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A cluster analysis of the negative birthing experiences of Black people in the United States from 2000-2020

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An abstract of
A thesis submitted to the Faculty of the
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Abstract

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By Sarah Murray

INTRODUCTION: Maternal mortality is the death of a woman during pregnancy, at delivery, or soon after delivery (CDC, 2022). According to the AJMC, approximately two-thirds of maternal deaths are preventable (Melillo, 2020). Among eleven developed nations, a 2020 report found that the United States ranked last in terms of maternal mortality, maternal care, supply of maternity providers, and access to home visits or paid parental leave (Melillo, 2020).

PURPOSE: To characterize common features of a cluster of Black birthing experiences in the US between the years 2000 and 2020, and to develop hypotheses for the documented trends of high and rising Black maternal morbidity and mortality in the United States

METHODS: Twelve birthing experiences of pregnant Black people were found through broad internet searches. Each story was described and analyzed for common themes. Four main outcomes of interest were compared to eight exposures found throughout the birthing stories, and a similarity score was calculated and presented in a matrix. Recommendations for future research and intervention were proposed.

LIMITATIONS: The data is limited due to bias of reporting and is not a direct account of the events.

RESULTS: The exposures with the highest similarity score to maternal mortality were lack of agency, c-section birth, and poor care.

CONCLUSIONS: More attention needs to be given to the issue of maternal mortality within the US, especially among the Black community. Research must be done on what is causing the exposures to be linked to mortality and interventions must be implemented to reduce the rate.

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Introduction:

For the purposes of this study, “Black” encompasses all non-Hispanic individuals of African descent and “white” references non-Hispanic individuals of European descent.

On average, 10,977 children are born per day in the United States (World Population Review, 2022), but, tragically, not all births end with the same result. The pregnant person can suffer from “unexpected outcomes of labor and delivery that result in significant short- or long-term consequences,” which is termed maternal morbidity (Centers for Disease Control and Prevention, 2022), or in extreme cases, can die. Maternal mortality is the death of a woman during pregnancy, at delivery, or soon after delivery (CDC, 2022). Pregnant people suffer complications during childbirth that can result in morbidities or mortality, with the most common being severe bleeding, infections, high blood pressure during pregnancy, delivery issues, and unsafe abortions (WHO). However, most causes of maternal death, approximately two-thirds, are preventable according to the AJMC (Melillo, 2020).

From 2000 to 2017, the global maternal mortality ratio declined by 38% – from 342 deaths to 211 deaths per 100,000 live births (UNICEF, 2022). At the same time, Southern Asia achieved the highest decline in MMR, from 384 to 157 (UNICEF, 2022). Despite having high MMR in 2017, sub-Saharan Africa achieved a substantial reduction in MMR of nearly 40% (UNICEF, 2022). Additionally, four other sub-regions roughly halved their MMRs during this same time period: Central Asia, Eastern Asia, Europe and Northern Africa (UNICEF, 2022). Countries that saw an increase in MMR over the study period include the United States, Australia, Mauritania, Brunei Darussalam, the Dominican Republic, Germany, and Canada. An interesting trend seen in the data is that several high-income countries saw marked increases in MMR, while low- and middle-income countries reduced their rates (UNICEF, 2022). A

breakdown of global MMR by race is shown in Figure 1. In order to explore the reasons for this trend, the United States will be used as a case study.

As of 2022, the US had a population of 334,418,545, with a new birth occurring every nine seconds (World Population Review, 2022). 60.4% of the country is currently considered white, but the percentage is expected to drop by 20% over the next 20 years, and Black individuals make up around 13% of the total population (World Population Review, 2022). According to Guttmacher, in 2018 72.7 million women were of reproductive age, which is considered 15-49 years old (Guttmacher, 2021).

Maternal mortality statistics show that in 2020, the overall MMR for the United States was 23.8 deaths per 100,000 live births, which is an increase from the rate of 20.1 in 2019 (CDC, 2022). When broken down by race, the MMR for Black people was 55.3, which is 2.9 times higher than for their white counterparts (CDC, 2022). This information is highlighted in Table 1. Among eleven developed nations, a 2020 report found that the United States ranked last in terms of maternal mortality, maternal care, supply of maternity providers, and access to home visits or paid parental leave (Melillo, 2020). The same report states that even with the last place ranking, the US spends the highest gross amount on health care.

From the 20th to 21st century, improvements in OBGYN care and social factors resulted in a decline of the MMR in the United States. The introduction of antibiotics during surgery, improved standards of living, antisepsis, blood transfusions, legalizing abortion (Cates et al., 1978), and better operative and anesthetic techniques are a few of the reasons why the US was able to decrease their MMR from 900 per 100,000 births to 12.7. (Callaghan, 2012). Maternal mortality review committees provided problem identification and recommendations to reduce the rate of deaths occurring by investigating areas of intervention. However, the improvements to

healthcare only slowed the maternal death rate, which has since begun to rise again in the US (Callaghan, 2012).

In the weeks leading up to an estimated due date, the pregnant person is scheduled for weekly visits with an OBGYN to monitor blood pressure, discuss signs of labor, and check the well-being of the fetus. These last few visits are especially important for people who have high risk factors, such as advanced maternal age (>35 years-old), hypertension, or gestational diabetes (Kleppel, 2016). Postpartum care is equally as important as prenatal care, if not more so. Kleppel et al. cites a study by Kassebaum et al. from 2014, which states that the postpartum period is more hazardous than the pregnancy itself, as more than half of cases of maternal mortality occur after the birth of the child, from immediately after delivery up to one year postpartum (Kleppel, 2016; Kassebaum et al., 2014). Postpartum care is limited to a single visit that occurs 6 weeks post-birth and focuses mainly on education of how to care for a newborn, leaving the person who experienced the birth to navigate the "fourth trimester" on their own (Kleppel, 2016). The Kassebaum et al. 2014 study mentions that improving discharge education could prove effective in limiting postpartum mortality, indicating that a high number of deaths occur after a hospitalization for birth. However, they do not go into details as to why a hospital birth could have more risk. Introducing policy to extend postpartum care would allow people who just gave birth to be more closely monitored and perhaps save a life.

Access to care is even more difficult for those who are considered low-income or who lack insurance. According to Figure 2 from Noël 2018, Black or African American individual make less money on average than any other racial group within the United States. Black US citizens are also more likely to be uninsured than their white counterparts. Between 2010-2016 the Affordable Care Act (ACA) helped to narrow the racial gap in insurance coverage, but it did

not eliminate the disparities (Artiga, 2021). However, beginning in 2016 with the change in governmental administration, coverage began reversing for members of all racial groups and the rate of uninsured individuals increased again. Black individuals faced more difficulties finding alternative forms of insurance due to lack of affordability, as options were limited to private sectors (Artiga, 2021). A lack of insurance altogether or a public plan can limit access to quality healthcare, which can in turn affect outcomes of a pregnancy.

