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Pandemic-related stressors and mental health among women with a live birth in 2020

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Abstract

The objective of this analysis was to assess the associations between pandemic-related stressors and feeling more anxious/depressed, among women with a live birth. We analyzed data from the Pregnancy Risk Assessment Monitoring System (PRAMS) COVID-19 maternal experiences supplement, implemented in 29 U.S. jurisdictions from October 2020–June 2021, among women with a live birth during April–December 2020. We examined stressors by type (economic, housing, childcare, food insecurity, partner, COVID-19 illness) and score (number of stressor types experienced [none, 1–2, 3–4, or 5–6]). Outcomes were feeling 1) more anxious and 2) more depressed than usual due to the pandemic. We calculated adjusted prevalence ratios estimating associations between stressors and outcomes. Among 12,525 respondents, half reported feeling more anxious and 28% more depressed than usual. The prevalence of stressor types was 50% economic, 41% childcare, 18% partner, 17% food insecurity, 12% housing, and 10% COVID-19 illness. Respondents who experienced partner stressors (anxious aPR: 1.81, 95% CI: 1.73–1.90; depressed aPR: 3.01, 95% CI: 2.78–3.25) and food insecurity (anxious aPR: 1.79, 95% CI: 1.71–1.88; depressed aPR: 2.32, 95% CI: 2.13–2.53) had the largest associations with feeling more anxious and depressed than usual. As stressor scores increased, so did the aPRs for feeling more anxious and more depressed due to the pandemic. COVID-19 stressors, not COVID-19 illness, were found to be significantly associated with feeling more anxious and depressed. Pregnant and postpartum women might benefit from access to supports and services to address pandemic-related stressors/social-determinants and feelings of anxiety and depression.

Keywords

COVID-19; Pandemic; Mental health; Reproductive health; Recent live birth

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Disclaimer The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Background

The COVID-19 pandemic dramatically changed people's lives, introducing new stressors and exacerbating existing ones, leading to significant impacts on mental health (Xiong et al. 2020). Specifically, the pandemic has contributed to increased psychological distress and mental health disorders including anxiety, depression, and post-traumatic stress disorder (Xiong et al. 2020), which have the potential to impair daily functioning and diminish quality of life (Parsaei et al. 2020). Mental health conditions, including depression and anxiety, have been associated with deleterious physiological effects and can contribute to increased healthcare costs (Yaribeygi et al. 2017; Bereza et al. 2009).

Stress can have a harmful impact on the health and well-being of pregnant and postpartum women (Mulder et al. 2002; Brummelte and Galea 2010; Schetter and Tanner 2012). It has been shown that stressors experienced during pregnancy (e.g. partner and financial) are associated with postpartum depressive symptoms (Stone et al. 2015). Further, the prevalence of maternal stressors differed by individual demographic characteristics and circumstances related to social determinants of health. A 2022 study indicated that a higher composite score of COVID-19 stressors was associated with increased postpartum anxiety and depression among Black birthing individuals in Philadelphia, PA, but only among those experiencing higher levels of interpersonal or systemic racism (Njoroge et al. 2022).

The objective of this study was to assess the prevalence of experiencing COVID-19 related stressors overall and by type and composite score, among women with a live birth in 2020, and to investigate associations between stressors and feeling more anxious and feeling more depressed than usual due to the pandemic. Findings may facilitate understanding about the unique needs of pregnant and postpartum women in the context of a pandemic.

Methods

We analyzed data from 29 U.S. jurisdictions (Puerto Rico (births April–December 2020); Alaska, Connecticut, District of Columbia, Iowa, Maryland, Massachusetts, Missouri, Nebraska, Pennsylvania (Births June–December 2020); Arizona, Illinois, Louisiana, New Jersey, New York City, Oregon, South Dakota, Tennessee, Utah, Vermont, Virginia, West Virginia, Wyoming (births July–December 2020); Delaware (births August–December 2020); Arkansas, Georgia, Florida, Michigan, North Dakota (births October–December 2020) that implemented the Pregnancy Risk Assessment Monitoring System (PRAMS [<https://www.cdc.gov/prams/prams-data/researchers.htm>]) COVID-19 Maternal Experiences supplement (https://www.cdc.gov/prams/pdf/questionnaire/COVID-19-Experiences-Supplement_508.pdf), administered October 2020–June 2021 among women with a live birth in April–December 2020, and achieved a response rate of 50% or higher. Not all 29 jurisdictions administered the supplement at the same time. PRAMS is a population-based, jurisdiction-specific surveillance system designed to assess self-reported behaviors and experiences before, during, and shortly after pregnancy among women with a live birth. Individuals are sampled and contacted 2–6 months postpartum and participate in the survey by either mail or telephone interview. Data collection is typically conducted 2–6 months postpartum, but completed surveys are

accepted up to 9 months postpartum (Shulman et al. 2018). Data were weighted to adjust for sample design, non-coverage, and nonresponse to be representative of the total population of women with a live birth in each jurisdiction. Because birth certificate data are available for nonresponders and responders, non response can be adjusted for (Shulman et al. 2018).

