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Moms and Vaccines:
A Cross-Sectional Survey Assessing COVID-19 Vaccine Acceptance Among Pregnant People in East Tennessee

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May 2022
Abstract

This study aims to identify and understand factors associated with COVID-19 vaccine acceptance during pregnancy and estimate COVID-19 vaccine coverage among pregnant East Tennesseans. COVID-19 vaccination during pregnancy has been shown to be safe and effective and is strongly recommended, as pregnant people are at increased risk of severe illness and death from COVID-19 infection. At the national level, COVID-19 vaccine uptake among pregnant adults was initially lower than that of US adults overall. Further, vaccination coverage in Tennessee lags behind that in non-pregnant US adults overall and, to the best of our knowledge, COVID-19 vaccination coverage among pregnant people in East Tennessee is unknown. Identifying contributors and barriers to vaccine acceptance among pregnant people will inform the development of interventions to combat vaccine hesitancy among this high-risk population. A cross-sectional survey assessing vaccine uptake and factors contributing to the decision to vaccinate among pregnant people in East Tennessee was launched in February 2022 and is currently ongoing. The preliminary data presented here were collected February 14, 2022, through May 12, 2022. Of the n = 73 participants described here, 79.5% were vaccinated. Trust in medical advice regarding COVID-19 infection and vaccination was low in those who were not yet vaccinated and would not accept a COVID-19 vaccine, but the overall level of trust in prenatal care providers was similar among those who would not accept a vaccine and those already vaccinated against COVID-19.
**Introduction**

Pregnant people are at increased risk of severe morbidity and death from COVID-19 infection [1-9]. COVID-19 infection during pregnancy has been associated with increased risk of adverse outcomes such as maternal mortality, preeclampsia, and preterm birth [3, 4, 9-11]. One study found that hospitalization associated with COVID-19 infection was 3.5 times higher among pregnant adults with SARS-CoV2 infections than in similarly aged non-pregnant adults [3]. In a multinational cohort study with over 2,000 participants in 18 countries, Villar et al. found that pregnant people with a COVID-19 diagnosis during pregnancy were 22 times more likely to die during or shortly after pregnancy compared to pregnant people without a COVID-19 diagnosis during pregnancy [9]. Data also show that COVID-19 vaccination during pregnancy is effective and safe for both mother and baby [12-18]. Further, COVID-19 vaccination during pregnancy additionally confers protection to infants after birth [18-23]. Thus, COVID-19 vaccination during pregnancy is strongly recommended [1, 10, 12, 19, 24-31].

At the national level, COVID-19 vaccine uptake among pregnant adults (approximately 70% as of March 2022) is lower than that of the general US adult population of reproductive age (approximately 76% as of March 2022 [32]). Further, vaccination coverage in Tennessee lags behind that in the US overall (approximately 59% of all adult Tennesseans ages 21-50 vaccinated as of March 2022 [32]). To the best of our knowledge, COVID-19 vaccination coverage among pregnant people in East Tennessee is unknown.

Vaccine uptake in pregnant people may lag behind non-pregnant adults due to several factors, including that the vaccine was not recommended for pregnancy until later (recommended for non-pregnant adults in December, 2020 and then pregnant adults in late April, 2021 [33]), concern for the fetus and infant, and vaccine hesitancy. Vaccine hesitancy during pregnancy is
documented, but COVID-19 vaccine uptake may be lower than for other vaccines during pregnancy given several factors, including political influences, the relative overall newness of the COVID-19 vaccine, and vaccine hesitancy independent of pregnancy [34]. Vaccination is a complex decision-making process that is influenced by several contextual factors and purported to be vaccine specific [35-38]. It has been proposed that trust in mainstream medicine and perceived risk are critical components of vaccine hesitancy [35, 37-42]. The primary objective of this study is to describe COVID-19 vaccine coverage and factors associated with COVID-19 vaccine uptake among pregnant people in East Tennessee.

We anticipate that the study will find a lower prevalence of COVID-19 vaccination among pregnant adults compared to the US and Tennessee general adult populations [32]. We anticipate that COVID-19 vaccination will be associated with high levels of trust in mainstream medicine and participants’ prenatal care provider, high perceived risk of severe COVID-19 infection, low perceived risk of adverse outcomes from vaccination, and low levels of exposure to misinformation. The preliminary data presented here were collected from February 14, 2022 through May 12, 2022, the study roll out period. They provide an estimate of the prevalence of COVID-19 vaccination among pregnant individuals in East Tennessee and explore their trust in medical providers for information on COVID-19 and the COVID-19 vaccines.