While the Family and Medical Leave Act of 1993 grants all eligible workers unpaid leave in cases of caregiving needs, no law in the United States mandates paid leave (Donovan, 2019). Instead, states can voluntarily provide paid leave in the form of insurance, or places of employment can provide paid leave on their own dime as well. The employer-provided paid leave is usually limited to the private sector, however, and is most commonly seen in managerial or other professional occupations. (Donovan, 2019). Donovan reports that a 2017 study by the Pew Research Center found that 27% of workers employed between November 2014 and 2016 took leave for medical reasons, 47% of which received full pay, 36% had no pay, and 16% were partially paid.16% of all workers sampled during this time period had a need for leave, but were unable to take it.

As of May 2019, six states in the US, California, New York, New Jersey, Massachusetts, Washington, and Rhode Island, plus the District of Columbia, offer state-level insurance plans for individuals who need to take a medical leave of absence (Donovan, 2019). Coverage extends anywhere from 2-26 weeks total, and there are stipulations on how much time can be taken for specific medical needs. Eligibility requirements for state insurance include in-state employment for a pre-determined duration, minimum earnings covered in employment, or contributions to the

insurance fund. Some programs provide job protection and security to those who take a medical leave of absence, but this protection is not mandatory.

According to Donovan's report, the US ranks last in terms of fully paid family leave for both mothers and fathers out of 35 member countries (Donovan, 2019). As shown in Figure 3, the United States is the only country in the Organization for Economic Co-operation and Development (OECD) that offers zero weeks of fully paid leave for mothers. The US is also tied for last with seven other member countries for offering zero weeks of fully paid leave to fathers after the birth of their child, which is highlighted in Figure 4. Without the option of paid leave, parents may not be able to afford time off from work for essential post-partum care. This not only would endanger the newborn child, but it could negatively impact the well-being of the person who experienced the childbirth as well. A report published in 2020 by several physicians found a 12% reduction in post neonatal mortality in the state of California after the implementation of a paid family leave policy in 2004 (Montoya-Williams, 2020). While this is only one study done on one state, the result shows a positive impact of providing paid leave.

Abortion is a routine, normal health service that is highly politicized within the United States, with laws and regulations varying by state and often by election results. When abortions are legalized and performed by a licensed medical professional, the mortality rate is 0.7 per 100,000 abortions performed (Zane et al., 2016). However, when an abortion is done in unsafe conditions, due to a lack of resources, strict abortion laws, or other reasons, the mortality rate increases to 13% (Haddad, 2009). Not surprisingly, the morbidity rate from abortions is highest for Black pregnant people, with a rate of 1.1 compared to 0.4 for white individuals (Zane et al., 2016). However, with the recent Supreme Court decision to overturn Roe V. Wade, the mortality

rate due to unsafe abortions will increase and disproportionately affect low-income and minority populations.

In order to examine the instances of negative birthing experiences within the United States, a cluster analysis methodology was used. A "cluster" is defined as an unusual aggregation, real or perceived, of health events that are grouped together in time and space and that are reported to a health agency (CDC, 1990). Cluster investigations can be compared to public health surveillance, as they examine patterns within a health condition instead of determining associations or relationships between agents and diseases (CDC, 1990). Performing a cluster analysis is dependent on a few factors, such as the data available, the characteristics of the health problem, the time and spatial elements of the cluster, and the occurrence of the events within the cluster (CDC, 1990). Limitations of this type of analysis include, the rare occurrence of the events, the length of time for another event to happen, the influence of chance, and the constraints of time and/or geography. Clusters can be formed by analyzing individual cases and grouping such cases according to similarities. The basic information needed for each case is the location of the event, the time that the event occurred, and possible exposures (CDC, 1990). Exposures are important to identify because if they are common among the community it is more difficult to clearly document an association with a rare outcome.

According to Mansfield, cluster investigations have four main steps: initial ascertainment, assessment of excess occurrence, determination of feasibility, and etiologic investigation. Initial assessment includes gathering demographic data, clinical information about the cluster, and other contact information if the interviews are conducted in person. After gathering the initial information needed, the investigator should decide whether to continue the study, which is determined if the following criteria are met; clinically similar health events without a plausible

alternative etiology, an apparent excess occurrence of such health events, a plausible temporal association with the possible exposure(s), a disease present in a particular demographic group in which it is not normally found, one or more cases of a very rare disease (Mansfield). If continuing with the investigation, the assessment includes determining if the occurrence of the health event is more than is expected for the geographic region, demographic, or other criteria (Mansfield). Final steps include determining the feasibility of the study and performing an etiologic investigation. Table 2 from Mansfield highlights past cluster investigations that have brought novel findings to the field of epidemiology. While the data for these studies focuses on chemical exposure and its impact on disease, the application of the methodology of cluster investigation can still be useful in this project. It is a novel approach, but looking at specific clusters of diseases, in this case maternal morbidity and mortality, and possible exposures that influenced the event can help inform future research and areas of priority for intervention.

Purpose of thesis:

The purpose of this thesis is to characterize common features of a cluster of Black birthing experiences in the US between the years 2000 and 2020. I will use these common features to develop hypotheses for the documented trends of high and rising Black maternal morbidity and mortality in the United States. The paper will finish with possible public health interventions and recommendations to address the identified similarities within the cluster.

Methods:

Twelve adverse birthing experiences of Black persons from the year 2000 to 2020 were identified through broad media searches. Names of pregnant people were found by using a search engine and looking up “Black maternal mortality,” or “Black maternal morbidity and mortality.” Each name that came up was then searched individually, and the phrases “birth story”

or “maternal mortality” were added if using the name only did not return relevant results. If a name was a hit under the search “maternal mortality,” then obituaries were also researched in order to find additional information for Table 3. Sources of each story varied, so for consistency and, hopefully, accuracy, stories were favored if they were reported in a news source and had evidence of an interview with someone directly connected to the birthing experience. If a major news source, such as a well-known and regarded newspaper or magazine, did not pick up the story of interest, then a direct account from someone involved in the situation was weighted more heavily. The inclusion criteria used to evaluate each story was, (1) a publicly accessible account of the birthing experience that had, at minimum, the date, the outcome, and possible influencing factors in the experience, (2) the person experiencing childbirth was Black, and (3) the story had a negative outcome such as maternal morbidity, maternal mortality, or fetal mortality. Each story in this cluster was analyzed for common themes that influenced the negative outcome of their birth. Positive or protective factors were also noted and used to inform public health interventions to address the identified exposures. A similarity matrix was constructed by calculating the number of times specific outcomes, maternal mortality, maternal morbidity, fetal mortality, and living, were connected to the common exposures, which were factors identified in each story that could have influenced the outcome, such as preexisting conditions or the type of care received. The number of instances in which an exposure was related to a given outcome was divided by the total number of stories analyzed (n=12) to create a similarity score between zero and one, with zero indicating no relation and one indicating high similarity. From the similarity matrix, high priority areas of intervention were noted, and public health strategies were presented to address them.

