FULL PROTOCOL TITLE: Mitigating the Effects of Prenatal Stress from Hurricane Harvey on Preterm Birth and Associated Neurodevelopmental Delay

INSTRUCTIONS:

- *All referenced Checklists, Worksheets and SOPs are available to the research team in the Library located on the electronic database. Additional guidance may be found on the Human Subjects/IRB website, accessible through the UH Division of Research Compliance webpage.*
- *Use the following protocol template ("TEMPLATE PROTOCOL (HRP-503)" to prepare a document with the information from following sections.*
- *Depending on the nature of what you are doing,* ***some sections may not be applicable to your research and may be deleted as indicated within the template. If not indicated as a section that can be deleted, mark as "N/A."*** *For example, research involving a retrospective chart review may have many sections with N/A.*
- *When you write/update this protocol, keep an electronic copy. This is a "living document" and you will need to modify this copy when making changes to submit to the IRB.*
- ***As you are writing the protocol, remove all instructions in italics so that they are not contained in the final version of your protocol.***

PRINCIPAL INVESTIGATOR:

Name: Johanna Bick
Department: Psychology
Telephone Number: 713-743-1058
Email Address: jrbick@uh.edu

Table of Contents

1.0 Objectives

1.1 Describe the purpose, specific aims, and/or objectives.

Thirty years of research has demonstrated the clinically significant effects of a very simple and affordable intervention: 15-20 minutes of expressive writing over 3-4 days. An online system could potentially deliver this intervention to hundreds of pregnant women at once. There is currently a critical need for such an intervention in Harris County and Houston, Texas where 72,000 babies will be born in the year following Hurricane Harvey. Our goal is to test the efficacy of this simple intervention to improve pregnancy outcomes, maternal well-being, and infant neurodevelopment in a large sample of women affected to varying degrees by Hurricane Harvey in late August, 2017. Beginning in late September we will begin recruiting women who were pregnant during, or became pregnant in the 6 months following, Hurricane Harvey. We will adapt the University of Alberta website that we designed for the CIHR-funded Fort McMurray (FMM) Mommy Baby Study to screen, recruit, and assess the sample for pregnancy status, level of hurricane-related stress, and demographics. The online system randomly assigns participants to one of 3 treatment groups, and administers the intervention. Early FMM data suggest that the online writing intervention predicts significant improvement in maternal mental health at 6-months postpartum. We hypothesize that this intervention, applied to victims of Harvey, will reduce risk of preterm birth, and improve maternal mental health post partum. The current grant, leveraging the work done for the FMM fires, could immediately improve outcomes in a large, disaster-affected population, and could fill gaps in our understanding of prenatal stress in humans.

Our primary aim will test the ability of the writing intervention to improve pregnancy outcomes and maternal mental health and maternal perceptions about their infants' development. We will administer measures at baseline, two months after completing the intervention, and once the baby turns six months of age. The large-scale data set generated from this study will allow for population-level understanding of the effects of disaster-related stress exposure on maternal stress and birth outcomes.

State the hypotheses to be tested.

Study Objective: to examine the ability of the expressive writing intervention to improve three domains: maternal mental health, pregnancy and birth outcomes. Specific objectives, hypotheses, and data analytic plans.

Hypothesis for Objective 1. We hypothesize that, controlling for the severity of objective PNMS, mothers who completed the expressive writing intervention will show significantly greater reductions in PTSD symptoms than those who received the control intervention or no intervention

Hypothesis for Objective 2. We hypothesize mothers who completed the expressive writing intervention will show reductions in preterm births and associated complications compared to those who received the control intervention or no intervention.

Hypothesis for Objective 3. We hypothesize that infants of mothers who received the expressive writing intervention will have better growth, cognitive and motor development at six months of age.

This study may be continued if these first objectives are accomplished and if additional funding is ascertained. If so, we will continue follow up assessments to occur at later stages of development. For now, we are only requesting ethics approval for assessments that last until infants are six months of age. The focus of this study is on pregnancy related stress associated with Hurricane Harvey exposure, maternal adjustment and birth outcomes.

2.0 Background

1.2 Describe the relevant prior experience and gaps in current knowledge.

Study Introduction. Hurricane Harvey of August 2017 presents an opportunity to conduct a natural experiment within, arguably, one of the most vulnerable communities in the United States: Harris County in Houston, Texas, which includes approximately 4.5 million residents

(and 6.5 million in greater Houston). The scope of the damage is estimated at $190 billion; 32,000 families were displaced during the storm. There are 72,000 babies born each year in Harris county, which has high rates of teen pregnancy (8.9%) and preterm birth (11.9%)[1] Based on parameters described by the Center of Disease Control Division of Reproductive Health for Harris County, an estimated 54,000 women were pregnant at the time of Hurricane Harvey and another 36,000 will conceive within the six months following Hurricane Harvey for a total of 90,000 births in the population we wish to study. Hence, the magnitude of the disaster is ideal for determining the effects of PNMS because Hurricane Harvey provided a sizeable sample of pregnant women, has the qualities of being unrelated to maternal personality traits (unlike many life events), and had a relatively sudden onset (unlike many life events) allowing careful assessment of any moderating effects of the timing of the hurricane in preconception or pregnancy. This disaster presents a rare opportunity to test the effectiveness of a large-scale, web-based intervention which has relatively low costs compared to psychotherapy or support groups.

The Natural Experiment. Growing research on fetal programming (Barker) and the Developmental Origins of Health and Disease (DOHaD) suggests that multiple environmental risk factors operating on the mother before, during, and after pregnancy can influence development of the child in ways that lead to long term risk for maladaptive outcomes. Increasing attention has been paid to the environment and experiences of the mother during pregnancy; consequently, prenatal maternal stress (PNMS) has become an important subject of research. Reviews of the animal[2-4] and human[5,6] reviews on PNMS suggest that stressing the pregnant or preconception animal, or maternal exposure to depression or adverse life events in human pregnancy, including adverse childhood experiences or chronic abuse,[7] is associated with negative pregnancy outcomes (e.g. preterm birth, gestational diabetes, preeclampsia, fetal growth restriction). Further, burgeoning evidence suggests that pre- and postpartum anxiety, depression, and trauma symptoms have adverse effects on offspring development.[2,8,9] However, most human PNMS research fails to approximate the internal validity inherent in animal research in which pregnant dams are randomly assigned to PNMS conditions, the timing in gestation is punctual, controlled, and consistent across

animals, and in which genetic confounds can be avoided through strain selection and cross-fostering.

Opportunities for Intervention. Several studies show that simple interventions with highly anxious mothers, including reassurance of the fetal health using additional ultrasound sessions,[21] can protect against poor perinatal outcomes; there remain significant gaps in the literature.[22] The challenge to which we are responding is to provide a simple, but effective, intervention to large numbers of pregnant women immediately and all at once. Results will answer questions of significant public health importance, and inform the development of future intervention efforts for vulnerable families exposed to disaster-related stress.

