Hurricane Trauma: The Effects of Prenatal Stress on Child Development
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As a natural disaster, hurricanes have a profound impact on the prenatal development of unborn children and their mothers because of the elevated stress levels that parallel the event. Factors such as shelter conditions, disruptions in supplies of clean water, food, and comfortable living conditions all contribute to stressors that lead to birth complications and physical and cognitive disadvantages to the infant at the time of birth (Callaghan et al., 2007). Infants whose mothers were exposed to hurricane trauma are susceptible to preterm delivery as well as lower birth weight according to a study conducted in Louisiana which implies the high vulnerability of pregnant women who were displaced during Hurricane Katrina (Antipova, 2007).

Defining Stress
Stress, like most phenomena in life, is a common aspect of the emotional construction of human beings. It affects everyone, no matter their cultural background or socioeconomic status and seems to hold great weight in the daily challenges of life. Most people have used the term to describe these challenges, but even in their basic understanding of it, they do not have a clear conception of what it really is. The term “stress” was coined in 1936 by Hans Selye who defined it as “the non-specific response of the body to any demand for change” (Rosch, 2009, para. 2). Such change is often a result of negative experiences and burdens to an individual that have affected his or her well-being by causing disruptions in the normal events of day-to-day life.

Causes
Usually stress is induced by personal, financial, or social issues, but it has been recognized in the work of Simeonova (2009) and Antipova (2007) that one of the most harmful proponents of this hormonal reaction can be found in nature. Natural disasters in particular, pose a strong threat to the overall balance of stress within the individual, and as studies have shown, victims who suffer from these often catastrophic events have increased levels of stress, anxiety, and depression (Simeonova). Specifically, hurricanes, a recurrent form of natural disaster, have a significant effect on the stress and anxiety levels of those victimized by their occurrence. Everyone who lives through such disasters are vulnerable to their effects and the stress that comes with them, but one group of individuals that are at an especially high risk are pregnant women (Antipova). During pregnancy both mother and child are more susceptible to environmental influences and teratogens, external substances and toxins such as pollutants, hazardous chemicals, and drugs, that harm the delicate condition. Their vulnerability increases with the onset of stress, especially when it is severe, and this creates another set of challenges to the well-being of the mother and her child’s prenatal and later development.

As Simeonova (2009) maintained, “natural disasters provide a ‘natural experiment’ for the increased maternal stress
on pregnancy outcomes” (p. 2). This is helpful to researchers who seek to better determine the effects of environmental stress on pregnancy. Hurricane Katrina has proven to be one such natural disaster that has aided greatly in these findings, for it continues to show a strong influence and impact on mothers and their young children who were victims of the storm even years after its onset in 2005. The hurricane itself directly affected about 56,000 pregnant women residing in the Gulf Coast states, and its impact can be seen in the developmental delays, pre-term deliveries, low birth weights, schizophrenic behaviors, increased production of certain hormones such as cortisol, and deaths that occurred after the births of these babies whose mothers suffered severe stress before, during, and after its arrival (Callaghan et al., 2007; Harville, Xiong, & Buekens, 2009; Lakshmi, 2006; Nauret, 2008; Simeonova, 2009). For women living in poor conditions, the consequences of natural disaster-produced stress are profound due to their already demanding living situations and lack of resources, medical care, nutrition, and safety.

Being that pregnancy is a delicate time for any mother and her growing child, it is not difficult to understand how stressful situations such as natural disasters can add to the anxiety and tension they already face on a daily basis. One major issue contributing to this stress can be found in the mother’s forced decision or inability to relocate. In a study conducted by Harville et al. (2009), it was found that nearly 10,000 pregnant women were displaced because of Hurricane Katrina. Being relocated is a burden to anyone, but pregnant women show greater adversity due to the stress incurred by leaving ones home and available access to prenatal and medical care. After Hurricane Katrina, displaced pregnant women were put under a number of taxing situations as they tried to care for their unborn children in crowded, unhygienic secondary shelters as they waited for permanent living residences. The new environments in which these women were placed were ridden with contagious diseases and illnesses due to overcrowding and were often too far from proper medical care sources to allow them to receive the necessary treatment and prenatal care. Evidence has shown that without the proper prenatal care, nutrition is greatly impaired for the developing fetus whom will likely be born premature or of low birth weight (Antipova, 2007); two major contributing factors of developmental problems after gestation. These problems add greatly to the already increasing rate of infant mortality within the United States, as they have become two of the three main causes of this rise in the last decade (Antipova). To make matters worse, Laplante et al. (2004) found that the likelihood of premature birth tends to be heightened when exposure to natural disasters, i.e. severe stress, occur within the first trimester of gestation when the threat of miscarriage and birth defects are notably elevated (Greenfield, 2001). The frequency of such births is increased by 1.3% when natural disasters occur within the nine months prior to delivery (Simeonova, 2009). This increase is confirmation of the negative impact weather can have on a pregnant mother’s mental state and the welfare of her developing child.