Limitations:

As the main method for this research was secondary analysis, the study is limited to stories of birthing experiences that have been publicly reported. The twelve chosen are not representative of all birthing experiences of Black pregnant people, but this specific cluster can provide information on possible areas for intervention within the general public once the findings are extrapolated to future clusters. There is also a possibility of reporting bias that must be taken into consideration, as these stories are not directly from the individual experiencing childbirth. In most cases, the story is reported by a loved one through a news outlet, which can lead to misinterpretation or misrepresentation.

Stories:

Cori Bush – In 2000, 24-year-old US Representative Cori Bush was 5 months pregnant when she went to her doctor because of severe abdominal pain. A sign in the office promoted open conversation between the patient and doctor, stating “If you feel like something is wrong, something is wrong. Tell your doctor.” Cori felt comfortable enough to express her concerns with her physician, and instead of a positive reaction, she was told to go home and that everything was fine. A week later, Cori went into pre-term labor at only 23 weeks of gestation. She gave birth to her son, who weighed just over a pound and was not fully developed. Cori was told her son had zero chance of survival, but after living on a ventilator for a month and in intensive care for four months, he pulled through. Cori’s doctor acknowledged his mistake of not listening to her concerns, and Cori chose to forgive him when she became pregnant with her second child. At just 16 weeks pregnant, Cori again went into pre-term labor. A different doctor told her she would lose her baby and pressured her to abort the fetus. The doctor said it would be fine because she could just “get pregnant again because that’s what you people do.” After

throwing a chair down the hallway in frustration, Cori's original doctor was called, and he was able to place a cervical cerclage. She later gave birth to a healthy baby girl (Munz, 2021).

Tatia Oden French – In 2001, Tatia Oden, age 32, began what her mother and doctors considered an "unremarkable" pregnancy. She had no major health concerns, carried the pregnancy to full-term, and, being a pre-medical student, educated herself on how to best care for herself and the growing child. Tatia's plan was to wait for her husband to return from overseas before she gave birth, so her doctors sent her in for frequent stress tests to monitor the fetus. Thirteen days after Tatia's estimated due date, her doctors sent her in to be induced, even when she tried to tell them no. The doctors were insistent, going so far as to say, "you don't want to go home with a dead baby do you?" Concerned for her own health and the health of her unborn child, Tatia gave in and the doctors assured her that everything was safe and that the procedure was done frequently. The medical team decided to use the drug misoprostol, which was not FDA approved for induction, but stated they chose the medication because it worked faster than other options. Tatia and her family were not given education on the drug used to induce, nor were they given an informed consent. Tatia sent her family home around 5pm that night and no one heard anything until early the next morning, when her husband called and said she was being rushed in for an emergency c-section. By the time Tatia's mother reached the hospital, both her daughter and grandchild had already passed away. The drug used to induce her labor caused an amniotic embolism, which was not caught by the medical staff until it was too late (Gourrier, 2018).

Audrey Lockett LaBranche – In January 2016, Audrey found out she was pregnant with her fifth child, and the pregnancy was anything but easy. She suffered from Braxton Hicks contractions, thyroid disease, obesity, and a history of blood clots that she was taking blood thinners to try and manage. After falling out with her normal OBGYN, Audrey began to see a

new one later in her pregnancy. Even with concerns about having a new doctor that did not know her medical history, Audrey gave birth to a healthy baby boy by cesarean in late August 2016. However, after returning home from the hospital, Audrey began experiencing headaches and pain at her incision site. When she returned to her doctor and told them of the symptoms, they told her that her sinus must be acting up and sent her home. Shortly after, Audrey was rushed to a trauma center where she was diagnosed with a severe brain hemorrhage. She died two days later, on September 2, 2016 (Martin, 2017).

Kira Johnson – In 2016, 39-year-old Kira Johnson went into the hospital for a scheduled cesarean of her second child. While the surgery seemingly went smoothly, the recovery was anything but. Kira's husband noticed the fluid in her catheter turn pink, which is an indication of blood. He called hospital staff and a CT and other tests were ordered. This was at 4pm. An hour later, Kira's labs came back abnormal, she was sensitive to the touch, and had lost color, but no imaging was done. By 9pm, Kira's husband became frustrated and asked a nurse what was going on. Her response was, "your wife is not a priority right now." After midnight Kira was finally transported to an operating room (OR), where the doctor informed her husband that complications happen, and she will be out in 15min. While on the table, the doctor opened her incision to find over 70% of Kira's blood volume pooling in her abdomen. Kira coded during surgery and never made it back (Pahr, 2020).

Marqwetta Johnson – In 2016, Marqwetta Johnson unexpectedly became pregnant with twins. At 42 years-old, she was raising seven other children and was at a higher risk for pregnancy-related complications due to her age, weight, and socioeconomic status. On April 7th, Marqwetta and her oldest son, who was studying in China at the time, spoke on the phone and talked about his studies. He described their conversation as happy and normal, noting his mother

did not mention any concerns about her health or the health of her unborn children. The next morning, however, Marqwetta complained of abdominal pain and bleeding and was rushed to the hospital where she was diagnosed with an ectopic pregnancy. She later died from hemorrhage and cardiac arrest (Martin, 2017).

Tanisha Malloy – In early January 2016, 33-year-old nurse Tanisha Malloy walked into work at St. Mary's Hospital in Virginia. With one month to go before her due date, this was Tanisha's last day at work before she would go on bed rest until her delivery. However, Tanisha would not walk out of the hospital alive. Shortly after beginning her shift, Tanisha suddenly collapsed and went into cardiac arrest. Her coworkers tried everything they could, but after an emergency c-section, only the baby survived. Tanisha died January 4th, 2016 (Wise & Burns, 2016).

Simone Landrum – In January 2017, 21-year-old Simone Landrum was a few short weeks away from delivering her unborn child. During this time, Simone began to experience symptoms of preeclampsia, which included headaches, swelling, aches, fatigue, and a general sense of feeling ill. While these symptoms should have alerted her medical team to take necessary precautions, Simone was instructed to return home, calm down, and take a Tylenol. After the recommended treatment did not help her symptoms, Simone's pain became unbearable. She called an ambulance, and after arriving at the hospital, she was told that her blood pressure was dangerously high and had caused a placental abruption. After an emergency c-section was performed, Simone delivered a stillborn baby girl. After carrying her child for nine months, Simone was unable to carry her baby home from the hospital (Ashley, 2022).

Shalon Irving – In 2017 at 36 years-old, Shalon Irving became pregnant with her first child. Her friend's described her as brilliant and fully immersed in her pregnancy. Shalon

researched everything she could about pregnancy, childbirth, and postpartum expectations in order to be prepared for her journey. On January 3rd, Shalon gave birth to her baby girl via c-section, and both Shalon and her daughter left the hospital happy and healthy. However, in the days and weeks following her surgery, Shalon began experiencing symptoms such as a hematoma, rising blood pressure, swollen limbs, and an incision wound that would not heal. Shalon's mother stated that her daughter went back to her doctors at least nine or ten times in the two weeks following her delivery, but was sent home each time without her concerns addressed. Shalon pushed back at the medical team pleading with them for help as she knew something was not right. After being sent home yet again, Shalon went into cardiac arrest and was announced brain dead in an ICU two days later (Kindelan, 2022).