1.3 Describe any relevant preliminary data. Reference previously approved IRB protocols (by number), if applicable.

Dr. Suzanne King and her team from McGill University have been studying the effects of prenatal exposure to the Quebec Ice Storm of January 1998 (Project Ice Storm). They recruited nearly 200 women who were pregnant during the ice storm or who became pregnant within 3 months after the storm. At recruitment, 5 months after the disaster, the women completed questionnaires on their objective degree of exposure (or "hardship"), their subjective distress (i.e., their PTSD symptoms), and their cognitive appraisal of the disaster (as an overall negative, neutral, or positive experience). Results showed that exposure to the storm in the first or second trimester resulted in, on average, 1-2 weeks shorter gestation compared to the pre-conception and 3rd trimester-exposed groups. A subjective distress-by-timing interaction showed that high maternal distress predicted lower birth weights (by ~500g) when the ice storm occurred in mid-gestation. As well, the higher the mothers' levels of subjective distress from the ice storm, the greater the "head-sparing" effect in boys, that is, the larger the head relative to body length at birth.

Project Ice Storm has followed the children's cognitive development throughout childhood and adolescence. They found that the mothers' objective degree of exposure to the storm (e.g., more days without power) explained 12% of the variance in their infants' Bayley IQ scores (a 0.75 SD difference between low and high objective stress), and

explained 17% of variance in receptive language abilities at age 2 years, after controlling for birth outcomes; these effects were especially significant when exposure occurred in early pregnancy. These effects on cognitive and language development continued through age 5 years and throughout childhood.

Project Ice Storm has also demonstrated the programming power of objective PNMS on body mass index and obesity at age 5 (OR = 1.37); this association steadily increases in magnitude between age 5 (r = 0.23) and 15 (r = 0.34). Greater objective PNMS also predicts greater insulin secretion (r = 0.62) and pro-inflammatory cytokines (r = 0.42 - 0.46) in adolescence. The team has also shown powerful associations between the children's DNA methylation in adolescence and both objective PNMS and maternal cognitive appraisal; this association with epigenetic markers of PNMS significantly mediates the effects of PNMS on child outcomes such as BMI and cytokines. Subjective and objective PNMS also predict outcomes such as autistic-like symptoms at age 6 (r = 0.43 and 0.45), and internalizing and externalizing problems throughout childhood with correlations in the range of 0.40 - 0.50.

King's group is following two other prenatal disaster-exposed cohorts that are replicating results from Project Ice Storm. The Iowa Flood Study is finding similar effects of PNMS on child cognitive development, with PNMS in early pregnancy predicting adiposity at ages 2 and 4. The Queensland Flood Study (QF2011) in Australia reported that 3rd trimester exposure is a vulnerable period for motor development as was also found in Project Ice Storm.

Life-long and trans-generational effects of prenatal maternal stress. In an Edmonton study from Olson's laboratory, women who were subjected to either two or more adverse childhood experiences prior to the age of 18, or abuse as an adult, had a higher risk for preterm birth some ten years later at a mean delivery age of 28. Studies in rats carried out at the University of Lethbridge in the laboratory of Dr. Gerlinde Metz have shown that prenatal maternal stress in the parental (or F0) generation is transmitted to daughters, granddaughters and great granddaughters where it causes preterm delivery, delays in offspring motor skills, altered behaviours and increases in anxiety. These are mediated, in part, by epigenetic events. In other studies, Dr. Metz and

her colleagues have demonstrated that the addition or accumulation of stresses in one generation lead to the same adverse outcomes (e.g. preterm birth, altered offspring development) in another generation as observed in their transgenerational or multigenerational models. They have also demonstrated that the accumulation of at least two stresses in one generation can lead to preterm delivery and other adverse reproductive and generational effects, whereas exposure to only one stress was tolerated without effect. The good news is that moving the pregnant dams from the stressful environments to enriched environments diminishes many of the stress mediators and improves outcomes. Hence these studies demonstrate in humans and animals that prior life experience or stress has impacts at least one decade later, that stresses can be passed on to successive generations, that stress can be accumulated or additive, which worsens its effects, but also that interventions exist that reduce the level of stress mediators and mitigate their adverse outcomes.

Effects of stress upon preconception women. While there are very few studies examining stress on preconception women and their pregnancy and offspring outcomes, two very large studies of administrative data from Sweden and Denmark have demonstrated profound effects of stress in prenatal (during pregnancy) and preconception (prior to pregnancy) women on birth outcomes. More than 3 million pregnancies in Sweden from 1973 to 2009 were examined for the effect of an acute major stress (defined as death of a child, sibling, parent or father of a child) on birth outcomes when the stress occurred 0-6 months preconception. The results showed that preconception stress predicted increases in the rate of preterm birth and small for gestational age (SGA) babies and in infant mortality. It appeared that the 0-6 months preconception period was a particularly vulnerable one because preconception stress occurring in the 7-12 or 13-18 month periods before conception were not associated with preterm delivery. Prenatal stress was not found to predict infant mortality in either unadjusted models or those adjusted for birth outcomes such as preterm birth and SGA status. When assessing the gestational period by trimester, they also failed to find any significant associations between prenatal maternal stress and infant mortality. However, there was a correlation between prenatal stress and preterm birth, and between prenatal stress and SGA status. The results of this study were repeated in a second study using Danish data

Pilot Data for this study: This study replicates (web-based design of intervention pre and post pre-natal disaster related stress) and improves (larger sample) upon the CIHR/Alberta Health funded FMM study, (UH is not a recipient of this grant) directed by Drs. Olson and King, testing the effectiveness of the expressive writing intervention for pregnant mothers exposed to wildfires in FMM, Alberta (The Fort McMurray Mommy Baby Study (P.I. D. Olson, U Alberta), funded in 2016 by a CIHR/Alberta Health grant). Therefore, the web-based design in the current proposal is an exact replication of the Fort McMurray Study.

Preliminary data from the Fort McMurray study points to intervention effectiveness in reducing neonatal complications following forest fire exposures, $F(2,52)=2.67$, $p=.05$ partial eta squared=.108. Post hoc tests revealed that mothers assigned to the expressive writing conditions reported fewer neonatal complications ($M=.19$, $SD=.92$) compared to the control writing condition ($M=1.0$, $SD=.92$). Further, compared to controls, women reported lower levels of perceived stress, $F(2,53)=3.15$, $p=.05$, partial eta squared = .106, when their infants was 4 months of age. These data not only demonstrated study feasibility but offer preliminary data supporting a main hypothesis of the study: that writing-based intervention can support improvements in maternal mental health and child outcomes suffering from post-disaster distress.

1.4 Provide the scientific or scholarly background for, rationale for, and significance of the research based on the existing literature and how will it add to existing knowledge.

