Life Course Indicator: Stressors During Pregnancy

Basic Indicator Information

Name of indicator: Stressors During Pregnancy (LC-56)

Brief description: Proportion of women reporting two or more stressors during pregnancy.

Indicator category: Reproductive Life Experiences

Indicator domain: Risk/Outcome

Numerator: Respondents (women having a live birth) who reported two or more stressors during most recent pregnancy

Denominator: All respondents (women having a live birth)

Potential modifiers: Race, age, income, insurance status, English proficiency, zip code

Data source: Pregnancy Risk Assessment Monitoring System (PRAMS)

Notes on calculation: The numerator is composed of women who reported experiencing two or more stressors in the 12 months before the birth of their most recent infant. The Phase five and six core PRAMS items list the following 13 stressful life events:

1. A close family member was very sick and had to go into the hospital
2. I got separated or divorced from my husband or partner
3. I moved to a new address
4. I was homeless
5. My husband or partner lost his job
6. I lost my job even though I wanted to go on working
7. I argued with my husband or partner more than usual
8. My husband or partner said he didn’t want me to be pregnant
9. I had a lot of bills I couldn’t pay
10. I was in a physical fight
11. My husband or partner or I went to jail
12. Someone very close to me had a problem with drinking or drugs
13. Someone very close to me died

The Life Course Metrics Project

As MCH programs begin to develop new programming guided by a life course framework, measures are needed to determine the success of their approaches. In response to the need for standardized metrics for the life course approach, AMCHP launched a project designed to identify and promote a set of indicators that can be used to measure progress using the life course approach to improve maternal and child health. This project was funded with support from the W.K. Kellogg Foundation.

Using an RFA process, AMCHP selected seven state teams, Florida, Iowa, Louisiana, Massachusetts, Michigan, Nebraska, and North Carolina, to propose, screen, select and develop potential life course indicators across four domains: Capacity, Outcomes, Services, and Risk. The first round of indicators, proposed both by the teams and members of the public included 413 indicators for consideration. The teams distilled the 413 proposed indicators down to 104 indicators that were written up according to three data and five life course criteria for final selection.

In June of 2013, state teams selected 59 indicators for the final set. The indicators were put out for public comment in July 2013, and the final set was released in the Fall of 2013.
Analysts who use the raw datasets should apply the appropriate survey weights to generate the final estimates.

**Similar measures in other indicator sets:** None

**Life Course Criteria**

**Introduction**
Defined broadly, "stress" experienced during pregnancy is a prime example of the life course health development model posited by Lu and Halfon (2003) which combines the concepts of early life programming and cumulative wear and tear on the body's allostatic system; the stress experienced by a pregnant woman becomes a fetal exposure that contributes to early life programming, impacting the trajectory of her offspring, while the stress she experiences contributes to her overall allostatic load and impacts her future reproductive and health potential.

The experience of stress ultimately impacts pregnancy outcomes through both direct and indirect mechanisms. Physical stress, such as standing for long periods of time during work, impacts direct biological functions like reducing blood flow to the uterus; psychosocial stress, including items in the PRAMS stressful life events scale, impact pregnancy outcomes indirectly by eliciting hormonal and immune stress responses that prepare the fetus for early delivery and survival (Hobel and Culhane 2003). Researchers have demonstrated impacts from stress on fetal growth, preterm labor and complications of labor and delivery (Tambyrajia and Mongelli 2000). Maternal stress in pregnancy also has been linked to elevated cortisol in utero (Coussons-Read, Lobel, & Carey et al., 2012). Additionally, elevated levels of depression and anxiety during pregnancy have been associated with obstetric complications, preterm labor and use of pain relief under labor (Adler et al 2007).