Serena Williams – During her pregnancy in 2017, Serena Williams, age 36, suffered from a pulmonary embolism. So, when the symptoms reoccurred after giving birth to her child by an emergency cesarean, Serena knew to alert her medical team and what to ask for. Instead of receiving the CT scan and blood thinner that she had asked for, Serena's nurse told her that her pain medication was making her confused. After being persistent about her care, Serena was given an ultrasound, which did not show anything concerning, but her symptoms continued. A doctor finally ordered a CT scan, which showed multiple blood clots in her lungs, more commonly known as pulmonary embolisms. After being given the blood thinner that she originally asked for, Serena's condition improved (NBC, 2018).

Erica Garner – 2018. Erica Garner was an activist in her community. When her father was killed from a chokehold from an NYPD officer, Erica was traveling around the state of New York in an effort to bring national attention to the issue. She even held a "die-in" on the same street corner where her father had died. Although she tried to bring change for her community,

the trauma and stress of the situation took a toll on her health. After Erica had delivered her first child, she suffered a heart attack that exacerbated her chronic illness due to an enlarged heart. When she became pregnant with her second child a few years later in 2018, she was not given extra prenatal care or presented with options for how to manage her condition and have a safer delivery. While the birth of her second child did not directly cause her death, Erica suffered another heart attack and asthma attack less than a year after the delivery. She was placed into a medically induced coma and later passed from a lack of oxygen to her brain. Erica was 27 (Lockhart, 2018).

Amber Rose Isaac – On April 17, 2020, 26-year-old Amber Rose Isaac tweeted from her account that she should write an exposé on her mistreatment by medical staff at Montefiore Medical Center in New York. Amber had previously experienced mistreatment from a doctor she had seen since she was a teenager at another branch of the hospital and had switched to one where her mother had been working for over 20 years when she became pregnant. Amber developed Hemolysis, Elevated Liver enzyme, and Low Platelet count (HELLP) syndrome, which is a pregnancy-related condition that few people die from as long as they are given treatment. Amber was diligent with monitoring her platelet count, but due to the COVID-19 pandemic her prenatal visits were mostly virtual, and they discussed her blood work results and managed her blood pressure. She wanted to hire a doula to assist with an at-home birth, but Amber's doctors advised her to see a surgeon due to her condition and her falling platelet levels. Amber got additional blood work done on her own accord and attempted to reach out to her medical team to figure out why her platelet count was continuing to drop. Her concerns went ignored until she was rushed to the hospital for an emergency c-section over a month before her scheduled due date. Neither the surgeon whom she was assigned, nor her family, who were

denied access due to the pandemic, were present during the surgery. Amber died on April 21st due to complications from the procedure (Villarreal, 2020).

Sha-Asia Washington – In July of 2020, Sha-Asia Washington went to her OBGYN for a routine stress test. She was several days past her expected due date, and her medical team decided to keep her for observation due to an abnormally high blood pressure. Sha-Asia was given Pitocin to induce contractions and asked if she wanted an epidural. After some hesitation, she consented. Suddenly, Sha-Asia was rushed into the OR with the explanation that the baby's heart rate was dropping. Sha-Asia then went into cardiac arrest, which prompted an emergency c-section. While the baby made a full recovery, Sha-Asia did not. After performing CPR for 45min, the medical team could not restart her heart and Sha-Asia died on the OR table. Sha-Asia was 26 (Dickson, 2020).

Analysis of Birthing Stories:

From analysis of this cluster of birthing stories, several common themes emerged. First, many of the people reciting the events mentioned a lack of agency or autonomy over care. Those giving their account recalled situations where the person experiencing childbirth was dismissed when they discussed concerns about their health, ignored when they gave specific requests, and felt overpowered by their medical staff. While the reasons behind the reported unsatisfactory care are unknown, half of the individuals in this cluster lost their life because of them. Second, several instances of explicit bias occurred. The stories highlighted instances where a medical professional made biased or stereotypical remarks that made the person experiencing childbirth uncomfortable or untrusting of the person in charge of their care. The person describing the event felt that a comment was racially biased and may have contributed to the care they received. Third, many of the childbirth experiences involved either a planned or emergency c-section.

While cesarean births could also be classified as an outcome due to a string of unaddressed health concerns, they are considered an exposure for this project as the full scope of the individual's health and experiences is not publicly known. C-sections are a medical advancement designed to be an aid in difficult deliveries, so for almost three-quarters of the stories to have either a planned or emergency cesarean was eye-opening. The maternal mortality outcomes that occurred with a planned cesarean were slightly more provoking as there were no other health concerns noted and no emergency to add stress or danger to the birth. Fourth, in a few of the stories, comorbidities were mentioned as a possible contributing factor. Comorbidities can complicate any health issue or medical procedure, but when they are addressed and managed the additional risk should not pose imminent threat. The most common comorbidities mentioned in this cluster of birthing experiences were age, obesity, and heart disease, with other less common conditions mentioned such as HELLP syndrome, pulmonary embolisms, and chronic stress due to past trauma. Fifth, several stories made explicit comments about poor care that they received, while others were more covert in their displeasure. Once story mentioned the pregnant person had to switch doctors in the middle of their pregnancy due to a fallout, another changed their physician after a bad experience during their first birth, a third went so far as to make public complaints about the care they received. While "poor" care can be a subjective experience, there is a reason why the individuals in these stories felt like they were not treated as they should have been. For those that did not openly express their displeasure, comments such as "no one came to help," "we were not told anything," "we were not given informed consent," or "we were told we were not a priority" were also used to classify the experience as poor care. Sixth, the socioeconomic status of two of the pregnant persons was distinctly mentioned within the story. When looking into the area of residence of each pregnant person, their marital status, and

occupation, there does not seem to be a clear pattern of who is suffering mortality and who is not. In both instances where low socioeconomic status was expressed the outcome was maternal mortality, but that did not mean that those of high socioeconomic status survived in their stories. Table 3 shows demographic information about the twelve individuals described in this project, as well as six additional pregnant people whose names appeared in the media searches but did not have a detailed story. It was interesting that there were no obvious patterns in which stories ended in maternal mortality and which did not. Finally, stories with pre-term and post-term births were examined to see if they had a strong relationship with negative outcomes. Out of the two experiences of pre-term labor, one individual survived, and the other did not. When looking at the post-term births, both instances resulted in maternal mortality, and one of the two also ended in fetal mortality. Strong assumptions cannot be made with a small sample size such as these, but in this cluster, post-term deliveries were more lethal than pre-term deliveries. This was an unexpected observation, as premature deliveries are often described as more dangerous for the fetus and can be the result of extreme complications with the pregnancy.

Similarity Matrix:

The matrix shows similarity rates between the outcomes (rows) and the exposures (columns). The outcomes displayed were the conditions of interest for this research project, and the exposures were chose based on common themes found within the cluster of birthing stories. Rates were calculated by counting the number of times an outcome and exposure occurred within the same story and dividing that number by the total number of stories presented (n=11). Rates range from 0 – 1, with 1 indicating high similarity, i.e., an outcome occurred frequently with a specific exposure.