Question CV11 of the COVID-19 Experience Supplement (https://www.cdc.gov/prams/pdf/questionnaire/COVID-19-Experiences-Supplement_508.pdf) asks, “Did any of the following things happen to you due to the COVID-19 pandemic?”. Respondents are then given a list of 13 items, with the option to choose “yes” or “no”, for each. We used question CV5 of the supplement to get the information about whether the respondent or someone in their household was ever told by a healthcare provider that they had COVID-19 while pregnant (“yes” or “no”). This analysis uses these supplement questions to focus on stressors experienced due to the COVID-19 pandemic, which we assessed in two ways. First, we grouped stressors into six types: 1) economic (respondent or household member lost job, or had reduced work hours, or respondent had problems paying the rent/mortgage or bills [CV11]), 2) housing (moved/relocated or experienced homelessness [CV11]), 3) childcare (loss of childcare or school closures, increased care-taking responsibilities [CV11]), 4) food insecurity (worried whether the food would run out [CV11]), 5) partner (increased arguments or aggression from partner [CV11]), and 6) COVID-19 illness during the pregnancy (respondent or household member told they had COVID-19 during respondent pregnancy [CV5]). Of note, not all of the 13 experiences listed in CV11 are necessarily stressors (e.g., a planned/desired move during the pandemic may not be considered a stressor). Second, we created a stressor score by summing the number of stressor types (economic, housing, childcare, food insecurity, partner, and COVID-19 illness) experienced by respondents and categorized as none, 1–2, 3–4, and 5–6. The outcomes were 1) feeling more anxious than usual due to the pandemic and 2) feeling more depressed than usual due to the pandemic. Outcome information was also derived from question CV11 of the supplement.

We calculated weighted percentages and 95% confidence intervals (CI) for the stressor types and scores by respondent characteristics including: age, race/ethnicity, highest education level, health insurance at delivery, pre-pregnancy diagnosed health conditions (diabetes, chronic hypertension, and depression), and diagnosed conditions during pregnancy (gestational diabetes; gestational hypertension, preeclampsia, or eclampsia; and depression). In this analysis, we combined race and ethnicity by first categorizing participants as Hispanic or not Hispanic. Those with an ethnicity of non-Hispanic were grouped by reported race: White, Black, American Indian/Alaska Native (AI/AN), Asian/Pacific Islander, and other/persons of multiple races. Maternal non-Hispanic Asian/Pacific Islander race was combined due to small sample size. Highest education level was categorized as high school or less and greater than high school. Health insurance at delivery was categorized hierarchically as private (private, TRICARE/CHAMPUS), Medicaid, other (other, other government plan), or none (self pay, Indian Health Service coverage) (Cohen 2019; D’Angelo et al. 2015). Chi-Squared tests were used to assess the differential distribution of outcomes by respondent characteristics or other exposure variables.

We examined the associations between stressors (types and scores) with the outcomes of feeling more anxious and feeling more depressed than usual due to the COVID-19 pandemic. We used an adjusted marginals prediction approach (allowing comparisons of outcomes between groups of people in the population, after controlling for differences in covariate distributions) to calculate adjusted prevalence ratios (aPR), adjusting for respondent age, race/ethnicity, education level, health insurance at delivery, and jurisdiction of residence to estimate associations between exposures and outcomes. SAS-callable SUDAAN 11.0 (SAS v9.4) (RTI Int., Research Triangle Park, NC; SAS Inst., Cary, NC) was used to perform all analyses on weighted data. The PRAMS study protocol was approved by the Institutional Review Boards of Centers for Disease Control and Prevention and each participating jurisdiction. This activity was reviewed by CDC and was conducted consistent with applicable federal law and CDC policy.¹

Results

The respondent sample for this analysis included 12,525 women with a recent live birth who answered yes or no to at least one stressor question of interest. Most respondents (58%) were aged 25–34 years, non-Hispanic White (55%), had completed greater than high school level of education (63%), and had private health insurance at delivery (54%). During the three months before becoming pregnant, 2% of respondents reported having type 1 or type 2 diabetes, 5% hypertension, and 15% depression. Twelve percent were diagnosed with gestational diabetes during pregnancy, 15% gestational hypertension, preeclampsia, or eclampsia, and 15% depression during pregnancy (Table 1).

Of the respondents, 50% reported experiencing economic stressors, 12% housing stressors, 41% childcare stressors, 17% food insecurity stressors, 18% partner stressors, and 10% COVID-19 illness stressors (Table 1, Fig. 1). For all stressor types, significant differences were observed by respondent race/ethnicity and health insurance type at delivery (private versus Medicaid). Non-Hispanic Black women (59%, 95% CI: 56–63) and Hispanic women (60%, 95% CI: 57–63) experienced the highest percentage of economic stressors compared with Non-Hispanic White women and Non-Hispanic Asian/Pacific Islander women. Overall, housing stressors differed by maternal race and ethnicity. While confidence intervals overlapped for estimates by racial/ethnic groups, Non-Hispanic American Indian/Alaska Native women reported the highest percentage of housing stressors (22%, 95% CI: 12–35) and non-Hispanic white and Asian/Pacific Islander women reported the lowest percentage of housing stressors (each at 9%). Childcare stressors also varied by maternal race and ethnicity, with almost 50% of non-Hispanic Asian/Pacific Islander, non-Hispanic Black, Hispanic, and non-Hispanic other/multiple race women reporting this stressor, and almost 40% of non-Hispanic white and non-Hispanic American Indian/Alaska native women reporting this stressor. Hispanic women experienced the highest percentage of food insecurity stressor (32%, 95% CI: 30–35), followed by Non-Hispanic Black women (23%, 95% CI: 21–26) and Non-Hispanic Asian/Pacific Islander (11%, 95% CI: 8–15). Twenty-two percent of Non-Hispanic Black women experienced the partner-related stressor

See e.g., 45 C.F.R. part 46; 21 C.F.R. part 56; 42 U.S.C. §241(d), 5 U.S.C. §552a, 44 U.S.C. §3501 et seq.