Rationale: To a certain extent, pregnant humans are self-selected into many prenatal "stress" conditions through heritable conditions such as depression and anxiety, and through non-independent life events such as interpersonal discord. In order to approximate the random assignment of stress in animal studies, and to avoid genetic confounds inherent in most human PNMS studies, principal investigator King has been studying women exposed to sudden-onset natural disasters for 20 years. Her CIHR-funded longitudinal studies, *Project Ice Storm*, *Iowa Flood Study*, and *QF2011 Queensland Flood Study*, are able to disentangle the effects of the mothers' disaster-related exposure, cognitive appraisal, and subjective distress from their postpartum depression and on their children's development. These studies

demonstrate significant effects of one or more of these aspects of the mothers' stress experience on maternal mood,[10,11] birth outcomes,[12,13]and the cognitive,[8,9,14] behavioral, [9,15,16] and emotional development, (in addition to motor [15,17] and physical [18-20] delays) of their children. Further, the results of these studies often suggest that the timing of the stressor *in utero*, can moderate the impact of the stressor on pregnancy, birth and postnatal maternal and infant outcomes. In this study, we extend prior human and animal research further by examining the extent to which these adverse outcomes may be mediated by altered trajectories of infant neural and behavioral development[2] *Opportunities for Intervention.* Several studies show that simple interventions with highly anxious mothers, including reassurance of the fetal health using additional ultrasound sessions,[21] can protect against poor perinatal outcomes; there remain significant gaps in the literature.[22] The first challenge to which we are responding is to provide a simple, but effective, intervention to large numbers of pregnant women immediately and all at once. A second challenge is to then understand the impact of the stress exposure on neurodevelopmental trajectories of the offspring, and the ability of the intervention to "buffer" the PNMS effects. Results will answer questions of significant public health importance, and inform the development of future intervention efforts for vulnerable families exposed to disaster-related stress.

3.0 Inclusion and Exclusion Criteria

1.5 Describe the specific criteria that define who will be included or excluded in your final study sample. Make sure to include age.

Participants will include English-speaking women aged 18-45 who resided in the greater Houston area and who were pregnant at the time or who conceived within six months of Hurricane Harvey's landing (August 25, 2017); as such, will recruit women giving birth or with due dates between August 25, 2017 and November 25, 2018. Women who do not complete the consent and recruitment questionnaires will not be eligible for the next stage of the project, the web-based expressive writing intervention.

Exclusion criteria will include (1) non English speaking women, who (2) were not exposed to Hurricane Harvey on August 25, 2017, (3) were not pregnant at the time of Hurricane Harvey, or are not currently pregnant, or (4) women do not complete the questionnaires at the

baseline assessment or intervention.

There are no exclusionary criteria for infants of mothers who will be invited to participate in this study.

1.6 Describe how potential subjects will be screened for eligibility based on these criteria.

Participants will respond to two questions on the web-based platform:

1. Were you living in the greater Houston area during Hurricane Harvey?
2. Were you pregnant at the time, or have you become pregnant since then?
3. What is your full name (optional)
4. What is your date of birth? (mandatory)
5. Email (mandatory to send study link)

If mothers respond yes to these question, and are between 18 and 45 years of age, they will be eligible for the study.

1.7 Indicate specifically whether you will include or exclude each of the following special populations: (You may not include members of the populations listed below as subjects in your research unless you indicate this in your inclusion criteria.)

- ***Pregnant women: YES***
- ***Economically and/or educationally disadvantaged persons: YES***
- *Adults unable to consent: NO*
- ***Individuals who are not yet adults (infants, children, teenagers): YES***
- *Prisoners: NO*
- *Students for whom you have direct access to/influence on grades: NO*

4.0 Vulnerable Populations

1.8 If the research involves individuals who are vulnerable to coercion or undue influence, describe additional safeguards included to protect their rights and welfare.

- *If the research involves pregnant women, review "CHECKLIST: Pregnant Women (HRP-412)" to ensure that you have provided sufficient information.*

- *If the research involves neonates of uncertain viability or non-viable neonates, review "CHECKLIST: Neonates (HRP-413)" or "HRP-414 – CHECKLIST: Neonates of Uncertain Viability (HRP-414)" to ensure that you have provided sufficient information.*

- *Individuals who are economically/educationally disadvantaged may be susceptible to undue influence and coercion, and are therefore also considered a vulnerable population. Special protections should be in place to ensure that participants' incentives for research participation are proportionate with the risks, discomforts and inconveniences involved in the research, and financial or other gains are not overly compelling. Additionally, recruitment materials should not promise "free" treatment or emphasize the medical care that participants may receive during the research; recruitment processes should be carefully designed to ensure participation is truly voluntary; and, to ensure equity in enrollment, other factors should be considered, such as the burden of cost for child care or transportation. Additional safeguards must be considered during the consent process; consent documents must be written in language that is easily understandable to participant, the possibility of illiteracy or limited reading skills, and the need for communicating in foreign languages must be considered and addressed.*

5.0 Number of Subjects

LOCAL:

1.9 Indicate the total number of subjects to be accrued locally.

Maximum1000

1.10 If applicable, distinguish between the number of subjects who are expected to be enrolled and screened, and the number of subjects needed to complete the research procedures (i.e., numbers of subjects excluding screen failures.)

Not applicable

1.11 If not provided in the "study-wide" section, provide justification for the number of subjects. A power analysis is required for research that is more than minimal risk.

In the current study, we expect to recruit 1000 mothers and infant dyads (for a total of 2000 participants) and maintain a sample size of at least 800 over the course of the study.

With this sample size and an alpha of .05, we have sufficient power (.80) to detect findings with small effect sizes (*Cohen's D* = .2; partial eta squared = .009 or higher); our preliminary data from the FMM suggests intervention effect sizes in the small to medium range; this is consistent with prior work testing expressive writing interventions.[23,33] Therefore, we have sufficient power to test the models proposed in this larger Hurricane Harvey study.

6.0 Recruitment Methods

LOCAL:

Describe when, where, and how potential subjects will be recruited.

Participant recruitment will take place in several ways.

1. We will recruit mothers on-line via social media. Specifically, we will create a facebook page targeting pregnant mothers in Houston who were affected by Hurricane Harvey. No identifying information will be requested on our facebook page. Specific information on content for our facebook page is described in an attached document.

   The facebook page will direct mothers to our secure study website, to be developed after materials are approved, where they will receive more information about our study, complete screening questionnaires, and provide consent, if interested. We are waiting until our materials are approved by UH IRB before launching our website; We include our website content in this proposal; the website will be named, houstonharveybaby.com. This website will be developed by our collaborators who developed a similar website, www.mommmybabyfmm.ca, for their previous study, which this UH study replicates. As in the prior study, participants will enter information on this website, which will go to a secure server.

2. We will also post ads in local newspapers and will advertise through local radio stations. Advertisement content is described in an attached document.