	LACK OF AGENCY	BIAS	C-SECTION	COMORBIDITIES	POOR CARE	LOW SES	PRE-TERM LABOR	POST-TERM LABOR
MATERNAL MORTALITY	0.5	0	0.5	0.33	0.5	0.08	0.08	0.17
MATERNAL MORBIDITY	0.08	0	0	0.08	0	0	0	0
FETAL MORTALITY	0.17	0	0	0	0.17	0	0	0.08
LIVING	0.08	0.08	0	0.08	0.08	0	0.08	0

Future Recommendations:

While causal relationships cannot be determined through cluster analysis, this research can still be used to identify areas of interest within a health concern and inform next steps. As lack of agency, c-section delivery, and poor care all had the highest similarity score with maternal mortality, it would be beneficial to explore these relationships further to decrease the mortality rate within the US. Other interesting trends to look into more deeply would be the geographic distribution of maternal mortalities and the larger cluster that occurred in 2016. Based on the information presented in Table 3, a large group of deaths occurred in the south and southeastern region of the United States (Oklahoma, Texas, Georgia, Florida, Louisiana, Virginia) with a smaller cluster in the northeast (New York, Pennsylvania) and a few outliers (California, Illinois, Missouri). Perhaps the high density of maternal mortality in the south is due to the pollical standing of each state, as the southeast tends to be more conservative and vote against abortion access and increased reproductive care. It could also be due to a high density of more rural communities, making access to quality care more difficult and costly. The high occurrence of mortality in the year 2016 is also an interesting finding but could be tied to political standing as well. 2016 was a controversial election year in the United States, where a member of the conservative party was elected, and promptly took strides towards limiting reproductive care and reinstating the global gag rule. The higher number of stories presented could also be due to reporting bias or a shift in focus on maternal mortality stories due to the

rising MMR within the country and the growing visibility of women's rights issues such as the MeToo movement.

Agency is an important aspect of medical care, especially within marginalized communities. There is a long-standing history of mistrust of the medical system, especially among Black communities, due to unethical testing and stereotypical assumptions surrounding health practices, which creates an uncomfortable environment. Any patient, regardless of socioeconomic or other factors, should feel comfortable seeing a medical professional and be given autonomy over their care. People know their own bodies and can sense when something is off, so their concerns should be heard, validated, and addressed. More research should be done to assess where the breakdown in communication or collaboration is occurring, how often it occurs, and what the difference in outcomes is when patients are able to advocate for themselves.

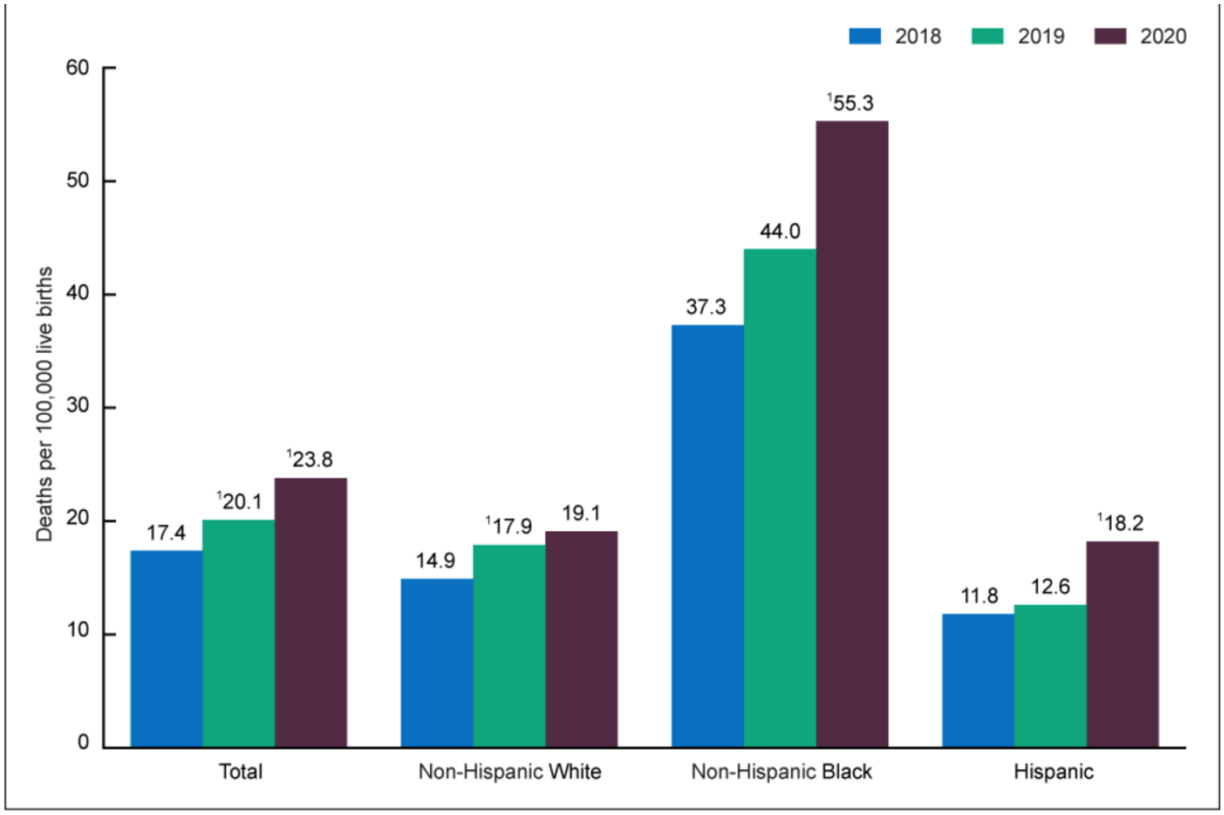
The most interesting relationship seen from these stories is the high similarity between c-section births and maternal mortality. While any surgical procedure poses risk, higher death rates are usually only seen with more invasive, longer, complex procedures. A 2018 study found that the maternal mortality rate from c-section births was 5.8-6.1 per 100,000 births, and that planned cesareans had the lowest mortality rate compared to all other births (Gupta & Saini, 2018). It is surprising, then, that 8/11 stories in this cluster reported a cesarean birth, and that 7/8 of those deliveries ended in maternal mortality. There could be bias in reporting, however, and that only those that resulted in mortality were investigated and reported. There is also a lack of information on what occurred prior to the decision to move to a c-section, as only one of the eight was a scheduled cesarean. Emergency c-sections are just that, emergencies. More research needs to be done to determine if there were underlying medical conditions that went overlooked during pregnancy, or if a high-risk factor was known but not managed, which ultimately led to

emergency surgery and death. With the overturning of Roe v. Wade in the United States and more states moving towards outlawing abortion, emergency deliveries or other surgeries are anticipated to increase. It is important to address cases such as those in this cluster to avoid preventable deaths in the future.