There is evidence that the experience of stress during pregnancy impacts not only a woman’s health and her birth outcomes, but also birth outcomes across generations. Studies focused primarily on birth weight have demonstrated that a mother who was born low birth weight is more likely to have a child born low birth weight, that the fetal environment (including the experience of stress by the mother during pregnancy) impacts the health of that adult, including coronary artery disease and hypertension risk, and that the impact of maternal weight on the weight of her offspring is independent of factors such as receipt of adequate prenatal care (Emmanuel 1986, Barker et al 1993, Coutinho et al 1997, Collins et al 2003).

**Implications for equity**
Pregnancy is a critical and sensitive period in the life course of a woman; her life experiences prior to and during pregnancy have the potential to directly impact the health of her children and her children’s children, as well as the overall health and well-being of her family. Despite decades of work to reduce disparities in birth outcomes, two- and three-fold differences in infant mortality, low birth weight, preterm birth, and other health outcomes persist. As proposed by Lu and Halfon (2003), if the persistent disparity in outcomes is at least in part attributable to the impact of racism experienced by African Americans over generations, it is essential to monitor women’s experiences of discrimination and the experiences of stressful life events, particularly those experienced immediately before and during pregnancy.

While an examination of stressful life events could not explain the racial/ethnic disparities in preterm birth (Lu and Chen 2004), this study did find significant disparities in the experience of stressful life events between women in minority racial/ethnic groups, with Black and American Indian/Alaska Native women reporting the highest number of stressful life events in the 12 months before delivery. Another study reported that women with low socioeconomic status were more likely to experience stressful life events than other women (Whitehead et al 2005). A report from Michigan PRAMS found that the prevalence of low numbers of stressful life events (zero, one or two events) in the twelve months before delivery increased with increasing age, educational attainment, and socioeconomic status (Michigan Department of Community Health 2004). The impact of stress on pregnancy health is dependent upon the severity and duration of the stress, the maternal perception of the severity, and coping mechanisms available to mitigate the stressful event(s). Hamilton and Lobel describe different types of coping strategies for pregnancy stress and note that avoidance coping was associated with high state anxiety (anxiety in response to a perceived dangerous or threatening situation) and pregnancy-specific distress while spiritual and planning coping mechanisms were associated with optimism (2008).
Public health impact
The experience of stressful life events in the 12 months before delivery, as measured through the PRAMS survey, has been associated with poor birth outcomes, such as preterm birth (Whitehead et al 2002) and other risk factors and outcomes such as physical abuse (Martin et al 2001) and postpartum depression (Herrick 2000). Poor birth outcomes, such as preterm birth and low birth weight, impact children, families, and communities emotionally, developmentally, and economically. For a premature infant, the normal patterns of interaction for both parent and child are disrupted, making it difficult for bonding to occur (Goldberg 1979). Among children born extremely low birth weight (401–1000 g), those that survived to 18 months were at increased risk for neurologic abnormalities, developmental delays, and functional delays (Vohr et al 2000). The total economic cost for medical care, early intervention, and special education services, and for lost household and labor market productivity was estimated to be $51,600 per preterm birth in the United States in 2005 (Behrman & Butler (Eds.), 2007). The reduction of stressful life events could result in improvement in women’s health overall and in birth outcomes such as preterm birth and low birth weight, and also could potentially result in improving the overall health and development of children in the United States, with implications for education and health care costs in addition to public health.

Leverage or realign resources
Because the nature of “stress” before and during pregnancy is so varied, there are many partners that can be engaged in promoting healthy pregnancies. Healthy pregnancies start before conception, and the National Initiative on Preconception Health and Health Care (PCHHC) has a vision for improving preconception health and pregnancy outcomes that includes opportunities to address stress and identify mental health issues prior to pregnancy (CDC 2012). The PCHHC goals include improving the knowledge, attitudes, and behaviors of men and women related to preconception health, creating health equity and eliminating disparities in adverse maternal, fetal, and infant outcomes, ensuring that all women of childbearing age in the United States receive preconception care services—screening, health promotion, and interventions—that will enable them to achieve high levels of wellness, minimize risks, and enter any pregnancy they might have in optimal health, and reducing risks among women who have had a prior adverse maternal, fetal, or infant outcome through interventions during the postpartum and interconception period.