**Research Design and Methods**

*Survey Design and Development*

A cross-sectional, online, anonymous survey was developed using both pre-existing survey instruments and original questions. We conducted a literature review to inform survey development and consulted professionals in the field throughout survey development and
refinement. An approximately 140-question survey was developed and administered using REDCap, a secure web-based application for building and managing online surveys and clinical research databases that is compatible for use with mobile devices. The survey is presented in Appendix A. The current report focuses on COVID-19 vaccination status and perceptions of the COVID-19 vaccines and COVID-19 infection (including trust in primary and prenatal care providers on these topics). The survey also assessed demographic information, acceptance and perceptions of routine maternal vaccines (Tdap and flu vaccinations during pregnancy) and routine childhood vaccines, history of confirmed or likely COVID-19 infection before or during the current pregnancy, COVID-19 prevention behaviors, and pandemic-related stressors specific to pregnancy (PREPS survey [43-45]). Figure 1 displays the Moms and Vaccines survey sections and content. The institutional review board at the University of Tennessee Graduate School of Medicine reviewed and approved this study (study #4868).

<table>
<thead>
<tr>
<th>Section</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Screening Questions</td>
<td>Screens for eligibility (participants must live or receive medical care in East Tennessee, be 18 years of age or older, be comfortable communicating in English, must be currently pregnant, and must have a due date within 8 months of the date they begin the survey); participants must pass screening questions to proceed</td>
</tr>
<tr>
<td>II. Consent to Participate</td>
<td>Informed consent for participants; they must consent to proceed with survey</td>
</tr>
<tr>
<td>III. Demographic Information</td>
<td>Demographic questions about study participants, including race and ethnicity, marital status, household income, age, community type (urban/rural/suburban), education level, and political affiliation</td>
</tr>
<tr>
<td>IV. Maternal Vaccinations</td>
<td>Assesses uptake and perceptions of flu and Tdap vaccines during pregnancy, two routine vaccinations that are recommended during pregnancy</td>
</tr>
<tr>
<td>V. Childhood Vaccinations</td>
<td>Assesses perceptions and beliefs about routine childhood vaccinations [46, 47]</td>
</tr>
<tr>
<td>VI. COVID-19 Vaccines</td>
<td>Assesses uptake and perceptions about COVID-19 vaccines during and related to pregnancy</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>VII. COVID-19</td>
<td>Asks if participants have had or likely had prior COVID-19 infection (both during and before current pregnancy), assesses participants’ level of trust in their primary care and prenatal care providers regarding COVID-19 vaccines</td>
</tr>
<tr>
<td>VIII. COVID-19 Behaviors</td>
<td>Assesses what COVID-19 prevention behaviors participants engage in, such as mask-wearing, social distancing, etc., and asks where participants get their information about COVID-19 from</td>
</tr>
<tr>
<td>IX. Impacts of the COVID-19 Outbreak on You</td>
<td>Assesses the level of stress and the impacts of the COVID-19 outbreak on participants; includes the Pandemic Related Pregnancy Stress Scale (PREPS) [43-45]</td>
</tr>
<tr>
<td>X. Survey Conclusion</td>
<td>Participants must choose to submit answers to research team or withdraw from the study; those who submit can optionally continue to a separate survey instrument to receive a $10 Walmart gift card for their time</td>
</tr>
<tr>
<td>XI. (Optional) Email and Mailing Address to Receive Gift Card</td>
<td>Participants can submit a valid USPS mailing address and email address if they want to receive a $10 Walmart gift card for completing the survey; this information is not linked to their survey responses and is kept strictly confidential</td>
</tr>
</tbody>
</table>

*Figure 1. Moms and Vaccines Survey sections and summaries*

The REDCap survey is compatible with mobile browsers and takes approximately 30 minutes to complete. *Figure 2* displays the mobile browser version of the survey. Study advertisements (displayed in Appendix B) contain a QR code and short URL (redcap.link/momsandvaccines) that direct potential participants to the screening questions; participants must pass all five screening questions and consent to participate in the study before they proceed through the survey. The final question of the survey requires participants to confirm they would like to submit their responses to the research team (versus withdraw from the study).

Participants who complete the survey and submit their responses to the research team then have the option to continue to a separate REDCap survey, where they can enter a valid mailing address and email address in order to receive a $10 Walmart gift card incentive. The incentive is entirely optional, participants’ mailing address and email are not linked to their survey responses in any way, and this information is stored in a separate REDCap database from the survey.
responses. Mailing addresses and email addresses remain strictly confidential and are used only to distribute the gift card to those who opt-in to the incentive.

Setting and Sampling

Study data were collected and managed using REDCap electronic data capture tools hosted at the University of Tennessee Graduate School of Medicine [48, 49]. REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources.