Assessing situations in which incomplete or unsatisfactory care occur is essential in reducing preventable deaths. Losing a patient will happen to every health care provider and is an inevitable part of the job, but it is difficult to accept when a death occurs because necessary care was not given. Several of the exposures examined in this project could contribute to poor care, such as comorbidities not managed, lack of agency, and bias, so the similarity score calculated for poor care may be an underestimate. Looking into why insufficient care is occurring, whether it be understaffing at healthcare facilities, a lack of funding, a lack of training, an anomaly, or other reason, is vital for creating processes to address the issues. Maternal mortality review committees should be implemented in at least every state, if not a smaller geographical region, to systematically and frequently review cases of maternal and fetal mortality and present feasible interventions for handling root causes. Maternal mortality needs to be made a higher priority in this country, sooner rather than later. The fact that pregnant people are dying does not mean that this population has been neglected, but the increasing MMR in the US suggests that the topic warrants more attention and effort. While mortality does not discriminate, Black pregnant people should be the target population of this research as they are dying at higher rates than their counterparts. Preventing maternal deaths is not only possible, but also necessary.

Figures and Tables:

Figure 1: Global MMR by race per 100,000 live births for 2018-2020



[1]Statistically significant increase in rate from previous year ($p < 0.05$).
NOTE: Race groups are single race.
SOURCE: National Center for Health Statistics, National Vital Statistics System, Mortality.

UNICEF. (2022, January 27). *Maternal mortality rates and statistics*. Retrieved April 10, 2022, from https://data.unicef.org/topic/maternal-health/maternal-mortality/

Table 1: maternal morbidity, mortality, and live birth rates by race in the US from 2018-2020

NCHS Health E-Stats February 2022

Table. Number of live births, maternal deaths, and maternal mortality rates, by race and Hispanic origin and age: United States, 2018–2020

Race and Hispanic origin and age	2018			2019			2020		
	Live births	Maternal deaths	Maternal mortality	Live births	Maternal deaths	Maternal mortality	Live births	Maternal deaths	Maternal mortality
	Number		Rate[1]	Number		Rate[1]	Number		Rate[1]
Total[2]	3,791,712	658	17.4	3,747,540	754	20.1	3,613,647	861	23.8
Under 25	907,782	96	10.6	877,803	111	12.6	825,403	114	13.8
25–39	2,756,974	458	16.6	2,739,976	544	19.9	2,658,445	607	22.8
40 and over	126,956	104	81.9	129,761	98	75.5	129,799	140	107.9
Non-Hispanic White[3]	1,956,413	291	14.9	1,915,912	343	17.9	1,843,432	352	19.1
Under 25	391,829	41	10.5	374,129	49	13.1	348,666	40	11.5
25–39	1,504,888	207	13.8	1,480,595	248	16.8	1,433,839	253	17.6
40 and over	59,696	43	72.0	61,188	46	75.2	60,927	59	96.8
Non-Hispanic Black[3]	552,029	206	37.3	548,075	241	44.0	529,811	293	55.3
Under 25	176,243	27	15.3	169,853	32	18.8	159,541	46	28.8
25–39	358,276	137	38.2	360,206	179	49.7	351,648	198	56.3
40 and over	17,510	42	239.9	18,016	30	166.5	18,622	49	263.1
Hispanic	886,210	105	11.8	886,467	112	12.6	866,713	158	18.2
Under 25	275,553	21	7.6	270,948	23	8.5	258,635	20	7.7
25–39	579,553	72	12.4	584,109	71	12.2	576,690	111	19.2
40 and over	31,104	12	*	31,410	18	*	31,388	27	86.0

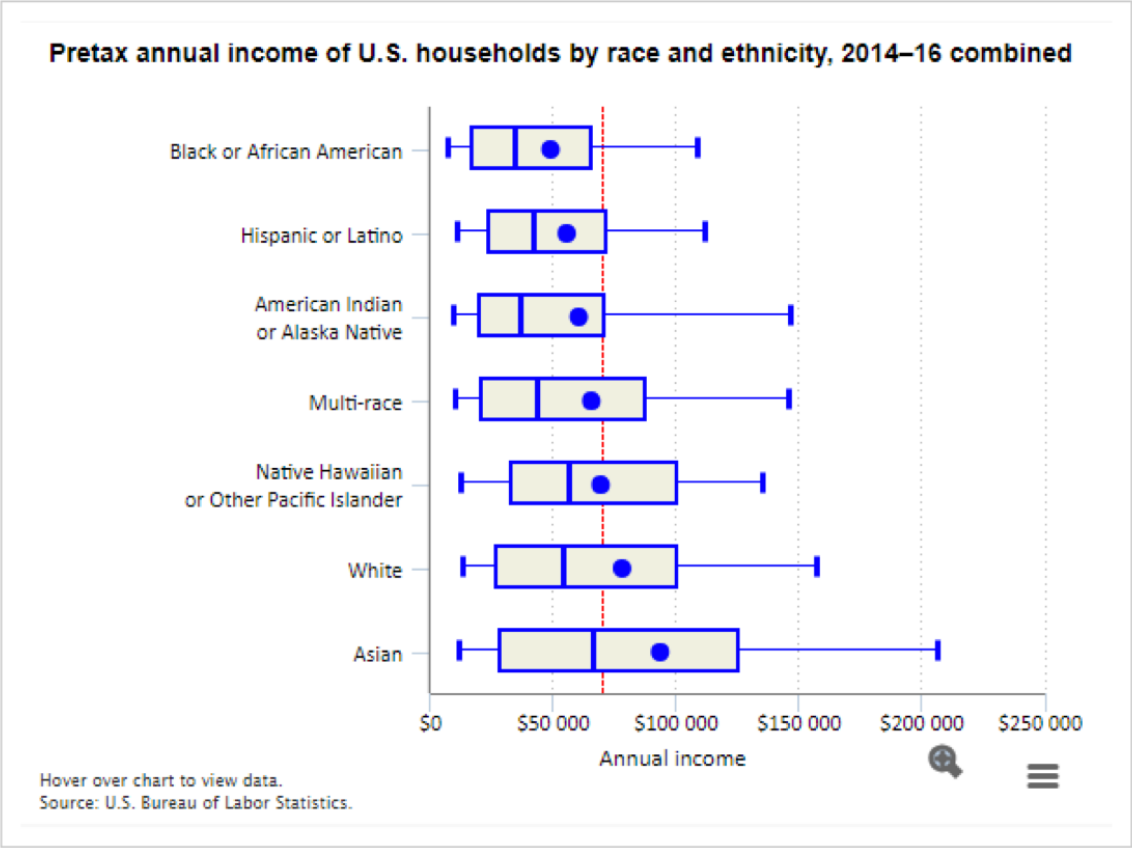
* Rate does not meet National Center for Health Statistics standards of reliability.
[1]Maternal mortality rates are deaths per 100,000 live births.
[2]Total includes race and origin groups not shown separately, including women of multiple races and origin not stated.
[3]Race groups are single race.

NOTES: Maternal deaths are those assigned to code numbers A34, O00–O95, and O98–O99 of the *International Classification of Diseases, 10th Revision*. Maternal deaths occur while pregnant or within 42 days of being pregnant.