3. Dr. Bick's team will also recruit through local community centers that serve pregnant women. Research staff will distribute fliers to personnel/clinic staff. Study staff will ask personnel/clinic staff to post fliers in waiting rooms. See flier in the attached document.

1.12 Describe the source of the subjects

The source of our participants are women who lived in Houston at the time of Hurricane Harvey and were pregnant at the time, August 25, 2017, or became pregnant before February 25th, 2017 (six months following the Hurricane). Participants who respond to ads and meet eligibility criteria will be included in the study.

1.13 Describe the methods that will be used to identify potential subjects.

Mothers who are interested in the study will be directed to our website. The website page will provide a brief explanation about the study and will ask them to complete two screening questions to assess eligibility

1) What is your date of birth?

2) where you living in Houston or greater Houston area affected by Harvey (August 25th?) or have you become pregnant since then?

3) Were you pregnant at the time of Harvey (August 25, 2017) or are you pregnant right now)?

Mothers who respond "no" to question A and B or C will not be eligible for this study. They will receive the following message: "Thank you for your interest in this study however, unfortunately you do not meet our inclusion criteria and are therefore not eligible. Please click 'Submit' to close the survey."

If mothers are 18 and over, and respond "yes" to any of the eligibility criteria, they will receive the following message: "Thank you for completing the survey. You are eligible for this study. Before we proceed, we need you to provide consent for your participation. Once you provide consent, you will be taken to the questionnaires. We will also send you an email containing a link. This link will allow you to

return to the questionnaires in the future. If you do not receive the email, please check your spam folder. Please do not use the original Harvey baby study link as this will start the registration process and will create duplicate entries in our database."

Once mothers provide consent, the following message will be shown on the screen: "Thank you for agreeing to participate in our study. Now, you will be taken to the questionnaires. We will also send you an email containing a link. This link will allow you to return to the questionnaires in the future. If you do not receive the email, please check your spam folder. Please do not use the original Harvey baby study link as this will start the registration process and will create duplicate entries in our database."

1.14 Describe materials that will be used to recruit subjects.

- *Submit copies of these documents with the application as an attachment to the SmartForm.*

Attached are copies of the following recruitment material:

- Facebook page content (to be created upon approval)
- Fliers to be posted in community agencies and pre-natal clinics
- Content that will be used for newspaper and radio ads
- Web-site for study screening, consent, all pre and post-intervention assessments, and intervention assignment and delivery.

The website and link to the surveys is:

http://vantageppc.com/harvey-study/

7.0 Multi-Site Research Communication

This is not a multi-site study. Recruitment and data management will be directed by Dr. Bick's laboratory at the University of Houston.

Collaborators at the University of Alberta are creating our redcap data base. This is a replication of a study that is currently taking place in Alberta, Canada, and it is more efficient for them to copy their existing database and store data there, so that the project recruitment can get underway.

The PI and recap team, Dr. David Olson, Rick Watts, and Shana Rimmer, and currently getting approval from their IRB office at the University of Alberta.

This is necessary as they will have access to confidential information associated with redcap data collection, until the database is transferred to the University of Houston, after its development is complete and a data manager is secured.

Therefore, all data, including identifying information, will temporarily be kept on the University of Alberta server linked to the Harvey Study redcap data base. However, Dr. Bick has access to this data base. Her team will oversee data entry, data quality control, and weekly data exportation to Dr. Bick's lab, and ongoing data analyses. Recruitment, intervention assignment, and study progress will be monitored by Dr. Bick's lab.

Given that recruitment of participants is extremely time sensitive, Dr. Bick has consulted with Kristin Rochford about going ahead with IRB approval through the University of Houston. However, approval will not be granted until the study is also approved at the University of Alberta.

8.0 Study Timeline

Recruitment: IRB approval to November of 2018

Baseline visit: IRB approval to November of 2018

Intervention: IRB approval to November of 2018

2 month post assessment: 2 months post IRB approval to January 2018

6 month post partum assessment: 6 months post IRB approval to March 2018

1.15 Describe:

The total duration of an individual subject's participation in the study; and The number, frequency and length of study visits

All mothers who are assigned to one of two writing groups will complete a baseline assessment (90 minutes).

One third of mothers will be assigned to a control group a writing intervention (10 minutes a day for four days), a 2-month post intervention assessment (90 minutes) and a 6-month post-partum assessment (90 minutes). Therefore, the total participation will be approximately 5 hours and 10 minutes. Mothers who are assigned to a control group will not participate in the writing group, but will participate in the recruitment assessment, another assessment 2 months after their initial assessment, and another assessment when their baby reaches 6 months of age. Therefore, their total participation will be approximately 270 minutes.

Mothers do not have to complete all of the questions at one sitting. Mothers will be invited to complete the web-based questionnaires for each assessment over a 7 day period. Regardless of how many questions they complete, they will be paid 20 dollars after completion.

The duration anticipated to enroll all study subjects

Enrollment of participants will take place between start date of study approval and February 25, 2018

The estimated date for the investigators to complete this study (complete primary analyses).

The estimated completion date of this study is March, 2019.

9.0 Study Endpoints

1.16 Describe the primary and secondary study endpoints.

The primary study endpoint is when mothers complete the 6-month post-partum visit. The last eligible pregnant mother will be recruited in February 25th, of 2017 (for mothers who are pregnant within the six months following Hurricane Harvey). Therefore, the last 6-month post-partum visit will take place at the end of March, 2018.

1.17 Describe any primary or secondary safety endpoints.

N/A

10.0 Procedures Involved

1.18 Describe and explain the study design.

Consent will be required for study participation including surveys and questionnaires. All questionnaires and expressive writing intervention will be delivered online through the secure web-based platform. Responses will be confidential; participants will be de-identified; subject numbers will be assigned to each participant and used to label all data provided in this study. They will be analyzed to provide information that may associate with or predict risk for a preterm birth, another adverse pregnancy outcome or demonstrate the effectiveness of an intervention. Links between subject numbers and identifying information will stored in a separate data base from any responses to questionnaires or intervention responses.

Once consent is provided, women will complete a set of recruitment questionnaires, replicating those in King's other PNMS studies. Demographic data, including parental education, income, job classification, and housing status (to reflect socioeconomic status), age, marital status, household income, and medical and prenatal history (previous pregnancy, current pregnancy including due date and prenatal complications).

Phase 1:

The following measures will be administered. All measures are attached in as supplementary material.

- Demographics
- Objective stress
- IES-R
- PDI
- PDEQ
- Harvey IDAS-40
- Nutrition

Description of Measures listed above:

Objective stress: The Iowa Flood 100 (IF100) scale, modified for Harvey, obtains data about the women's exposure in terms of threat, loss, scope and change.

Peritraumatic Distress and Dissociation. The degree of distress experienced during the disaster as recalled at a later point in time is assessed with the 13-item Peritraumatic Distress Inventory (PDI). Peritraumatic dissociation is assessed using the 10-item Peritraumatic Dissociative Experiences Questionnaire (PDEQ).