Another noteworthy aspect of relocation that presents troubling challenges to pregnant women is found in their inability to do so. In the areas hit hardest by Katrina, a large proportion of the people living in
New Orleans, were of low socioeconomic status and were already on social welfare when the storm arrived (Antipova, 2007). Many of the pregnant women who lived in these areas could not afford to move due to their financial circumstances and minimal resources. As studies conducted by Callaghan et al. (2007) have shown, this factor alone is enough to make the already traumatic experiences of the victims all the more difficult because with lower living conditions, comes a number of other related problems that are made more dangerous and stress-inducing by the hurricane. In this study, Callaghan et al. (2007) found that rising flood waters present a major threat to the very livelihood of hurricane victims even after the storm has commenced, making it more difficult for individuals to not only evacuate, but also to find appropriate shelter or clean water and food. This places greater stress and tension on pregnant women who must exert more effort than they should to save their lives and that of their children.

**Effects on Mother**

Moreover, floodwaters often contain a great deal of environmental toxins that can eventually cause serious medical problems for all with whom they come into contact, but as Hurricane Katrina has shown, the effects of teratogens are especially dangerous to pregnant women (Callaghan et al., 2007). The toxins found in floodwaters include increased levels of bacteria such as E. coli and coliform, sewage waste, lead, and other harmful contaminants, all of which can greatly impair prenatal development and cause severe illness or death (Callaghan et al.; Water toxins, 2009). Without clean water, pregnant women are more likely to contract the many diseases associated with natural disasters that result in developmental defects and a greater chance of preterm birth and low birth weight infants (Antipova, 2007).

Natural disasters and the stress that comes with them greatly escalate these problems, especially when the hardships lead to the onset of self-induced exposure to hazardous toxins. As asserted in Antipova’s (2007) research, changes in behavior and nutritional care occur as a way to relieve or cope with stress. These changes include returning to unhealthy behaviors such as smoking, drinking, and substance abuse, which are all extremely harmful to the overall welfare of pregnant women. The use of such substances often continue well after the child is born, introducing more developmental and health problems to newborns that will likely affect them well into adulthood being that exposure to such substances can lead to respiratory problems and abnormal brain function (Antipova). After Katrina, pregnant women who resorted to such behaviors often did so in response to a severely stressful or traumatic experience during the hurricane. However, this behavior was found to be greater among women who walked through floodwaters than among those who faced other challenges (Harville et al., 2009). Reasons for this heightened stress may be due to the propinquity of the dangers that arise in walking through such waters and the sense of helplessness that can be felt in such a distressing situation.

Furthermore, the risk of illness in pregnant women is heightened even more by stress and depression; two mental ailments that are often brought on by the disaster itself and have been shown to have inverse effects on the functioning of the immune system, while also increasing blood pressure levels and the production of corticotrophin-releasing hormone, a stress regulating
hormone that also serves to determine the length of gestation during pregnancy (Antipova, 2007; Dewar, 2008; Harville, 2009). With these increased levels, the mother and child are placed under an immense amount of strain that is very harmful to prenatal growth and can lead to premature birth. This is especially true in Louisiana and Mississippi, the two states that were impacted the most by Hurricane Katrina. These states were rated 49th and 50th, respectively, on the national health status scale, making them the poorest health care services in the country (Harville et al.). Pregnant women in these states were at greater risk for unfavorable outcomes in pregnancy than any other even before Hurricane Katrina made landfall, but once it did, it exacerbated these problems.