(95% CI: 19–25). Hispanic women experienced the highest percentage of COVID-19 illness stressor (15%, 95% CI: 13–17). (Table 1, Fig. 1).

There were differences in maternal stressors by delivery insurance. Among women with Medicaid, 64% (95% CI: 62–66) experienced economic stressors, 17% (95% CI: 16–19) experienced housing stressors, 44% (95% CI: 42–46) experienced childcare stressors, 29% (95% CI: 27–31) experienced food insecurity stressors, 20% (95% CI: 19–22) experienced partner stressors, and 12% (95% CI: 10–13) experienced COVID-19 illness stressors. Among women with no delivery health insurance, 58% (95% CI: 50–65) experienced economic stressors, 13% (95% CI: 8–19) experienced housing stressors, 44% (95% CI: 36–52) experienced childcare stressors, 29% (95% CI: 23–37) experienced food insecurity stressors, 17% (95% CI: 12–24) experienced partner stressors, and 12% (95% CI: 8–19) experienced COVID-19 illness stressors (Table 1).

Overall, 26% of respondents experienced no stressors, 53% experienced 1–2 stressor types, 19% experienced 3–4 stressor types, and 2% experienced 5–6 stressor types. Statistically significant differences in stressor scores were seen by the following maternal demographic characteristics: age, race/ethnicity, education, and delivery health insurance, and some pre-pregnancy and pregnancy health conditions. Non-Hispanic Black and Hispanic women had a higher percentage of experiencing 3–4 stressors and 5–6 stressors compared to Non-Hispanic White women. Inversely, Non-Hispanic White women had a higher prevalence of experiencing no stressors and 1–2 stressors compared with Non-Hispanic Black and Hispanic women (Table 2).

Fifty percent of the respondents experienced outcomes of feeling more anxious than usual due to the pandemic and 28% experienced feeling more depressed than usual (Table 1). Differences in these outcomes were seen by race/ethnicity and education level. A higher percentage of Non-Hispanic White women (56%, 95% CI: 54–57) experienced feeling more anxious than usual compared to Non-Hispanic Black (42%, 95% CI: 39–45), Non-Hispanic Asian/Pacific Islander (42%, 95% CI: 37–47), and Hispanic women (45%, 95% CI: 42–48). A higher percentage of Non-Hispanic White women (31%, 95% CI: 29–33) experienced feeling more depressed than usual compared to Non-Hispanic American Indian/Alaskan Native women (18%, 95% CI: 13–25). Women who had an education level greater than high school (55%, 95% CI: 53–57) reported feeling more anxious than usual compared to women with less than or equal to a high school education (42%, 95% CI: 40–44) (Table 1). Specific stressor types were also associated with these outcomes of feeling more anxious than usual and feeling more depressed than usual, including economic stressors (more anxious aPR: 1.56, 95% CI: 1.47–1.65; more depressed aPR: 1.78, 95% CI: 1.62–1.95); housing stressors (more anxious aPR: 1.35, 95% CI: 1.26–1.45; more depressed aPR: 1.64, 95% CI: 1.47–1.84); childcare stressors (more anxious aPR: 1.54, 95% CI: 1.46–1.63; more depressed aPR: 1.78, 95% CI: 1.63–1.94); food insecurity (more anxious aPR: 1.79, 95% CI: 1.71–1.88; more depressed aPR: 2.32, 95% CI: 2.13–2.53); and partner stressors (more anxious aPR: 1.81, 95% CI: 1.73–1.90; more depressed aPR: 3.01, 95% CI: 2.78–3.25) (Table 3). COVID-19 illness stressors was not significantly associated with feeling more anxious or feeling more depressed than usual (more anxious aPR: 1.09, 95% CI: 1.00–1.19; more depressed aPR: 1.02, 95% CI: 0.88–1.17).

As the stressor score increased, so did the aPRs for feeling more anxious and feeling more depressed than usual. Compared to those with no pandemic-related stressors, women who experienced 1–2 stressors had the lowest aPRs for feeling more anxious (aPR: 1.86, 95% CI: 1.70–2.03) and feeling more depressed (aPR: 2.13, 95% CI: 1.82–2.49); women who experienced 3–4 stressors had higher aPRs for feeling more anxious (aPR: 2.85, 95% CI: 2.61–3.10) and feeling more depressed (aPR: 4.48, 95% CI: 3.83–5.24); and women who experienced 5–6 stressors had the highest aPRs (more anxious aPR: 3.41, 95% CI: 3.11–3.74; more depressed aPR: 6.51, 95% CI: 5.48–7.75) (Table 3).

