting the follow-up at well-baby check-ups, as it would include mothers who may not have access to or the means to attend these visits. By using hierarchical modeling, we were able to analyze a variety of risk factors in an appropriate manner. Due to the prospective nature of the study, use of medical records for some risk factors, and use of independent, blinded interviewers for follow-up, we limited information, detection, and recall bias. Finally, using the Chilean version allowed us to compare our reported prevalence rates in the public sector with the other study regarding the private sector in Argentina.

Our study had several limitations. We must emphasize that the EPDS is not a diagnostic tool but a screening tool to identify women at risk for PPD. Though an advantage of the EPDS is that it can be used by anyone from the community setting, in order to be clinically diagnosed with depression, an in-person structured psychiatric evaluation is required. Additionally, researchers have found that self-reported measures, like the EPDS, can overestimate the prevalence of PPD in comparison to interview-based methods [8]. Finally, during the administration of the EPDS, we had difficulty limiting the influence of a family member's presence, potentially exaggerating or minimizing the respondent's psychiatric symptoms[17].

Our study had several other limitations worth noting. As we were unable to determine household income level or account for the partner's financial contribution, we relied on proxies to determine economic status. An additional related limitation to our

estimate of PPD prevalence was the exclusion of mothers with adverse neonatal outcomes and mothers less than 18 years old; several studies have found that mothers with stillbirth, neonatal death, critically ill newborn requiring neonatal intensive care or major fetal anomaly have an increased risk of PPD [32, 40], while other studies also found that a young age is a predictor or risk factor for the development of PPD [31, 41]. Questions regarding the inter-relationship between healthcare provider and the respondent or childcare support could be subjected to the woman's perception on how she felt she was treated or the support she receives, but it does not express the external reality. In other words, people with depression are more likely to perceive their relationship with others or their level of support more negatively compared to their non-depressed counterparts, but objectively, the woman is receiving more actual support than she thought to be important[42]. Our method of measuring support was over-simplified. We did not measure social support as a multi-dimensional construct, as the mother may be receiving support from other ways such as informational support, emotional support, etc. Finally, we only recruited women who lived less than 1 hour away from the capital city, which excluded mothers living in rural areas, who may be poorer and have less access to health care. Because of our exclusion criteria, the PPD prevalence rate may actually be higher than reported.

Conclusion/Future Directions

In summary, our prospective cohort study demonstrated that PPD is highly prevalent in the public sector in Tucuman, Argentina and showed that socio-demographic related factors, social and cultural influences, and previous personal and family history of mental illness can impact the development of PPD. Our results highlight the need for improved screening and treatment to reduce the negative impact of PPD on women and their families.

In the future, the impact of improved provider and patient inter-relationship on PPD should be further explored. A formally validated version of the EPDS in Argentina is warranted to improve the differences in the language nuance, to be more applicable to women with our similar sociodemographic characteristics, and to determine the appropriate screening threshold score. Future studies including hospitals from all sectors and from different regions of the country are also needed in order to estimate the prevalence of PPD in Argentina and to further elucidate potential risk factors in order to aid future community interventions to prevent and treat PPD.