We launched the Moms and Vaccines Survey beginning in late February 2022. This report presents preliminary data from the role out of the Moms and Vaccines Survey (i.e., between February 14, 2022 and May 12, 2022). Participants were eligible to participate if they were (self-reported): comfortable communicating in English (to complete the survey), 18 years of age or older, currently pregnant, live or receive medical care in East Tennessee, and had a due date within eight months of the day they began the survey. Participants were recruited via posters and flyers placed primarily in hospital and clinic waiting rooms (see Appendix B). During the role out period, advertising efforts were focused within the University of Tennessee Medical

![Figure 2. Moms and Vaccines Survey display on a mobile phone browser at start of survey (screening questions)](image)
Center (UTMC) and its satellite clinics, namely University Women’s Specialists (UWS). UTMC is an academic, regional, quaternary care medical center located in urban Knoxville, Tennessee. UTMC serves 21 counties in the East Tennessee region and serves as a regional referral center for East Tennessee [50]; UTMC delivers approximately 4,000 infants annually.

Data Analysis

Participants were dichotomized based on their reported COVID-19 vaccination status. The responses of those who indicated that they have already received a COVID-19 vaccine (the “vaccinated” group, n = 58) were compared to those who indicated that they have not yet received a COVID-19 vaccine and would not receive a COVID-19 vaccine (the “declining vaccination” group, n = 11). Participants who answered, “Yes, I would accept a COVID-19 vaccine, but I have not been vaccinated yet,” (n = 4) were excluded from this analysis due to the small sample size. Figure 3 provides an overview of the study design and stratification scheme. Further, data on perceptions of the risks of COVID-19 infection and vaccination, and medical information from, discussions with, and level of trust in healthcare providers, are also presented, by vaccination status.

**Figure 3.** Overview of methods and analysis. Pregnant people (N = 73) who reported that they live or receive medical care in East Tennessee took the mobile REDCap Moms and Vaccines Survey and could optionally receive a $10 Walmart gift card for their time. For data analysis, respondents were separated based on their reported vaccination status: already vaccinated against COVID-19 (n = 58, “vaccinated”), not yet vaccinated against COVID-19 but willing to receive a COVID vaccine (n = 4), or not vaccinated against COVID-19 and not willing to receive a COVID vaccine (n = 11, “declining vaccination”). The vaccinated and declining vaccination groups were compared.
To assess perceptions of the risks of COVID-19 infection and vaccination, participants rated their level of agreement with several statements about COVID-19 infection and vaccination on a Likert scale (statements are shown in Appendix A, section E). The answer choices on the Likert scale were: 1) strongly agree, 2) agree, 3) not sure or neutral, 4) disagree, and 5) strongly disagree. To describe responses to these questions, an answer of “strongly agree” or “agree” was considered affirmative, while an answer of “not sure or neutral,” “disagree,” or “strongly disagree” was considered to not affirm the statement. Table 2 displays participants’ agreement with these statements, stratified by vaccination status.

Participants were also asked to rate their level of trust in both their primary care provider and their prenatal care provider on a scale from 0-100, 0 being “not at all trust” and 100 being “trust completely.” These reported levels of trust were compared between vaccination groups using a one-sided, two-sample, independent t-test (alternative hypothesis of the declining vaccination group having lower average trust than the vaccinated group).
### Results

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COVID-19 Vaccination Status</strong></td>
<td></td>
</tr>
<tr>
<td>Vaccinated</td>
<td>58 (79.5)</td>
</tr>
<tr>
<td>Not vaccinated and would accept a vaccine</td>
<td>11 (15.1)</td>
</tr>
<tr>
<td>Not vaccinated and would not accept a vaccine</td>
<td>4 (5.5)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
</tr>
<tr>
<td>21-25</td>
<td>15 (20.5)</td>
</tr>
<tr>
<td>26-30</td>
<td>20 (27.4)</td>
</tr>
<tr>
<td>31-35</td>
<td>27 (37.0)</td>
</tr>
<tr>
<td>36-42</td>
<td>11 (15.1)</td>
</tr>
<tr>
<td><strong>Race and Ethnicity</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>61 (83.6)</td>
</tr>
<tr>
<td>Non-White</td>
<td>11 (15.1)</td>
</tr>
<tr>
<td>Missing</td>
<td>1 (1.4)</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
</tr>
<tr>
<td>High school or GED</td>
<td>3 (4.1)</td>
</tr>
<tr>
<td>Technical/trade school, some college, or 2-year degree</td>
<td>16 (21.9)</td>
</tr>
<tr>
<td>4-year college graduate</td>
<td>28 (38.4)</td>
</tr>
<tr>
<td>Postgraduate</td>
<td>26 (35.6)</td>
</tr>
<tr>
<td><strong>Community Type</strong></td>
<td></td>
</tr>
<tr>
<td>Urban</td>
<td>8 (11.0)</td>
</tr>
<tr>
<td>Suburban</td>
<td>42 (57.5)</td>
</tr>
<tr>
<td>Rural</td>
<td>20 (27.4)</td>
</tr>
<tr>
<td>Don't know</td>
<td>3 (4.1)</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
</tr>
<tr>
<td>Married/civil union</td>
<td>62 (84.9)</td>
</tr>
<tr>
<td><strong>Political Affiliation</strong></td>
<td></td>
</tr>
<tr>
<td>None/unaffiliated/independent/moderate</td>
<td>14 (19.2)</td>
</tr>
<tr>
<td>Democrat/progressive</td>
<td>21 (28.8)</td>
</tr>
<tr>
<td>Republican/conservative</td>
<td>20 (27.4)</td>
</tr>
<tr>
<td>Missing</td>
<td>18 (24.7)</td>
</tr>
</tbody>
</table>