Discussion

Among women with a live birth April–December 2020 in 29 U.S. jurisdictions, nearly three out of four experienced at least one COVID-19 pandemic-related stressor. Race/ethnicity and education level were associated with feeling more anxious or depressed, as was experiencing economic, housing, childcare, food insecurity, or partner stressors related to the pandemic. Experiencing food insecurity and partner stressors had the strongest associations with feeling more anxious or depressed than usual due to the pandemic. Those facing food insecurity during the pandemic were 79% more likely to experience feeling more anxious and 132% more likely to experience feeling more depressed, compared to those who did not experience food insecurity. Evidence suggests pregnant people who experience food insecurity are more likely to experience anxiety and depression (Huddleston-Casas et al. 2009). Those facing partner stressors during the pandemic were 81% more likely to experience feeling more anxious and 201% more likely to experience feeling more depressed, compared to those who did not experience partner stressors. Literature has shown increased relationship tension, arguments, and difficulties due to COVID-19 and related restrictions (Luetke et al. 2020). Our estimate of increased partner stress is not a measure of intimate partner violence; however, increased risks of anxiety and depression have been documented among people who experience intimate-partner violence (Campbell 2002).

Among all stressors examined, COVID-19 illness was the least frequently reported stressor and was the only stressor not significantly associated with feeling more anxious and more depressed than usual. Of note, while COVID-19 illness during pregnancy of the respondent or someone in the household may have been stressful, it is not a traditional stressor metric. Further, we do not have any measure of COVID-19 severity. This may partially explain the lack of association with feeling more anxious and depressed. Alternatively, this could suggest that pandemic-related increases in feeling anxious and depressed may be more likely the result of broader pandemic-related factors rather than the direct effects of SARS-CoV-2 infection in a respondent's household. In a mixed-methods study that explored coping and resources needed among perinatal women during the pandemic, authors found that respondents wanted financial resources, information/research on COVID-19, access to safe healthcare, and baby supplies (Barbosa-Leiker et al. 2021). A position paper by Moreno et al. entitled, "How mental health care should change as a consequence of the COVID-19 pandemic," suggests that a priority can be retaining existing mental health services and promoting new practices that can 1) expand access to services, and 2) provide cost effective delivery of services for people with new and existing mental health disorders (Moreno et al. 2020). Alternatively, managed care and other community organizations could serve a

valuable role in enhancing support among those impacted by food, childcare, and housing insecurity (Opoku et al. 2022).

Experience of stressors due to the COVID-19 pandemic varied by race and ethnicity. Non-Hispanic Black and Hispanic women experienced some of the stressor types due to the pandemic at a higher frequency compared with Non-Hispanic White women. Existing studies show the disproportionate impact of the pandemic on hospitalization rates among people of racial and ethnic minorities, and prevalence of stress and worry, and mental health conditions among Hispanic people due to the pandemic (Romano et al. 2021; McKnight-Eily et al. 2021). Despite the higher prevalence of some stressors due to the COVID-19 pandemic among some groups of racial and ethnic minorities, Non-Hispanic White women had the highest prevalence of feeling more anxious and more depressed than usual. A 2021 study by Owens et al. similarly found that Black Americans were significantly less likely to report anxiety and depression during the pandemic despite their disproportionate experience with economic and health stressors, as well as other racial inequities during the pandemic (Owens and Saw 2021; Romano et al. 2021). The complex interplay between disparities in social determinants of health, race, and stressors associated with COVID-19 may explain this result. Other potential explanations include differences in how questions about mental health are interpreted (Owens and Saw 2021), or reluctance to seek mental health care (Plowden et al. 2016).

Overall, we observed a positive association between increasing number of stressor types experienced and self-reported feelings of more anxiety and depression. We observed the strongest associations with individual stressors for partner stressors and experiencing food insecurity, although all stressors outside of COVID-19 illness were associated with increased self-reported feelings of depression and anxiety. Efforts to mitigate the impact of these stressors on pregnant and recently pregnant women can be explored. As many stressors assessed in this study represent social determinants of health, addressing inequities within the broader social and economic context can improve mental health outcomes (Williams et al. 2008). Stressors varied significantly by type of delivery insurance, with those with Medicaid and those with no delivery insurance demonstrating experiencing the highest prevalence of stressors. Strategies may be implemented to address these inequities in mental health needs. For example, Medicaid Managed Care Organizations (MMCOs) have worked to address social and mental health needs during the pandemic, with one study observing that there was an immediate need to address food insecurity early in the pandemic, and emphasizing the importance of community partnerships with MMCOs to serve populations disproportionately impacted by the pandemic (Opoku et al. 2022).

The findings in this study are subject to limitations. The PRAMS data used in the analysis are only generalizable to women with a live birth in the 29 jurisdictions included in this study. Also, all stressors were self-reported, which 1) may lead to underestimation due to social desirability bias in the case of sensitive topics or 2) introduce recall bias. Further, some of the listed experiences may not have been considered stressful to the respondent (e.g., a planned/desired move that occurred during the pandemic may not be considered a stressor). Also, some of the experiences might be more stressful than others depending on the respondent. The data include births from April to December 2020 only, which

represented the first months of the pandemic, and estimates may have changed after this time period. Additionally, Asian American and Pacific Islander women were combined, which may mask disparities in Native Hawaiian and other Pacific Islander women. Lastly, not all 29 jurisdictions participated in this full sample period. There was variation in start-month of implementation.