Figure 1

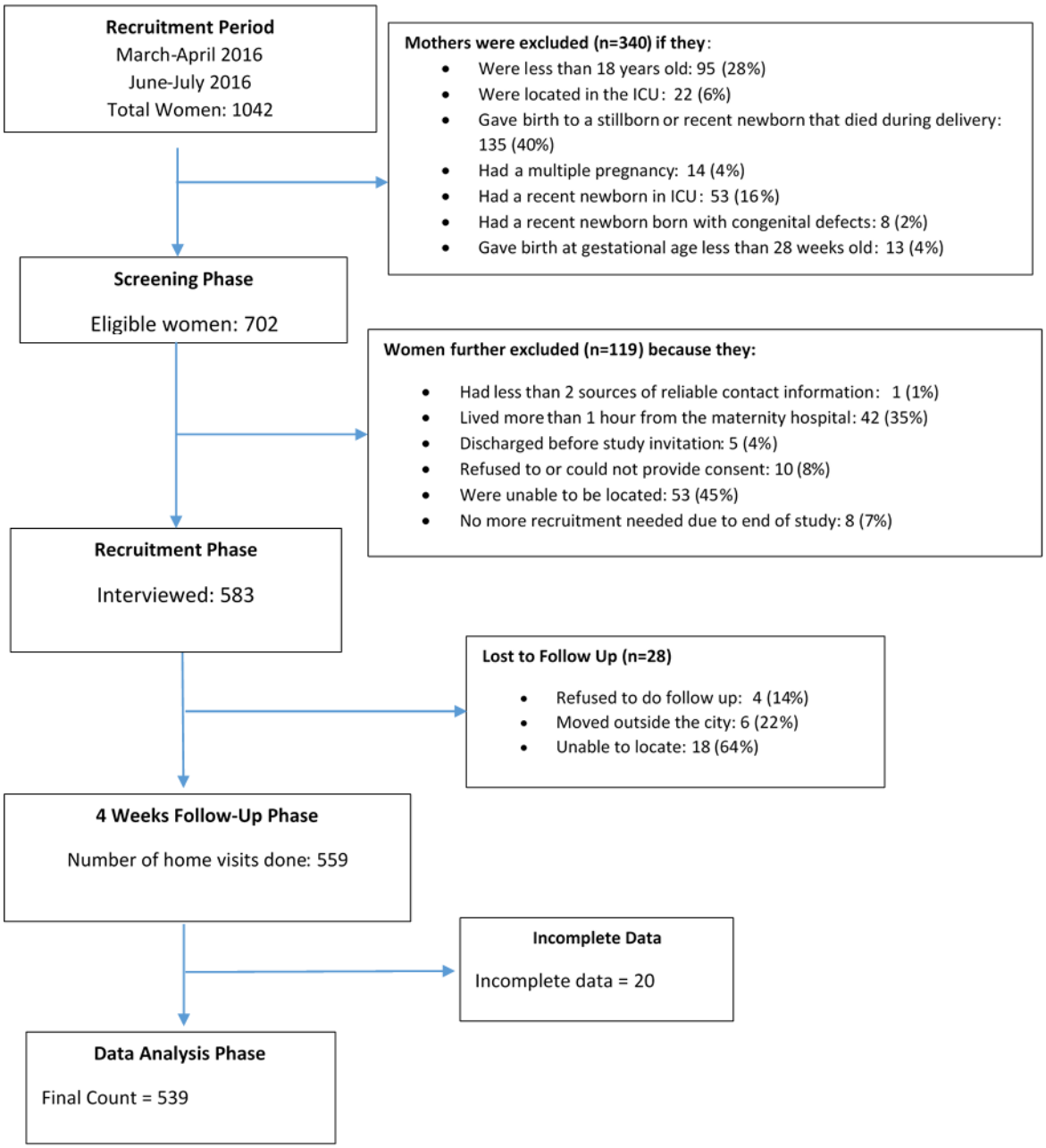

Table 1: Socio-demographic characteristics, maternal medical, psychiatric and obstetric history	n (%)
Maternal Age	
18 - 19 years	63/ 539 (11.7%)
20 - 34 years	429/ 539 (79.6%)
≥ 35 years	47/ 539 (8.7%)
Level of Education	
Incomplete primary	31/ 538 (5.8%)
Complete Primary	94/ 538 (17.5%)

Incomplete Secondary	176/ 538 (32.7%)
Complete Secondary or more	237/ 538 (44.1%)
Nationality	
Argentina	535/ 539 (99.3%)
Others	4/ 539 (0.7%)
Marital Status	
Married	63/ 539 (11.7%)
With a stable partner	388/ 539 (72.0%)
Single/separated	88/ 539 (16.3%)
Occupation	
Housewife	459/ 539 (85.2%)
Student	32/ 539 (5.9%)
Dependent Job	23/ 539 (4.3%)
Independent Job	25/ 539 (4.6%)
Live with:	
Alone	1/ 539 (0.2%)
With partner (with or without kids)	231/ 539 (42.9%)
With parents (with or without others)	194/ 539 (36.0%)
Others	113/ 539 (21.0%)
Total number of previous births	
0	176/ 539 (32.7%)
1-2	276/ 539 (51.2%)
More than 2	87/ 539 (16.1%)
Chronic Disease	
Yes	61/ 539 (11.3%)
No	478/ 539 (88.7%)
History of Depression	
Yes	64/ 539 (11.9%)
No	475/ 539 (88.1%)
History of Depression in Previous Pregnancies	
Yes	38/ 536 (7.1%)
No	498/ 536 (92.9%)
History of Postpartum Depression	
Yes	37/ 537 (6.9%)
No	500/ 537 (93.1%)
Family History of Depression	
Yes	83/ 538 (15.4%)
No	455/ 538 (84.6%)
Family History of Psychiatric Illness	
Yes	37/ 539 (6.9%)
No	502/ 539 (93.1%)
Plan Pregnancy	
Intended	252/ 539 (46.8%)
Mistimed	51/ 539 (9.5%)
Unwanted	236/ 539 (43.8%)
Complications during pregnancy	
Yes	155/ 539 (28.8%)
No	384/ 539 (71.2%)