Current PTSD symptoms will be assessed using the 22-item Impact of Event Scale – Revised (IES-R).

Depression and Anxiety. Mothers depression will be assessed using the inventory for depression and anxiety symptoms formatted for this study (IDAS-40).

Nutrition: Womens' dietary changes due to disaster exposure will also be collected, as following procedures used in the previous Queensland floods study.

Phase 2:

Immediately following the completion of the baseline questionnaires, mothers will be randomly assigned to one of three groups. Random assignment to one of three groups :

- Expressive writing Intervention
- Non-expressive writing intervention

- No-writing group

Scripts for each group are attached as supplementary material.

Phase 3:

The following measures will be administered, 2-months following the completion of the intervention:

- IES-R
- IDAS
- Coping (Brief Cope)
- Social Support (PSS)

All measures are attached in as supplementary material.

Description of Measures listed above:

Depression and Anxiety. Mothers depression will be assessed using the inventory for depression and anxiety symptoms formatted for this study (IDAS-40).

Coping. Maternal Stress will be assessed with the Brief Coping Questionnaire.

Social support. Levels of social support will be assessed with the perceived social support measure (PSS).

Phase 4:

The following measures will be administered when babies turn 6 months of age. All measure are attached in as supplementary material.

- Demographics
- IDAS
- LEQ
- ASQ
- IBQ
- Birth outcomes
- Infant Feeding

Description of Measures listed above:

Maternal Mental Health will be assessed in three domains with the IDAS. Stressful life events since the hurricane will be assessed with the LEQ.

Maternal perception of child outcomes will be assessed with the Ages and Stages Questionnaire (ASQ) once infants turn 6 months of age. Mothers will also be asked to report on their infants' temperament using the Infant Behavior Questionnaire (IBQ). Mothers will also report on their child birth outcomes and feeding using the Kinney Birth Outcomes and Infant Feeding measures, respectively.

1.19 Provide a description of all research procedures being performed and when they are performed.

All measures are attached as supplementary material.

1.20 Describe:

- *All interventions, drugs, devices, and biologics used in the research, the purpose of their use, and (for drugs, devices, and biologics) their regulatory approval status*

Expressive Writing Intervention for Post-Disaster Stress Exposure. Since the 1980's James W. Pennebaker has developed, tested and refined a simple intervention to help people deal with stressors utilizing expressive writing.[23] In his landmark study [24] the expressive writing group had significantly superior immune function and wellbeing compared to the controls. Short bursts of writing (i.e., 15-20 min) are sufficient to allow for emotional disclosure (the active ingredient in the intervention),[23-25] and to improve physical and immune functioning.[26-31] The writing accesses innermost thoughts and feelings and is a self-reflective learning activity allowing for review and cognitive processing of what has been written,[32] and thereby relieves anxiety and builds resilience.[25,28,3334] In the present study, participants are being randomly assigned to three treatment groups developed in consultation with Dr. Pennebaker for the FMM study: (1) a no writing control group, (2) a writing group addressing non-emotional issues of healthy lifestyle (active control group), and (3) a group that writes about their innermost thoughts and feelings about the disaster (active group). The online format makes participant involvement easy and convenient, even at a

distance.[32] Participation will take place through the automated portal, allowing 15-minute writing sessions with prompts for writing topic. For this study, the expressive writing intervention will be administered to the women regardless of whether they have returned to their homes in Houston or not, thanks to our online approach to outreach and intervention. *Measures.* Assessment batteries will be administered online and at several time points that are relevant to (a) the timing of Hurricane Harvey, or (b) pregnancy and postpartum (See appendix A for measure details).

Details about the Expressive Writing Intervention for Post-Disaster Stress Exposure. Since the 1980's James W. Pennebaker has developed, tested and refined a simple intervention to help people deal with stressors utilizing expressive writing.[23] In his landmark study [24] the expressive writing group had significantly superior immune function and wellbeing compared to the controls. Short bursts of writing (i.e., 15-20 min) are sufficient to allow for emotional disclosure (the active ingredient in the intervention),[23-25] and to improve physical and immune functioning.[26-31] The writing accesses innermost thoughts and feelings and is a self-reflective learning activity allowing for review and cognitive processing of what has been written,[32] and thereby relieves anxiety and builds resilience.[25,28,3334]

In the present study, participants are being randomly assigned to three treatment groups developed in consultation with Dr. Pennebaker for the FMM study: (1) a no writing control group, (2) a writing group addressing non-emotional issues of healthy lifestyle (active control group), and (3) a group that writes about their innermost thoughts and feelings about the disaster (active group).

The online format makes participant involvement easy and convenient, even at a distance.[32] Participation will take place through the automated portal, allowing 15-minute writing sessions with prompts for writing topic. For this study, the expressive writing intervention will be administered to the women regardless of whether they have returned to their homes in Houston or not, thanks to our online approach to outreach and intervention.

Details about Random Assignment: Then the subjects will be randomized into 3 groups: control, intervention, and no writing. The

control and intervention groups will receive an on-line writing intervention. They will be asked to write for 15 minutes per day each day for four consecutive days. The control group will be asked about the health factors. The intervention group will be asked to write about their deepest, inner-most feelings about Hurricane Harvey and it consequences. Following writing on days 1-3, control and intervention groups will complete a 5 minute daily writing reflection. After the 15 minutes of writing on the 4th day, the 2 groups will complete a 10 min. post-intervention writing reflection.

- *The source records that will be used to collect data about subjects. (Attach all surveys, scripts, and data collection forms to the SmartForm)*
- See attached
    - Consent forms
    - Recruitment (Baseline assessments
    - Phase 2 Questions (Writing group intervention instructions)
    - Phase 3 Questions (2 month post-intervention assessments)
    - Phase 4 Questions (6 month post-partum assessments)
    - Mental Health Referrals in the event that suicide items are endorsed.

1.21 What data will be collected, including long-term follow-up?

Data will be collected until children reach four months of age.

In the initial consent form administered prior to the baseline assessments, mothers will be asked to provide additional consent that they agree to be contacted at a later date if the study is extended, of if they are eligible for future studies. Only mothers who provide documented consent will be re-contacted.

1.22 If helpful, a flowchart/timeline can be created and attached to the SmartForm as supplemental information.

See attached timeline included as supplementary material.

11.0 Setting

1.23 Describe the sites or locations where your research team will conduct the research.

- *Identify where research procedures will be performed.*

  All recruitment, consent, pre and post intervention assessments and intervention participation will be web-based.

- *Describe the composition and involvement of any community advisory board.*

  none

1.24 Include, as an attachment to the SmartForm, any applicable Letters of Support/Cooperation, IRB Approval(s), School District Approvals, etc. to recruit potential subjects and/or conduct research at these specified sites

A letter of support from our collaborator who is helping us design our data base is attached.