Pandemic-related stressors (except for COVID illness) were associated with feeling more anxious or more depressed than usual among respondents, with disparities the prevalence of type of stressor by respondent race and ethnicity, delivery insurance, maternal age, and maternal education. This information can be used to inform strategies (in a pandemic/emergency or not) for identifying and alleviating stressors as a part of prenatal and postpartum care delivery, to address experiences of anxiety and depression, and for mitigating negative effects of anxiety and depression during and after pregnancy (Peahl et al. 2022; Reyes et al. 2021).

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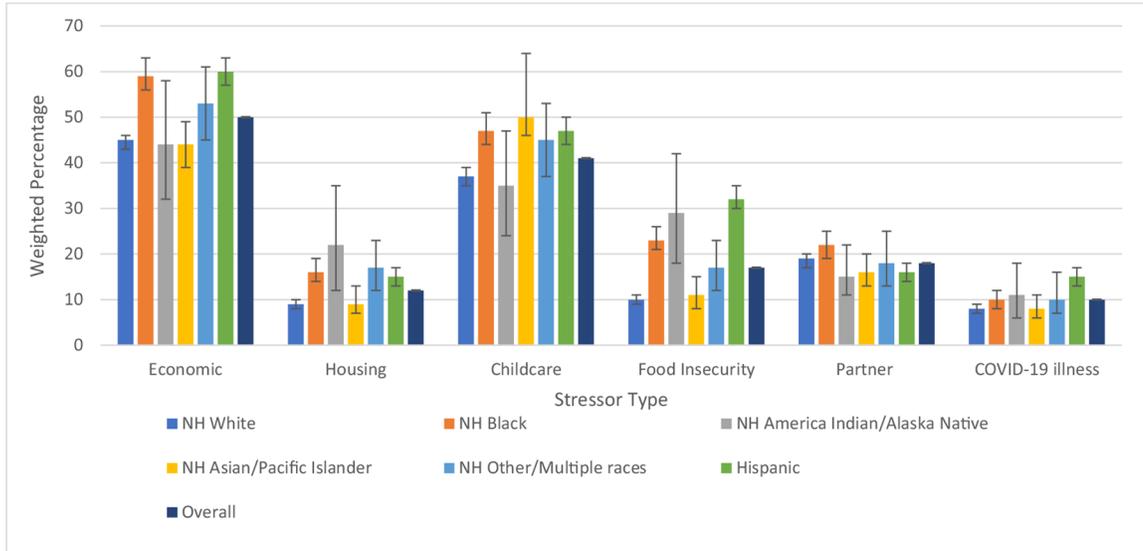


Fig. 1. The percentage of women with a live birth in 2020 experiencing selected pandemic-related stressor types by race/ethnicity, 29 Sites.^a, Pregnancy Risk Assessment Monitoring System, April 2020–December 2020. Abbreviations: Economic = Economic stressor (household member lost job, cut hours, trouble paying bills); Childcare = Childcare stressor (loss of childcare, increased care-taking responsibilities); Partner = Partner stressor (increased arguments or aggression); Food Insecurity = Food insecurity stressor (worried food would run out); Housing = Housing stressor (moved/relocated or homeless); COVID-19 = COVID-19 illness stressor (respondent or household member told they had COVID-19 during pregnancy); NH = non-hispanic.^aPuerto Rico (births April–December 2020); Alaska, Connecticut, District of Columbia, Iowa, Maryland, Massachusetts, Missouri, Nebraska, Pennsylvania (Births June–December 2020); Arizona, Illinois, Louisiana, New Jersey, New York City, Oregon, South Dakota, Tennessee, Utah, Vermont, Virginia, West Virginia, Wyoming (births July–December 2020); Delaware (births August–December 2020); Arkansas, Georgia, Florida, Michigan, North Dakota (births October–December 2020)

Select COVID-19 pandemic-related stressors overall and by respondent characteristics among women with a live birth in 2020, 29 Jurisdictions^a, Pregnancy Risk Assessment Monitoring System, April 2020–December 2020 (N = 12,525)