SOURCES: National Center for Health Statistics, National Vital Statistics System, Mortality and Natality.

Centers for Disease Control and Prevention. (2022, February 23). *Maternal mortality rates in the United States, 2020*. Centers for Disease Control and Prevention. Retrieved April 1, 2022, from https://www.cdc.gov/nchs/data/hestat/maternal-mortality/2020/maternal-mortality-rates-2020.htm

Figure 2: Red line indicates the average annual income, blue error bars show the highest and lowest income by race

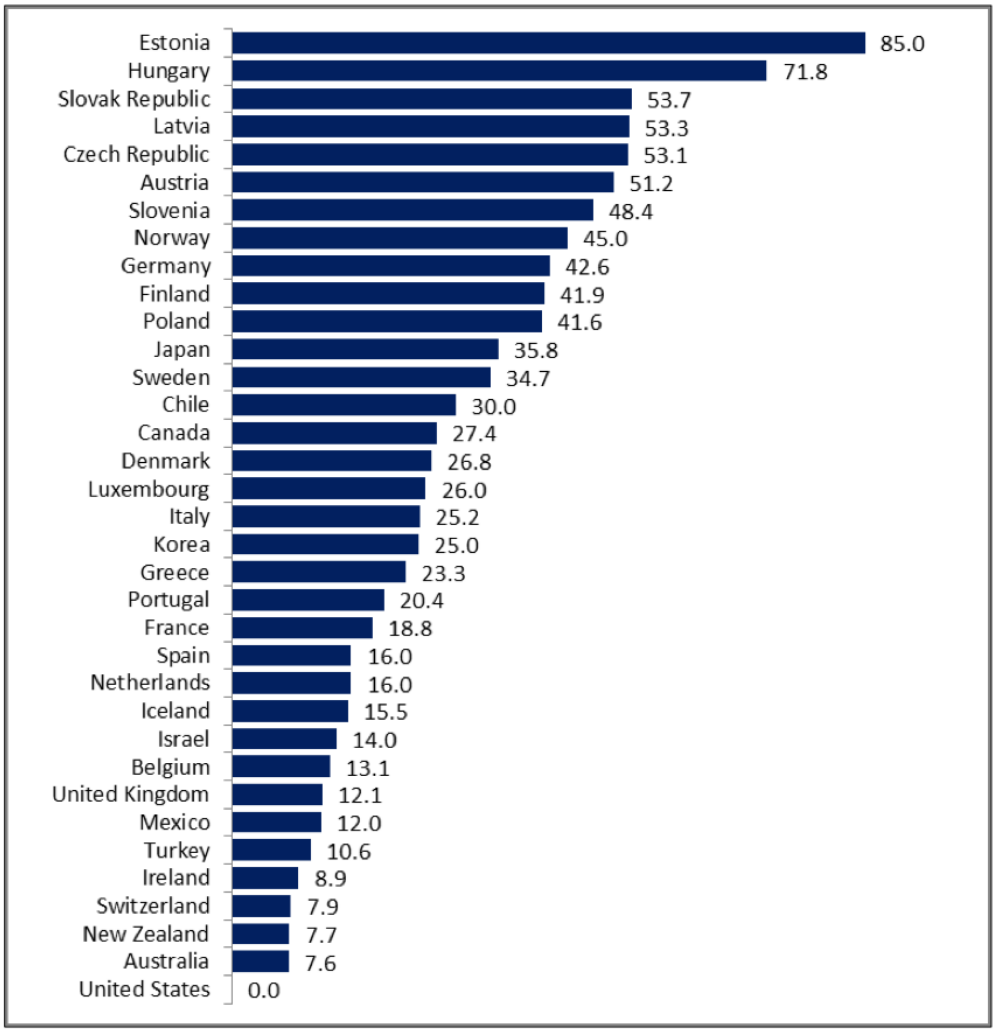


Noël, R. (2018, May). *May 2018 race, economics, and Social Status*. U.S. Bureau of Labor Statistics . Retrieved May 22, 2022, from https://www.bls.gov/spotlight/2018/race-economics-and-social-status/pdf/race-economics-and-social-status.pdf

Figure 3

Figure 1. Average Full-Wage Equivalent Weeks of Paid Leave Available to Mothers

OECD Member Countries' Leave Provisions as of April 2016



Source: OECD, Family Database, Indicator Table PF2.1, http://www.oecd.org/els/family/database.htm.

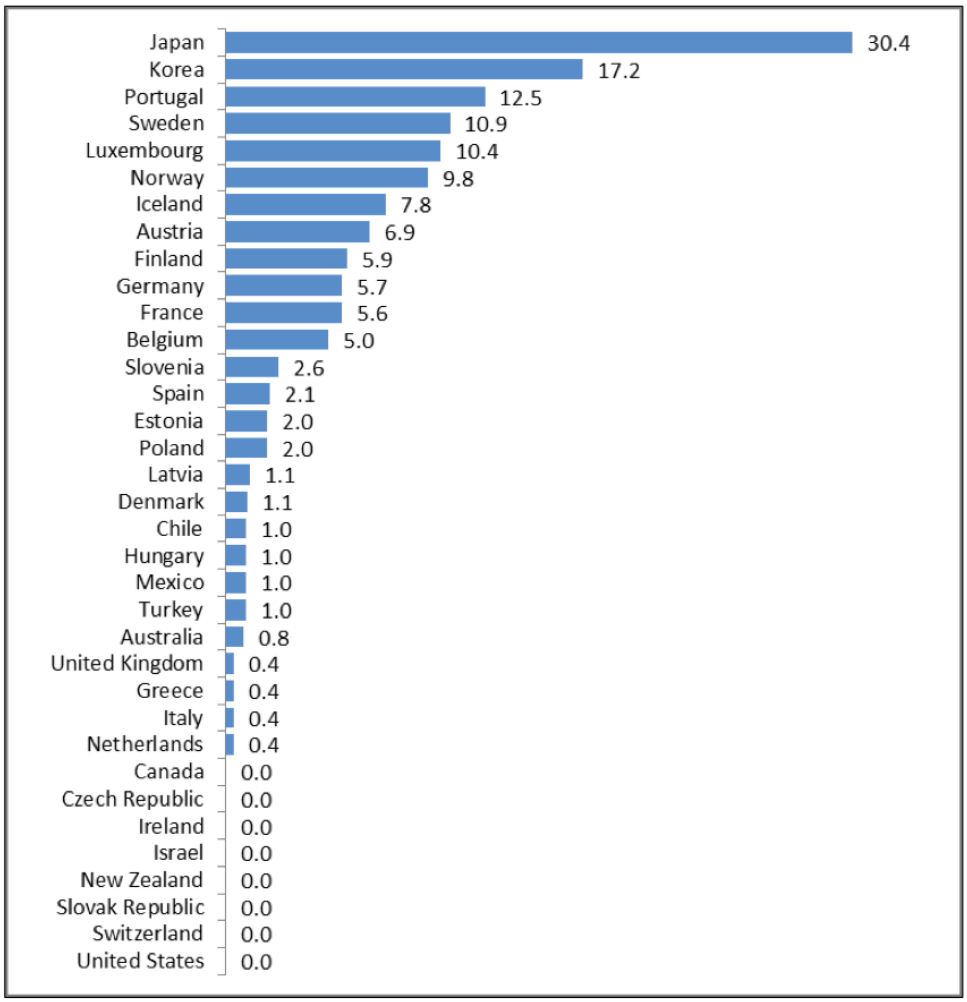
Notes: Leave available to mothers includes maternity leave and leave provided to care for children. Average full-wage equivalent weeks are calculated by the OECD as the product of the number of weeks of leave and "average payment rate," which describes the share of previous earnings replaced over the period of paid leave for "a person earning 100% of average national (2014) earnings." While federal law in the United States does not provide paid parental leave for private sector workers, some employers provide such leave voluntarily and some states have programs that provide wage insurance to workers on leave for selected family reasons; see section "Paid Family Leave in the United States" of this report for additional information.