12.0 Drugs or Devices

N/A

13.0 Risks to Subjects

1.25 List the reasonably foreseeable risks, discomforts, hazards, or inconveniences to the subjects related the subjects' participation in the research. Include as may be useful for the IRB's consideration, describe the probability, magnitude, duration, and reversibility of the risks. Consider physical, psychological, social, legal, and economic risks.

Risks associated with participation in this project are considered minimal.

It is possible that the intervention group may feel some psychological stress after the writing exercise since they will be asked to write down (15 min/day x 4 days) their deepest inner-most feelings about their experiences with the wildfire. Based upon previous application of this intervention though, it appears that this is a temporary experience and the longer-term experience is a very positive one.

It is possible a distressed subject in either group may reveal in her writing or queries to the research coordinator an indication of severe psychological stress.

Or a subject may feel they just want to share a psychological stress at any time with the study coordinator.

1.26 If applicable, indicate which procedures may have risks to the subjects that are currently unforeseeable.

None

1.27 If applicable, indicate which procedures may have risks to an embryo or fetus should the subject be or become pregnant.

None

1.28 If applicable, describe risks to others who are not subjects.

Not applicable

1.29 Describe procedures being performed to monitor subjects for safety

The data base is designed to monitor responses that endorse suicide.

If participants provide a response that indicates thoughts of suicide or self harm (items 12: I had thoughts of suicide, item 32: I thought about killing myself) at any level above "not at al" such as "a little bit", "moderately", "quite a bit", or "extremely" on the inventory of depression and anxiety symptoms (IDAS), their data will be flagged by the redcap data base. These participants will receive an automated email. The email message will say, "One or more of your responses on the questionnaires you just completed for project Harvey Baby indicated that you are thinking about or considering suicide. We care about your well being and your safety. Therefore, we proving you with a list of resources that may help you. Please access the following link to learn about the following resources: A suicide hotline to talk about your feelings of suicide, which you can call right now. An additional list of webpages for residents of Houston access free and local and convenient mental health resources.

1.30 Describe procedures performed to lessen the probability or magnitude of risks.

We will explain to participants that any discomfort may be a temporary

effect of the intervention, but that it is expected the longer-term feeling will be one of satisfaction and relief.

14.0 Potential Benefits to Subjects

1.31 Describe the potential benefits that individual subjects may experience from taking part in the research. Include as may be useful for the IRB's consideration, the probability, magnitude, and duration of the potential benefits.

From reports of the intervention it is likely that the subjects will feel some degree of stress relief by completing the intervention.

Mothers assigned to the control intervention are considered less likely to direct benefit to the participation in this study. However, preliminary data the previous study suggest reduction in stress symptoms in mothers who are assigned to the non-expressive writing control group. There are no expected benefits for mothers assigned to the non-writing group.

Information that we gather may help develop methods to better prevent preterm labor or to predict those pregnant women best able to come through a disaster with the best outcome

1.32 Indicate if there is no direct benefit. Do not include benefits to society or others.

Note: Remuneration for research participation should not be included as a benefit to the subjects.

15.0 Provisions to Monitor Data to Ensure the Safety of Subjects

This section is required when research involves more than Minimal Risk to subjects. If you would like assistance in determining if the research is more than minimal risk, please contact the IRB office.

N/A

16.0 Withdrawal of Subjects

1.33 If applicable, describe anticipated circumstances under which subjects will be withdrawn from the research without their consent.

Not applicable

1.34 Describe any procedures for orderly termination.

Not applicable

1.35 Describe procedures that will be followed when subjects withdraw from the research, including partial withdrawal from procedures with continued data collection.

If subjects decide to withdraw from the study, they will be asked whether 1) the agree to have their exciting data included in analyses or 2) if they want their data to be destroyed. If they request that their data is destroyed it will be deleted from the server and/or shredded. None of their data will be used in analyses.

17.0 Costs/Payments to Subjects

1.36 Describe any costs that subjects may be responsible for due to their participation in the described research.

None

1.37 Describe the amount and timing of any payments or inducements to subjects.

After the completion of each phase of the study, mothers will be sent gift cards via email in the amount of 20 dollars. A total of 4 payments of 20 dollars will be provided to women who complete all study visits. All procedures, as stated according to UH financial office will be following when procuring and distributing gift cards used for confidential human subjects studies, such as this one.

Gift cards will be purchased from https://www.giftcardmall.com/virtual-visa

For each phase of the study, participants will be told they will receive the full remuneration even if they do not complete all measures at that phase.

18.0 Confidentiality

1.38 Describe the local procedures for maintenance of confidentiality.

As part of consent, mothers will be informed that their identifiable information will be protected and that their participation in the study is confidential. All identifying information will be stored in a separate secure date base or in a locked cabinet in a locked room. Only study

personnel will have access to identified or de-identified data in this study.

1.39 Describe what direct identifiers will be obtained and any coding systems that will be used for study data (and specimens, if applicable). Note that:

Participants' names and addresses will be collected as part of recruitment and retention, and to verify that families live in the target area at the time of Hurricane Harvey.

1.40 Will anyone outside the research team have access to the identifiers?

The team in Alberta will have access to identifying information in their secure password protected database.

1.41 How long will the key to the study code be maintained? If not destroyed following data collection, provide justification for maintaining.

The key to the study codes will be maintained throughout the duration of the study. They will be kept separate from the data, and stored in a password protected file on a secure server.

1.42 If audiotaping is conducted, will the recordings be destroyed upon transcription? If not, provide justification.

N/A

19.0 Provisions to Protect the Privacy Interests of Subjects

1.43 Describe the steps that will be taken to protect subjects' privacy interests. "Privacy interest" refers to a person's desire to place limits on whom they interact or whom they provide personal information.

Study participation is web-based so there is no risk of interaction with other study members. Recruitment will take place on social media platforms; However, no identifying information is requested on the social media platform. Mothers will be referred to the study website to complete consent.

1.44 Describe what steps you will take to make the subjects feel at ease with the research situation in terms of the questions being asked and the procedures being performed. "At ease" does not refer to physical discomfort, but the sense of intrusiveness a subject might experience in response to questions, examinations, and procedures.

Participants will be informed that some questions contain sensitive information. They will be told that they do not have to answer any question or participate in any aspect of the project that makes them feel uncomfortable.

20.0 Informed Consent Process

Informed consent must be obtained from all subjects, unless a waiver or alteration is approved by the IRB (see below).

1.45 Indicate whether you will you be obtaining consent, and if so describe:

- *Where and when the consent process takes place*

Recruitment will be on-line. We will ask women to click on a box indicating their consent; they will be asked to confirm this choice within the on-line program.

- *Any waiting period available between informing the prospective subject and obtaining the consent*

  No

- *Any process to ensure ongoing consent.*

  Consent will be provided for each phase of the project. There are four phases. If consent is not received, the research activities associated with that phase will be not administered.