Table 1

| | Exposures/Stressors | | | | | | | Outcomes | | |
|------------------------------------|---|---|--|--------------------------------------|---|--|--------------------------------------|--------------------------------------|--|--|
| | Economic (respondent or household member lost job, or had reduced work hours, or respondent had problems paying rent/mortgage or bills) | Housing (moved/relocated or experienced homelessness) | Childcare (loss of childcare or school closures, increased care-taking responsibilities) | Food insecurity | Partner (increased arguments or aggression) | COVID-19 illness (respondent or household member told they had COVID-19 during respondent pregnancy) | Feeling more anxious than usual | Feeling more depressed than usual | | |
| Overall (N, %) | 6091 (50) % ^b (95% CI) | 1590 (12) % ^c (95% CI) | 5151 (41) % ^c (95% CI) | 2317 (17) % ^c (95% CI) | 2284 (18) % ^c (95% CI) | 1211 (10) % ^c (95% CI) | 6245 (50) % ^c (95% CI) | 3664 (28) % ^c (95% CI) | | |
| Demographic characteristics | | | | | | | | | | |
| Age | | | | | | | | | | |
| <20 | 4 (3–4) * | 17 (12–23) * | 28 (22–36) * | 24 (19–31) * | 20 (15–27) | 8 (5–14) * | 36 (29–43) * | 27 (20–34) | | |
| 20–24 | 18 (17–19) | 19 (17–22) | 28 (25–31) | 22 (20–25) | 21 (18–24) | 13 (11–16) | 42 (38–45) | 30 (27–33) | | |
| 25–34 | 58 (57–59) | 11 (10–12) | 42 (40–44) | 15 (14–17) | 17 (16–19) | 9 (8–10) | 52 (50–54) | 29 (27–30) | | |
| 35 | 21 (20–22) | 6 (5–8) | 55 (52–58) | 16 (14–18) | 19 (17–21) | 9 (7–11) | 55 (52–58) | 29 (26–31) | | |
| Race/ethnicity | | | | | | | | | | |
| NH White | 55 (53–56) | 9 (8–10) | 37 (35–39) | 10 (9–11) | 19 (17–20) | 8 (7–9) | 56 (54–57) | 31 (29–33) | | |
| NH Black | 15 (14–16) | 16 (14–19) | 47 (44–51) | 23 (21–26) | 22 (19–25) | 10 (8–12) | 42 (39–45) | 26 (23–29) | | |
| NH American Indian/Alaska Native | 1 (0–1) | 22 (12–35) | 35 (24–47) | 29 (18–42) | 15 (11–22) | 11 (6–18) | 42 (30–55) | 18 (13–25) | | |
| NH Asian/Pacific Islander | 6 (5–6) | 9 (7–13) | 49 (45–54) | 11 (8–15) | 16 (13–20) | 8 (6–11) | 42 (37–47) | 25 (21–30) | | |
| NH other/persons of multiple races | 3 (2–3) | 17 (12–23) | 45 (37–53) | 17 (12–23) | 18 (13–25) | 10 (7–16) | 49 (41–57) | 26 (20–34) | | |
| Hispanic | 21 (20–22) | 15 (13–17) | 47 (44–50) | 32 (30–35) | 16 (14–18) | 15 (13–17) | 45 (42–48) | 26 (24–29) | | |
| Education | | | | | | | | | | |
| High school | 37 (35–38) | 15 (13–17) | 42 (39–44) | 28 (26–30) | 18 (16–20) | 12 (10–13) | 42 (40–44) | 29 (26–31) | | |
| >High school | 63 (62–65) | 10 (9–11) | 42 (40–43) | 11 (10–12) | 19 (17–20) | 9 (8–10) | 55 (53–57) | 29 (27–30) | | |

| | Exposures/Stressors | | | | | | Outcomes | | |
|---|---|---|--|-----------------|---|--|---------------------------------|-----------------------------------|--|
| | Economic (respondent or household member lost job, or had reduced work hours, or respondent had problems paying rent/mortgage or bills) | Housing (moved/relocated or experienced homelessness) | Childcare (loss of childcare or school closures, increased care-taking responsibilities) | Food insecurity | Partner (increased arguments or aggression) | COVID-19 illness (respondent or household member told they had COVID-19 during respondent pregnancy) | Feeling more anxious than usual | Feeling more depressed than usual | |
| Delivery health insurance | * | * | * | * | * | * | * | * | |
| Private | 54 (52–55) | 7 (6–8) | 40 (38–41) | 7 (6–8) | 17 (16–18) | 8 (7–9) | 55 (53–56) | 28 (26–29) | |
| Medicaid | 42 (40–43) | 17 (16–19) | 44 (42–46) | 29 (27–31) | 20 (19–22) | 12 (10–13) | 46 (44–48) | 31 (29–33) | |
| Other | 2 (1–2) | 18 (10–30) | 41 (31–52) | 16 (9–24) | 15 (9–24) | 7 (4–13) | 39 (29–49) | 22 (15–31) | |
| None | 3 (3–4) | 13 (8–19) | 44 (36–52) | 29 (23–37) | 17 (12–24) | 12 (8–19) | 41 (33–48) | 26 (19–33) | |
| Pre-pregnancy health conditions ^d | | | | | | | | | |
| Type 1 or type 2 diabetes ^e | | | | | | | | | |
| Yes | 2 (2–3) | 10 (6–16) | 40 (32–47) | 21 (16–28) | 15 (10–21) | 12 (8–18) | 43 (36–51) | 27 (21–34) | |
| Chronic hypertension | * | * | * | * | * | * | * | * | |
| Yes | 5 (5–6) | 11 (9–15) | 47 (42–53) | 29 (24–34) | 26 (21–31) | 16 (12–21) | 54 (48–59) | 33 (28–38) | |
| Depression | * | * | * | * | * | * | * | * | |
| Yes | 15 (14–16) | 19 (16–22) | 43 (39–46) | 28 (25–32) | 35 (32–39) | 10 (8–13) | 69 (65–72) | 58 (55–62) | |
| Conditions during pregnancy | | | | | | | | | |
| Gestational diabetes | * | * | * | * | * | * | * | * | |
| Yes | 12 (12–13) | 11 (9–14) | 46 (42–50) | 23 (19–26) | 20 (17–24) | 12 (9–14) | 51 (47–55) | 33 (29–37) | |
| Gestational hypertension ^f , pre-eclampsia, or eclampsia | * | * | * | * | * | * | * | * | |
| Yes | 15 (14–16) | 13 (11–16) | 41 (38–45) | 21 (19–24) | 22 (19–25) | 14 (12–17) | 55 (51–58) | 31 (28–35) | |
| Depression | * | * | * | * | * | * | * | * | |
| Yes | 15 (14–16) | 20 (18–23) | 45 (41–48) | 31 (27–34) | 39 (36–43) | 10 (8–12) | 72 (69–75) | 66 (63–70) | |