Table 2. Positive Screening for Postpartum Depression	n (%)
Respondents who scored 10 or higher	167/ 539 (31.0%); 95% CI 27.1%-35.1%
Respondents who scored 13 or higher	99/539 (18.4%); 95% CI 15.1% - 21.6%

Table 3. Sociodemographic Data (Level 1)

Maternal Age

18 - 19 years

20 - 34 years

≥ 35 years

Level of Education

Incomplete primary

Complete Primary

Incomplete Secondary

Complete Secondary or more

Nationality

Argentina

Others

Marital Status

Married

With a stable partner

Single/separated

Occupation

Housewife

Student

Dependent Job

Independent Job

Live with:

Alone

With partner (with or without kids)

With parents (with or without others)

Others

Table 4. Maternal Medical History (LEVEL 2)

Total number of previous births

0

1-2

More than 2

History of previous abortions

0

1 or more

Chronic Disease

Yes

No

Table 5. Maternal and Familial Psychiatric History (LEVEL 2)

History of Depression

Yes

No

History of Depression in Previous Pregnancies

Yes

No

History of Postpartum Depression

Yes

No

Family History of Depression

Yes

No

Family History of Psychiatric Illness

Yes

No

Table 6. Maternal Medical Data of Current Pregnancy (LEVEL 3)

Plan Pregnancy

Intended

Mistimed

Unwanted

Gestational Age at the First Prenatal Visit

1st Trimester (13 weeks)

2nd Trimester (14 to 26 weeks)

3rd Trimester (27 or more weeks)

Number of Prenatal Checks

Less than 4

4 or more

Complications during pregnancy

Yes

No

Table 7. Experience of Hospital stay (LEVEL 4)	PPD Cases/Total (%)	Crude OR	P-Value	Adjusted OR	P-Value
Made ironic, disqualifying or joking comments					
Yes	14/ 24 (58.3%)	3.32 (1.45 -7.65)	0.0047	2.91 (1.15 -7.36)	0.0236
No	152/ 513 (29.6%)	1	-	1.00c	-
Feelings of vulnerability, guiltiness or insecurity					
Yes	25/ 44 (56.8%)	3.26 (1.74 -6.11)	0.0002	3.21 (1.62 -6.37)	0.0009
No	142/ 494 (28.7%)	1	-	1.00c	-
Accompanied by close family or friend during delivery					
Yes	123/ 411 (29.9%)	1	-		
No	44/ 127 (34.6%)	1.24 (0.81 -1.89)	0.3156		
Gestational Age (weeks)					
32-37	3/ 22 (13.6%)	1	-		
≥37	164/ 517 (31.7%)	2.94 (0.86 -10.1)	0.0859		
Type of Delivery					
Vaginal Delivery	95/ 300 (31.7%)	1.07 (0.74 -1.55)	0.7007		
C-Section	72/ 239 (30.1%)	1	-		

Did the mother hear baby cry after birth?					
Yes	162/ 519 (31.2%)	1.18 (0.41 -3.36)	0.7571		
No	5/ 18 (27.8%)	1	-		
Skin to Skin Contact					
Yes	121/ 391 (30.9%)	1	-		
No	46/ 147 (31.3%)	1.02 (0.67 -1.53)	0.9383		
Complications of the mother immediately after delivery					
Yes	12/ 43 (27.9%)	1	-		
No	155/ 496 (31.3%)	1.17 (0.59 -2.35)	0.6496		

Table 8. Recent Newborn Data (LEVEL 4)	**PPD Cases/Total (%)**	**Crude OR**	**P-Value**	**Adjusted OR**	**P-Value**
Birthweight (g)					
2000-4000	146/ 485 (30.1%)	1	-		
≥ 4000	20/ 50 (40.0%)	1.55 (0.85 -2.82)	0.1522		
Sex					
Male	74/ 281 (26.3%)	1	-	1.00c	-
Female	90/ 251 (35.9%)	1.56 (1.08 -2.26)	0.0179	1.60 (1.07 -2.38)	0.0209
Resuscitation Efforts					
Yes	17/ 46 (37.0%)	1.34 (0.71 -2.51)	0.3658		
No	150/ 492 (30.5%)	1	-		
Complications of the baby immediately after delivery					
Yes	14/ 32 (43.8%)	1.80 (0.87 -3.72)	0.111		
No	152/ 504 (30.2%)	1	-		

Table 9. Postpartum Experience until 4 weeks (LEVEL 5)

Help with Baby Care
- With no help
- With help from only partner
- With help from only mother
- With help only from partner and mother
- Help from other

Breastfeeding at the moment of the visit
- Yes
- No

Complications of the baby after discharge
- Yes
- No

Complications of the mother after discharge
- Yes
- No

Part E. References

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