- *Whether you will be following "SOP: Informed Consent Process for Research (HRP-090)." If not, describe:*

  We will be following "SOP: Informed Consent Process for Research (HRP-090).

Non-English Speaking Subjects

N/A

Waiver or Alteration of Consent Process (consent will not be obtained, required information will not be disclosed, or the research involves deception)

N/A

Subjects who are not yet adults (infants, children, teenagers)

N/A

Cognitively Impaired Adults

N/A

Adults Unable to Consent

N/A

21.0 Process to Document Consent in Writing

1.46 Describe whether you will be following "SOP: Written Documentation of Consent (HRP-091)." If not, describe whether and how consent of the subject will be documented in writing.

Participants will be asked to read through the questionnaire and provide an electronic signature. If consent is not provided electronically, participants will not proceed to any research activities.

If this project demonstrates feasibility and if additional funding is secured, there is a possibility that this study will be extended . For this reason, participants will also be asked to provide consent for allowing researchers to save their contact information for potential contact for additional studies, or an extension of this study.

1.47 If you will document consent in writing, attach a consent (and/or parental permission/assent) document (s) as an attachment to the SmartForm.

See attached consent form.

1.48 If your research presents no more than minimal risk of harm to subjects and involves no procedures for which written documentation of consent is normally required outside of the research context, the IRB will generally waive the requirement to obtain written documentation of consent. In most cases, a cover letter (consent information with no signature requirement, or an online "checkbox" acknowledgment) should still be utilized.

Review "CHECKLIST: Waiver of Written Documentation of Consent (HRP-411)" to ensure that you have provided sufficient information for the IRB to make this determination.

Subjects will not be presented with an oral script but will receive written information (cover sheet) containing all applicable elements of consent. This study qualifies for a waiver of written documentation of consent.

1.49 If you will obtain consent, but not document consent in writing, attach a cover letter or verbal consent script to the SmartForm.

n/a

1.50 You may use "TEMPLATE CONSENT DOCUMENT (HRP-502)"to create the consent document or script.

We used the HRP-502 waiver of consent template when creating our consent document.

22.0 Data Management

1.51 Describe the data analysis plan, including any statistical procedures.

Data Analyses. Study 1 will test Aim 1 of this proposal: to examine the ability of the expressive writing intervention to improve three domains: maternal mental health, pregnancy and birth outcomes, and infant development. specific objectives, hypotheses, and data analytic plans.

Objective 1. Test the effects of the intervention on maternal mental health.

Hypothesis for Objective 1. We hypothesize that, controlling for the severity of objective PNMS, mothers who completed the expressive writing intervention will show significantly greater reductions in PTSD symptoms than those who received the control intervention or no intervention.

Data analytic approach for Objective 1. We will use ANCOVA with the intervention group (expressive writing, control intervention, no intervention) as the independent variable, maternal PTSD symptoms at the post-intervention assessment as dependent variable. Models will control for the severity of the objective PNMS and maternal symptoms at recruitment. Using hierarchical linear modeling (HLM) we will also test the effectiveness of the intervention to alter the trajectory of maternal mental health symptoms across the five points (recruitment, 2 months post-intervention, and 6 months post partum). Additional analyses will test the moderating effects of trimester of exposure and intervention timing, severity of symptoms at recruitment, SES, perceived stress, coping, and social support.

Objective 2. Test the effects of the intervention on improving prenatal and birth outcomes in women who were pregnant (fewer than 35 weeks) at the time of the intervention.

Hypothesis for Objective 2. We hypothesize mothers who completed the expressive writing intervention will show reductions in preterm births and associated complications compared to those who received the control intervention or no intervention.

Data analytic approach for Objective 2. Our dependent variables will be gestational age (GA) at birth, and a dichotomized preterm birth variable (GA < 37 weeks). We will use ANCOVA to compare groups on GA controlling for variables such as maternal age, timing of Harvey, and of the intervention, etc. We will use logistic regression to test effects of the intervention on preterm birth. In both cases we will control for the severity of Objective PNMS.

Objective 3. Test the effectiveness of the intervention in improving infant outcomes at birth and at later ages.

Hypothesis for Objective 3. We hypothesize that infants of mothers who received the expressive writing intervention will have better growth, cognitive and motor development, at all ages.

Data analytic approach for Objective 3. Using ANCOVA, infant cognitive and socio-emotional outcomes will be compared by intervention group, controlling for degree of objective PNMS, trimester of Harvey exposure, timing of the intervention, etc. We will also test interactions between the intervention group and, for example, the severity of the prenatal stress, and the timing of the intervention.

1.52 Describe the steps that will be taken to secure the data (e.g., training, authorization of access, password protection, encryption, physical controls, certificates of confidentiality, and separation of identifiers and data) during storage, use, and transmission.

A master list containing the identifiers will be retained for a two year period while data is being collected. This information will be stored in a secure location and only accessed by the research coordinator and members of the research team as needed. Participant phone numbers will only be used if there is an indication undue distress during the intervention.

We will 1) minimize the number of study personnel who will have access to the information; 2) create a protocol manual for the project so that each worker knows the proper procedures and policies; 3) anonymize the data as soon as possible and always before administering the intervention; 4) discuss protocols and policies at the (frequently held) team meetings.

1.53 Describe any procedures that will be used for quality control of collected data.

TIMES, in the 3rd and 4th floor of HBSB, where Dr. Bick's office is located, supports data storage and analyses for this project. Data will be entered into Excel spreadsheets using ID codes only and non-identifying information. The quality of the data will be checked on an ongoing basis, during and/or directly after data collection. These electronic forms of the data will be stored securely on password-protected computers. Any identifiable data will be stored on secure, password-protected servers. Although not anticipated in this web-based study, in the event that hard copies of the data are collected for any reason, data will be locked in lockable cabinets in locked offices or cupboards. All data will be cleaned and inspected for quality using best data analytic practices. All identifiable data will be stored on a secure, password-protected server at TIMES, UH. The data will be stored as long as needed for the completion of publications and/or its deposition to the NIH repositories. Only authorized, approved study personnel will have access to the data. Authorized, approved study personnel will be responsible for the receipt or transmission of the data. All identifiable data will be transmitted locally through secure transmission channels, such as the TIMES Secure File Transfer Service, Biscom.

Only authorized, approved study personnel will have access to the data.

Authorized, approved study personnel will be responsible for the receipt or transmission of the data.

1.54 Where will data be stored?

The data will be initially be collecting using the REDCap server at the University of Alberta, but will be transferred to the Unversity of Houston, once redcap is established at TIMES. We are relying on the University of Alberta for the initial construction of our database so that

we can expedite the process of recruiting as many mothers as soon as this protocol is approved.