**Effects on Child**

Low birth weight and premature birth, as has been stated previously, are two outcomes that seem to reoccur frequently in conjunction with natural disasters. Several developmental delays and illnesses can result from low birth weight and premature births, but there is considerable evidence that hypertension, asthma, and an overall low IQ are leading outcomes of these medical problems (Antipova, 2007). Although they occur, in large part, due to severe maternal stress, poor prenatal care and nutrition also contribute to these prenatal complications.

With the onset of natural disasters, the quality of food is greatly impaired due to floodwaters, as they inhibit electrical, water, and sanitation functions and procedures that cause refrigeration problems, contamination, and lower nutritional value of available food supplies. Without adequate food for both mother and child these toxic waters can inhibit the nutrition they must receive, making lower birth weight all the more likely, leading to greater cognitive and physical impairments in development. For women who give birth during and/or after the storm, another imposing difficulty that impacts on pre and postnatal development comes in feeding their newborns. As physicians claim, the safest and most nutritionally enriched food source for infants is breast milk, but after the stress and fear that comes with hurricanes, mothers find it difficult to find the will or ability to breastfeed their young and hungry children (Callaghan et al., 2007). Studies have found that the stress of a major disaster can cause a cessation of lactation in women, leading to an inability to feed their children and provide them with the nutrients they are most likely being deprived of in the living conditions after the storm (Antipova, 2007). Nevertheless, although breastfeeding is usually the only available food source for young babies, hazardous toxins can be carried to the baby through the mother’s breast milk after being exposed to contaminated water or food (Callaghan et al.). The problem of feeding infants, however, cannot be easily solved when flooding pollutes the very water needed for drinking and baby formula. As a result, the difficulty in providing children with good nutrition and care impedes their development further and increases the likelihood of illness or death.

**Socioeconomic Effects**

The last variable impeding prenatal welfare and development during times of stress is the mother’s loss of social, economic, and cultural ties when immediate evacuations force her from everything she owns and knows. This experience is
particularly difficult when she is placed in an unfamiliar facility with other mourning, and often severely ill, victims as she struggles to cope with the many changes before her. The one change that is most influential and disheartening for pregnant women is the loss of social connections, such as family members, friends, and neighbors (Antipova, 2007). Research has supported this assertion by finding that people without social networks, especially after such events as a natural disaster, are at an approximately 2-3 times greater risk of mortality (Antipova). Without these social networks, the probability for mortality or other adverse outcomes increases because such connections often serve as support systems that provide people with love, care, and safety during times of hardship and prevent depression, vulnerability to disease or injury, and stress through traumatic events (Antipova). For this reason, the loss of such a strong system negatively impacts one’s mental stability, health, and will to live. These facets of the aftermath of the disaster can affect the welfare of their unborn children. These important issues serve to only prove the dangers that arise in the event of extreme weather and traumatic experiences amongst pregnant women and the young, developing children they carry.

Summary

In review, Katrina victims, like most hurricane victims, displayed increased levels of depression, suicide, and greater vulnerability to diseases and teratogens; all of which can be attributed to the many stressors the hurricane placed on their lives (Callaghan et al., 2007). These characteristics are particularly attributable to pregnant women in the duration and aftermath of any natural disaster, but as has been exemplified throughout this work, it is clear that hurricanes present clearly adverse effects on this particular population and the overall development of children before and after birth. Countering such effects, though difficult and time consuming, may be helpful to the welfare of pregnant women and their unborn children in the long run, but as natural disasters are unpredictable events, the likelihood of such an outcome is far from probable. Even so, with greater accessibility to appropriate medical services and shelter before and after the onset of a natural disaster it will be possible for all people, especially pregnant women, to receive the necessary health services and care required in order to prevent harm on their own lives and that of their future children. Moreover, greater protection for vulnerable groups could also be found in providing evacuation procedures and transportation to those individuals who do not have the means to leave immediately when the threat of a natural disaster is impending. Such precautions will greatly lessen the risk of illness, physical and mental harm, or death that often befalls these people who, as has been seen throughout this work, are typically pregnant women living in poor economic conditions. Hopefully as time goes on, progress will be made in aiding this group during times of natural disaster and curtail the stress and hardships that are imposed upon its members, allowing them and their unborn children to live relatively normal and healthy lives.

References

University and Agricultural and Mechanical College, Baton Rouge, Louisiana.