CI = confidence interval; NH = non-Hispanic

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^gPuerto Rico (births April–December 2020); Alaska, Connecticut, District of Columbia, Iowa, Maryland, Massachusetts, Missouri, Nebraska, Pennsylvania (Births June–December 2020); Arizona, Illinois, Louisiana, New Jersey, New York City, Oregon, South Dakota, Tennessee, Utah, Vermont, Virginia, West Virginia, Wyoming (births July–December 2020); Delaware (births August–December 2020); Arkansas, Georgia, Florida, Michigan, North Dakota (births October–December 2020)

^hWeighted column percentages and 95% CIs, calculated excluding missing data

ⁱWeighted row percentages and 95% CIs, calculated excluding missing data

^jDuring the 3 months before you got pregnant with your new baby

^kNot gestational diabetes

^lHypertension that started during pregnancy

* P-value < 0.05

COVID-19 pandemic-related stressor scores overall and by respondent characteristics among women with a live birth in 2020, 29 Jurisdictions^a, Pregnancy Risk Assessment Monitoring System, April 2020–December 2020 (N = 12,525)

Table 2

| | Total | Number of stressor types ^b experienced | | | |
|--|-------------------------|---|-------------------------|-------------------------|-------------------------|
| | | No stressors | 1–2 stressors | 3–4 stressors | 5–6 stressors |
| Overall N (%) | | 3336 (26) | 6489 (53) | 2435 (19) | 265 (2) |
| Demographic characteristics | % (95% CI) ^c | % (95% CI) ^d | % (95% CI) ^d | % (95% CI) ^d | % (95% CI) ^d |
| Age [*] | | | | | |
| < 20 | 4 (3–4) | 33 (26–40) | 44 (37–51) | 21 (16–28) | 2 (1–5) |
| 20–24 | 18 (17–19) | 24 (22–28) | 49 (46–53) | 24 (21–27) | 3 (2–4) |
| 25–34 | 58 (57–59) | 28 (26–30) | 52 (50–54) | 18 (17–20) | 2 (1–2) |
| 35 | 21 (20–22) | 21 (19–24) | 59 (56–62) | 19 (17–21) | 1 (1–2) |
| Race/ethnicity [*] | | | | | |
| NH White | 55 (54–56) | 30 (28–32) | 55 (53–57) | 14 (13–16) | 1 (1–1) |
| NH Black | 15 (14–16) | 23 (20–25) | 47 (44–51) | 27 (24–30) | 4 (3–5) |
| NH America Indian/Alaska Native | 1 (0–1) | 24 (16–35) | 53 (40–65) | 21 (14–32) | 2 (1–3) |
| NH Asian/Pacific Islander | 6 (5–6) | 26 (22–31) | 59 (54–64) | 13 (10–16) | 2 (1–4) |
| NH other/persons of multiple races | 3 (2–3) | 22 (16–30) | 56 (49–64) | 18 (13–25) | 3 (1–7) |
| Hispanic | 21 (20–22) | 19 (17–22) | 49 (46–52) | 29 (27–32) | 3 (2–4) |
| Education [*] | | | | | |
| High school | 37 (35–38) | 23 (21–25) | 49 (46–51) | 26 (24–28) | 3 (2–3) |
| > High school | 63 (62–65) | 28 (26–29) | 55 (53–57) | 16 (15–17) | 1 (1–2) |
| Delivery health insurance [*] | | | | | |
| Private | 54 (52–55) | 31 (29–32) | 57 (55–59) | 11 (10–13) | 1 (1–1) |
| Medicaid | 41 (40–43) | 20 (18–22) | 48 (46–50) | 29 (27–31) | 3 (2–4) |
| Other | 2 (1–2) | 23 (15–33) | 59 (48–69) | 15 (9–23) | 3 (1–10) |
| None | 3 (3–4) | 29 (23–36) | 42 (35–50) | 26 (20–34) | 2 (1–7) |
| Pre-pregnancy health conditions ^e | | | | | |
| Type 1 or Type 2 diabetes ^f | | | | | |
| Yes | 2 (2–3) | 25 (19–33) | 54 (46–61) | 20 (14–27) | 1 (0–4) |

| | Total | Number of stressor types ^b experienced | | | |
|--|------------|---|---------------|---------------|---------------|
| | | No stressors | 1–2 stressors | 3–4 stressors | 5–6 stressors |
| Chronic hypertension [*] | | | | | |
| Yes | 5 (5–6) | 19 (15–24) | 50 (44–56) | 26 (22–32) | 4 (3–7) |
| Depression [*] | | | | | |
| Yes | 15 (14–16) | 16 (14–19) | 48 (45–52) | 30 (27–34) | 5 (4–7) |
| Pregnancy health conditions | | | | | |
| Gestational diabetes [*] | | | | | |
| Yes | 13 (12–13) | 21 (18–24) | 54 (50–58) | 22 (19–26) | 3 (2–4) |
| Gestational hypertension ^g , pre-eclampsia, or eclampsia [*] | | | | | |
| Yes | 15 (14–16) | 23 (20–26) | 52 (48–55) | 22 (20–26) | 3 (2–4) |
| Depression [*] | | | | | |
| Yes | 15 (14–16) | 14 (12–16) | 49 (45–52) | 32 (29–36) | 5 (4–6) |