Dr. Bick has permission to access the database used for this study. She and associated lab personnel will access data on a weekly or bi-weekly bases. Data will be exported and saved on secure servers at the University of Houston.

Dr. Bick, the PI on this study, has been added as a user to the redcap project/database entitled, "the Harvey baby project" at the University of Alberta. From a secure server, she can log in (with unique log in ID and password) into the redcap data base associated with this study at this website: https://redcap.ualberta.ca/. From there, she will export the data and store them on a secure server at the University of Houston, Psychology Dept. and TIMES.

REDCap is a secure, web-based application designed exclusively to support data capture for research studies. REDCap provides 128 bit encryption between data entry client and the server (https://), and access to the study database is password protected. Data collection and storage will comply with the measures outlined in WCHRI's REDCap privacy document. Study participants will be allocated a unique study code and identifiers will be flagged as such in the RedCAP system which then provides additional protection for these data element. The application and data are housed on servers provided by the Faculty of Medicine at the University of Alberta. These servers are located within the faculty's secure data center at the University Hospital.

1.55 How long will the data be stored?

If this study is success, we may continued to follow mothers and babies. If we do not continue this study beyond what is specified in this protocol (when infants turn 6 months of age), then data will be kept for five years after the study completion.

1.56 Who will have access to the data?

Dr. Bick and her approved study personnel in Alberta Canada will have access to data collected as part of this study.

1.57 Who is responsible for receipt or transmission of the data?

Dr. Bick and her approved study personnel are responsible for receipt and transmission of this data. Data will be collected using recap, a secure data base platform. Data will be exported and saved ont Dr. Bick's secure network drive at TIMES in the University of Houston.

1.58 How will data be transmitted locally?

If necessary, data will be transferred using secure file transfer program, approved for human subjects research at the University of Houston.

1.59 If a multi-site study:

N/A

1.60 Will data be banked for future use? (Ex. establishment of a recruitment database?)

The initial consent form asks mothers to provide consent for future contact. Only mothers who provide consent for us to save their personal information, and be contacted at a later date for extensions of this study or for other studies will be contacted.

23.0 Specimen Use and Banking

N/A

24.0 Sharing of Results with Subjects

Upon completion of the study, families will receive a summary of the findings. Individual study results will not be shared with families. This will be stated in the consent form.

25.0 Resources

1.61 Describe the qualifications (e.g., training, experience, oversight) of you and your staff as required to perform your/their roles. When applicable describe their knowledge of the local study sites, culture, and society. Provide enough information to convince the IRB that you have qualified staff for the proposed research.

Drs. Bick has a permanent faculty positions in Houston. She is located at the Texas Institute for Measurement Evaluation and Statistics (TIMES). She has over 10 years of conducting research studies with at risk and marginalized populations of at risk mothers and infants.

Brian Biekmen and Rebecca Lipschutz are current graduate students mentored by Dr. Bick. They will be the primary study personnel associated with this project.

1.62 Describe other resources available to conduct the research: For example, as appropriate:

- *Justify the feasibility of recruiting the required number of suitable subjects within the agreed recruitment period. For example, how many potential subjects do you have access to? What percentage of those potential subjects do you need to recruit?*

  We plan to recruit 1000 women, of the estimated 54,000 women who were pregnant at the time of Hurricane Harvey, and 36,000 who are expected to conceive within six months of its landing. This represents about 1.1% of the total 90,000 eligible who are eligible for this study.

- *Describe the time that you will devote to conducting and completing the research.*

  Dr. Bick will devote 25% of her effort to this study.

- *Describe your facilities.*

  Data storage and analyses: TIMES, in the 3rd and 4th floor of HBSB, where Dr. Bick's office is located, supports data storage and analyses for this project. TIMES statistical software, computer hardware, teleconferencing facilities, and research administrative infrastructure are available to Dr Bick and associated staff. TIMES maintains 16 high-end Intel Xeon and i7 based workstations, each with 16-96GB of RAM, for the analysis of large, multi-level multivariate datasets, and has active licenses for Teleform and SAS Data Integration, SAS Data Quality, SAS Enterprise Business Intelligence with web portal, and SAS Education Analytic Suite, which together provide electronic and scannable paper forms, data warehousing and enterprise computing solutions. TIMES also maintains active licenses for statistical software, including MPlus, Splus, Bilog, Multilog, FACETS, WINSTEPS, Mathematica, MathStatica, freeware WinBugs and R, as well as facilities for high-speed scanning and printing of paper forms, electronic verification of scanned forms, and a license for WebEx

teleconferencing with a state of the art InSors conference facility. TIMES manages and maintains its own Microsoft Enterprise based computer network with over 35 Physical and Virtual servers and a host of computing services including center maintained and supported Microsoft Active Directory Domain. File services are hosted on Dell PowerEdge Intel Xeon processor based multi-socket, multi-core servers with over 100TB of RAID 5 data storage. Cardiff Teleform Application Server and dedicated data recognition server are hosted on Dual Dell PowerEdge Servers with dual socket 8 Core Xeon processors and 16 GB RAM. All Enterprise servers are located in the University's Tier 4 research datacenter. All servers are racked in four 40U dual powered APC server racks supported by a ProCurve 5000 series Gigabit switch. All servers in addition to Windows Server software firewalls are networked behind a Sophos UTM SG310 physical firewall and VPN appliance. TIMES' dedicated mail servers are also protected behind a ProofPoint SPAM/Malware appliance. Secure and encrypted large file transfers are accommodated by a HIPAA compliant Biscom secure file transfer system housed and maintained by TIMES. Paper scanning is supported by Fujitsu fi-5900C 100ppm high speed scanner. Printing services utilize multiple high speed printers. There are 100+ Dell branded workstations and laptops to support faculty and staff. All offices in the lab are fully networked and have full 10Gb CAT6 Ethernet connections supported by Cisco 4006 managed switches.

TIMES also provides investigators with access to personnel with expertise in the design of paper and electronic forms, handheld and portable electronic devices, and the design, construction, and maintenance of data management systems and data warehouses.

- *Describe the availability of medical or psychological resources that subjects might need as a result of an anticipated consequences of the human research.*

  Participants who endorse any indication of suicide will be contacted with a list of referrals, which will include a contact number for a suicide hotline and other local mental health resources

- *Describe your process to ensure that all persons assisting with the research are adequately informed about the protocol, the research procedures, and their duties and functions.*

  Dr. Bick will hold weekly lab meetings to discuss protocols and issues related to this study. All staff and students involved in this study will attend.

  Dr. Bick and laboratory staff or students will regularly ensure that all research staff and students are appropriately trained on protocols, procedures, duties, and other functions.

26.0 Additional Approvals

1.63 If not included in 11.2, above, describe any additional approvals that will be obtained prior to commencing the research (e.g., school, external site. funding agency, laboratory, radiation safety, or biosafety approval).

- *Submit copies of applicable approvals as an attachment to the SmartForm.*