The Office of Adolescent Health (OAH) provides Pregnancy Assistance Fund grantees with training and technical assistance around a variety of topics, including building partnerships. The grantees are implementing programs to assist pregnant and parenting teens, and the OAH encourages them to consider engaging non-traditional community partners for their endeavors, including everything from grocery stores to law enforcement in addition to “legacy” partners such as social services.

The impacts of poor birth outcomes for children and families continue throughout the life span; infants born preterm and/or low birth weight and survive may face lifelong health and developmental challenges. Education partners are instrumental in ensuring that children reach their fullest developmental potential, and would be a unique partner to engage when thinking about how to reduce stress and promote resiliency.

Although the types of stressful events noted in the PRAMS question and the physiologic responses to those stressors occur mainly on an individual level, Hogue and colleagues endeavor to explain the mixed results of studies examining the relationship between stress and birth outcomes such as prematurity, and posit that the use of the host-environment-agent conceptual framework helps to explain how context is important (Hogue et al 2001). The framework integrates the strength of the agent (stress) with the characteristics of the host, including the host’s susceptibility to stress, coping ability, and environment or context in which that host lives. This framework provides guideposts for intervention at key points along the life course, including the need to promote healthy communities that support resiliency in the face of unanticipated stressors, the need to create supportive work environments that allow preconception, pregnant, and parenting women flexibility to handle stressful events, and the need to develop strategies that promote resilience and healthy coping across the life span. Such efforts may complement partnerships to reduce exposure to stressors for women across the life course and especially during pregnancy, including the promotion of developing and sustaining healthy relationships, access to family and social support systems (e.g. the Centering Pregnancy model of group prenatal care) as well as resources to reduce financial hardships (partnerships with housing and homeless services agencies or financial counselors), and expedited entry into maternal mental health services.
Home visiting services have been designed to support pregnant women and families and improve a variety of outcomes; the Home Visiting Evidence of Effectiveness review (HomVEE) found that, among programs that met inclusion criteria, home visiting is a promising strategy to engage high risk families that may need more supportive services (Avellar and Suplee 2013). Home visiting programs have the potential to mitigate maternal adversity and allow mothers to develop strong relationships with their children, thereby reducing the risk that children are exposed to toxic stress (Garner 2013).

**Predict an individual’s health and wellness and/or that of their offspring**

In addition to impacts on pregnancy, stress contributes to other behaviors that have negative impacts on pregnancy outcomes: women who were not able to quit smoking during pregnancy experienced significantly higher stress levels due to financial, family, and domestic violence problems when compared with women who were able to quit smoking (Bullock et al 2001). Women with multiple stressors tend to report more self-coping “risky behaviors”, such as smoking, alcohol and substance use (Ahluwalia, Mack, & Mokdad, 2004). Additionally, stress experienced in the first trimester by low-income women was associated with poor diet quality; this is a sensitive period for fetal development (Fowles, et al 2012).

The impact of experiencing stressful life events, anxiety, and depression immediately prior to and during pregnancy extends beyond birth outcomes such as low birth weight and preterm birth; studies have demonstrated that the health and development of infants is impacted in the first year of life and beyond. Experience of prenatal stress, as measured both by maternal self-report and cortisol measurements, was shown to be associated with infant health including general, respiratory, and skin illnesses as well as antibiotic use (Beijers et al 2010). Laplante and colleagues found that exposure to stress prenatally in the form of a natural disaster event was associated with lower cognitive and language ability when assessed at age five and a half years (2008).

**Data Criteria**

**Data availability**

The Pregnancy Risk Assessment Monitoring System (PRAMS) was initiated in 1987. PRAMS is an ongoing population-based surveillance system designed to identify and monitor selected maternal experiences and behaviors that occur before and during pregnancy and during the child’s early infancy. Forty states and New York City currently participate in PRAMS, representing approximately 78 percent of all U.S. live births. Six other states previously participated. The Centers for Disease Control and Prevention (CDC) maintains a combined dataset with information from all participating PRAMS states, which represents approximately 87 percent of all live births in the United States. CPONDER is a Web-based query system created to access data collected through Pregnancy Risk Assessment Monitoring System (PRAMS) surveys.