CI = Confidence Interval; NH = non-Hispanic

^aPuerto Rico (births April–December 2020); Alaska, Connecticut, District of Columbia, Iowa, Maryland, Massachusetts, Missouri, Nebraska, Pennsylvania (Births June–December 2020), Arizona, Illinois, Louisiana, New Jersey, New York City, Oregon, South Dakota, Tennessee, Utah, Vermont Virginia, West Virginia, Wyoming (births July–December 2020); Delaware (births August–December 2020); Arkansas, Georgia, Florida, Michigan, North Dakota (births October–December 2020)

^bStressor types: economic, housing, childcare, food insecurity, partner, COVID-19 illness

^cWeighted column percentages and 95% CIs, calculated excluding missing data

^dWeighted row percentages and 95% CIs, calculated excluding missing data

^eDuring the 3 months before you got pregnant with your new baby

^fNot gestational diabetes

^gHypertension that started during pregnancy

^{*}p-value < 0.05

Associations between pandemic-related stressor types and score and feeling more anxious or more depressed due to the COVID-19 pandemic, among women with a live birth in 2020, 29 Jurisdictions^a, Pregnancy Risk Assessment Monitoring System, April 2020–December 2020 (N = 12,525)

Table 3

| | Feeling more anxious than usual | | Feeling more depressed than usual | |
|---|----------------------------------|---------------------------|-----------------------------------|---------------------------|
| | Total % ^b (95% CI) | aPR ^c (95% CI) | Total % ^b (95% CI) | aPR ^c (95% CI) |
| <i>Stressor Types</i> | | | | |
| Economic (respondent or household member lost job, or had reduced hours, or respondent had problems paying bills) | | | | |
| No (Ref) | 50 (48–51) | 1.0 | 50 (48–51) | 1.0 |
| Yes | 50 (49–52) | 1.56 (1.47–1.65) | 50 (49–52) | 1.78 (1.62–1.95) |
| Housing (moved/relocated or experienced homelessness) | | | | |
| No (Ref) | 88 (87–89) | 1.0 | 88 (87–89) | 1.0 |
| Yes | 12 (11–13) | 1.35 (1.26–1.45) | 12 (11–13) | 1.64 (1.47–1.84) |
| Childcare (loss of childcare or school closures, increased care-taking responsibilities) | | | | |
| No (Ref) | 58 (57–60) | 1.0 | 58 (57–60) | 1.0 |
| Yes | 42 (40–43) | 1.54 (1.46–1.63) | 42 (40–43) | 1.78 (1.63–1.94) |
| Food insecurity | | | | |
| No (Ref) | 83 (82–84) | 1.0 | 83 (82–84) | 1.0 |
| Yes | 17 (16–18) | 1.79 (1.71–1.88) | 17 (16–18) | 2.32 (2.13–2.53) |
| Partner (increased arguments or aggression) | | | | |
| No (Ref) | 82 (81–83) | 1.0 | 82 (81–83) | 1.0 |
| Yes | 18 (17–19) | 1.81 (1.73–1.90) | 18 (17–19) | 3.01 (2.78–3.25) |
| COVID-19 illness (respondent or household member told they had COVID-19 during respondent pregnancy) | | | | |
| No (Ref) | 90 (89–91) | 1.0 | 90 (89–91) | 1.0 |
| Yes | 10 (9–11) | 1.09 (1.00–1.19) | 10 (9–11) | 1.02 (0.88–1.17) |
| <i>Stressor Score</i> | | | | |
| No stressors (Ref) | 26 (25–27) | 1.0 | 26 (25–27) | 1.0 |
| 1–2 stressors | 53 (51–54) | 1.86 (1.70–2.03) | 53 (51–54) | 2.13 (1.82–2.49) |
| 3–4 stressors | 19 (18–21) | 2.85 (2.61–3.10) | 19 (18–21) | 4.48 (3.83–5.24) |
| 5–6 stressors | 2 (2–2) | 3.41 (3.11–3.74) | 2 (2–2) | 6.51 (5.48–7.75) |

CI = confidence interval; aPR = adjusted prevalence ratio; Ref = referent category

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^bPuerto Rico (births April–December 2020); Alaska, Connecticut, District of Columbia, Iowa, Maryland, Massachusetts, Missouri, Nebraska, Pennsylvania (Births June–December 2020); Arizona, Illinois, Louisiana, New Jersey, New York City, Oregon, South Dakota, Tennessee, Utah, Vermont Virginia, West Virginia, Wyoming (births July–December 2020); Delaware (births August–December 2020); Arkansas, Georgia, Florida, Michigan, North Dakota (births October–December 2020)

^bWeighted prevalence (expressed as a percentage)

^cAdjusted for maternal age, race/ethnicity, education level, health insurance at delivery, and jurisdiction of residence