Donovan, S. A. (2019, May 29). *Paid Family Leave in the United States*. Cornell ecommons. Retrieved May 22, 2022, from https://ecommons.cornell.edu/bitstream/handle/1813/79152/CRS_Paid_family_leave_0519.pdf?sequence=1&isAllowed=y

Figure 4

Figure 2. Average Full-Wage Equivalent Weeks of Paid Leave Available to Fathers

OECD Member Countries' Leave Provisions as of April 2016



Source: OECD, Family Database, Indicator Table PF2.1, http://www.oecd.org/els/family/database.htm.

Notes: Leave available to fathers includes paternity leave and leave reserved for fathers to care for children. Average full-wage equivalent weeks are calculated by the OECD as the product of the number of weeks of leave and "average payment rate," which describes the share of previous earnings replaced over the period of paid leave for "a person earning 100% of average national (2014) earnings." While federal law in the United States does not provide paid parental leave for private sector workers, some employers provide such leave voluntarily, and some states have programs that provide wage insurance to workers on leave for selected family reasons; see section "Paid Family Leave in the United States" of this report for additional information.

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Table 2

Table 1. Clusters leading to the identification of new exposure-disease relationships

Population	Year	Exposure	Outcome
expectant mothers	1962	thalidomide	phocomelia
workers	1968-1973	vinyl chloride	angiosarcoma
chemical workers	1978	kepone (pesticide)	infertility
jewelry wearers	1984	radioactively contaminated gold rings	dermatitis and skin cancer
drug users	1983	N-methyl-4-phenyl-1, 2, 5, 6 tertahydropyridine	Parkinson-like disorder
health food consumers	1989	L-tryptophan (contaminated)	eosinophilia-myalgia syndrome
dieters	1997	fenfluramine-phentermine	valvular heart disease

Mansfield, A. J. (n.d.). Cluster Investigations of Non-Infectious Health Events. *FOCUS on Field Epidemiology*, *5*(4), 1–8

Table 3: spreadsheet of demographic information for Black pregnant people in the years 2000-2020. Blank spaces represent unknown information

Name	Age	Year	Occupation	Marital Status	Hometown	Size of Community (as of 2020)	Type of Birth	Outcome	Source
Cori Bush	24	2000	Politics	Single	St. Louis, MO	304,709	Vaginal	living	styles/health-med-fit/health/u-s-rep-cori-bush-reveals-how-she-nearly-lost-her-two-babies/article_2925e2b3-6720-595c-ad22-edfa2103e69c.html
Tatia Oden French	32	2001	Academics	Married	Oakland, CA	422,575	Induction/emergnecy c-section	Maternal Mortality, Fetal Mortality	https://www.legacy.com/us/obituaries/easthaytimes/name/tatia-oden-french-zoran-french-obituary?id=28194395, https://tatia.org/about-tatia/
Audrey Lockett LaBranche	39	2016	Singer	Married	Crete, IL	8,058	C-section	Maternal Mortality	rticle/lost-mothers-maternal-health-died-childbirth-pregnancy
Kira Johnson	39	2016		Married	Atlanta, GA	497,642	C-section	Maternal Mortality	https://www.fox5atlanta.com/news/after-losing-wife-to-delivery-complications-georgia-man-urges-lawmakers-to-do-more-to-protect-mothers
Marqwetta Johnson	42	2016	Teacher	Single	Muskogee, OK	37,337	Ectopic	Maternal Mortality	rticle/lost-mothers-maternal-health-died-childbirth-pregnancy
Tanisha Malloy	33	2016	Nurse	Single	Henrico County, VA	330,076	C-section	Maternal Mortality	https://www.wtvr.com/2016/01/05/tanisha-malloy-obituary
Simone Landrum	21	2017	Waitress	Single	New Orleans, LA	391,249	Emergency c-section	Fetal Mortality	https://www.nytimes.com/2018/04/11/magazine/black-mothers-babies-death-maternal-mortality.html
Shalon Irving	36	2017	Academics	Single	Atlanta, GA	497,642	C-section	Maternal Mortality	https://www.mbfh.com/obituary/5669759
Serena Williams	36	2017	Athlete	Married	Miami, FL	461,080	Emergency c-section	living	https://www.mountsinai.org/about/newsroom/2018/serena-williams-health-scare-prompts-national-discussion-morgan-radford
Erica Garner	27	2018	Activist	Single	Brooklyn, NY	2,577,000		Maternal Mortality	https://www.nytimes.com/2017/12/30/nyregion/erica-garner-dead.html
Amber Rose Isaac	26	2020	Business	Married	Bronx, NY	1,427,000	Emergency c-section	Maternal Mortality	h/2021/4/20/22394884/year-after-childbirth-death-of-amber-rose-isaac-whats-changed
Sha-Asia Washington	26	2020	Paraprofessional	Married	Brooklyn, NY	2,577,000	Emergency c-section	Maternal Mortality	h/2021/4/29/22411019/brooklyn-doctor-investigation-sha-asia-washington-childbirth-death
Named, but no story found									
Traci Burnley Chocol	49	2016		Married	Denver, CO	715,878		Maternal Mortality	rticle/lost-mothers-maternal-health-died-childbirth-pregnancy
Domaniek Shepherd	38	2016	Business	Single	Dallas, TX	1,339,000		Maternal Mortality	rticle/lost-mothers-maternal-health-died-childbirth-pregnancy
Nivia Lashaundra McIntosh	36	2016		Single	Jacksonville, FL	902,488		Maternal Mortality	rticle/lost-mothers-maternal-health-died-childbirth-pregnancy
Chaphley Ornevil Jacques	41	2016	Teacher	Married	York, PA	44,019		Maternal Mortality	rticle/lost-mothers-maternal-health-died-childbirth-pregnancy
Yolanda Kadima	35	2020	Epidemiologist	Married	Locust Grove, GA	7,525		Maternal Mortality	https://www.yolandakadima.com
Derline Derilus	33	2016		Married	Boynton Beach, FL	78,060		Maternal Mortality	rticle/lost-mothers-maternal-health-died-childbirth-pregnancy

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