The length of time between an event and entry into the sampling frame is typically two to six months. Because PRAMS data are weighted to the final birth file, there is a data availability lag between the close of a calendar year and access to the final PRAMS dataset. As of July 2013, the most current year of data available in CPONDER was 2008.

Although the 40 states and one city that participate in PRAMS have access to their own state data, only states where the minimum response rates have been met are included in CPONDER. For 2000-2006, this required response rate was 70 percent, and for 2007-08 it was 65 percent. The required response rate may limit the availability of a “national” estimate through CPONDER, but states with PRAMS are encouraged to use their own data whenever possible.

The PRAMS survey consists of core questions that all states must include and standard, pilot-tested questions that states may choose to add. In addition, PRAMS allows states to design and add their own questions, and the state is responsible for completing question testing before the question can be included. PRAMS data is available from CDC by submitting a proposal for and data sharing agreement to CDC. Data from a single state can be requested from the state’s PRAMS coordinator.

The questions used for this indicator are core questions on the PRAMS module, meaning they are used in every state (40 states, plus New York City) conducting PRAMS. However, not all states are participating in PRAMS.

**Data quality**
PRAMS is a mixed-mode surveillance system that combines mail and telephone surveillance. Each year’s sample is weighted to represent all births that meet the inclusion criteria before reporting. Unlike many health surveys, the PRAMS project has a wealth of information from the birth certificate on those who do not respond by either mode of contact, and therefore weighting can be effective at minimizing differences between respondents and non-respondents.

Since the PRAMS survey is completed retrospectively by a woman two to six months after her birth outcome, some bias may occur due to self-reporting and recall. PRAMS is sampled from live births only, so the data do not include information on other pregnancy outcomes such as abortions, miscarriages, or stillbirths; the data do include responses from women who have experienced an infant death. PRAMS is sampled among singleton, twin, and triplet births, and therefore it is not representative of higher order births.

Most states oversample for low birth weight, and stratification by mother’s race or ethnicity also is possible. Typically, the annual sample is large enough for estimating statewide risk factor proportions within 3.5 percent at 95 percent confidence. Estimated proportions within strata are slightly less precise (typically, they are estimated within five percent at 95 percent confidence).

PRAMS has a minimum overall response rate threshold policy for the release of data. For years 2006 and earlier, this threshold was 70 percent. Beginning in 2007, the threshold changed to 65 percent. For any given year, the majority, but not all states meet the threshold. For this reason the number of states with data available may vary from year to year.

There is no standard definition of preconception counseling provided and no specific time parameters on the question. To date, there is no specific information available about the quality of data from the PRAMS stressful life events scale.

**Simplicity of indicator**

States participating in PRAMS should have the capacity to calculate this indicator and technical assistance would be available from CDC. The indicator should be easy to describe to the public and professionals as it can be described as a percentage or a number of women per 100 women. Comparisons with extracted birth certificate data can be presented in graph or chart form. A limitation in interpretation of analyses using the list of 13 stressors is whether all of the listed life events are equally stressful; these are all life events that are disruptive, particularly during pregnancy, and there is evidence that there are threshold effects for some outcomes (Whitehead et al 2002). The list of stressors can be grouped into four categories, including partner-related stressors, financial stressors, emotional stressors, and traumatic stressors. Analyses by these groupings are available on CPONDER.

**References**


Goldberg, S. (1979). Premature Birth: Consequences for the Parent-Infant Relationship: The normal pattern of interaction in which both infant and parent initiate and respond to mutually complementary behavior is difficult to establish when the infant is premature. American Scientist, 67(2), 214-220.