*Table 1. Characteristics of Moms and Vaccines Study participants (N = 73)*
The COVID-19 vaccine will affect their fertility | Vaccinated (N = 58) | Would not accept vaccine (N = 11)
--- | --- | ---
4 (6.9%) | 6 (54.5%)

COVID-19 vaccination during pregnancy will increase the risk of miscarriage or spontaneous abortion | 2 (3.4%) | 4 (36.4%)

Receiving a COVID-19 vaccine during pregnancy is unlikely to protect the baby from COVID-19 | 4 (6.9%) | 5 (45.5%)

Receiving COVID-19 vaccine during pregnancy will harm their baby | 2 (3.4%) | 5 (45.5%)

It is safe to receive a COVID-19 vaccine during pregnancy | 42 (72.4%) | 0 (0.0%)

COVID-19 infection will be more severe if they do not get the COVID vaccine | 54 (93.1%) | 0 (0.0%)

The COVID-19 vaccine will lead to a COVID infection | 1 (1.8%) | 4 (36.4%)

COVID-19 vaccines were developed too quickly to be safe and effective | 6 (10.3%) | 7 (63.6%)

COVID-19 vaccines could alter DNA | 1 (1.7%) | 4 (36.4%)

The risks of the COVID-19 vaccine are greater than the risks of infection with COVID-19 | 2 (3.4%) | 9 (81.8%)

Baby is at increased risk of infection if others in their household do not get the COVID-19 vaccine | 48 (82.8%) | 0 (0.0%)

Table 2. Perceptions of the risks of infection and vaccination

| | Vaccinated (N = 58) | Would not accept vaccine (N = 11)
--- | --- | ---
Trust information about COVID-19 vaccination from their primary care provider | 51 (87.9%) | 1 (9.1%)

Can openly discuss concerns about COVID-19 vaccination with their primary care provider | 52 (89.7%) | 6 (54.5%)

Trust information about COVID-19 vaccination from their prenatal care provider | 54 (93.1%) | 1 (9.1%)

Feel that they can openly discuss their concerns about COVID-19 vaccination with their prenatal care provider | 58 (100.0%) | 8 (72.7%)

Table 3. Medical information and discussions with providers
Participant characteristics are displayed in Table 1. The prevalence of COVID-19 vaccination among Moms and Vaccines study participants was found to be 79.5%. Perceptions of the risks of COVID infection and vaccination are displayed in Table 2. The three most prevalent concerns reported among those declining vaccination were: concerns about the vaccine’s effects on fertility, the belief that COVID-19 vaccines were developed too quickly, and belief that the risks of COVID-19 vaccines outweigh the risks of COVID-19 infection. Reported perceptions about providers are displayed in Table 3. Participants declining vaccination reported lower trust in information about COVID-19 infection and vaccination than vaccinated participants. However, those declining vaccination indicated that they feel that they can openly discuss their concerns about COVID-19 vaccination with their prenatal care provider.

The distribution in level of trust in primary care providers and prenatal care providers for the vaccinated and declining vaccination groups are displayed in Figure 4. There was a statistically significant lower level of trust in primary care providers in the declining vaccination group
compared to the vaccinated group, with a P-value of 0.0466. No difference in average level of trust in prenatal care providers was detected between the two groups, with a P-value of 0.0730. This indicates a lack of trust in the medical establishment among those declining vaccination.

The survey also included several open-ended questions where participants could provide additional information on why they chose to receive or not receive a COVID-19 vaccine. The responses were reviewed to identify themes related to perceptions of and trust in medical providers related to COVID-19 and COVID-19 vaccination. **Figure 5** and **Figure 6** display themes identified and direct quotes that summarize these responses.

<table>
<thead>
<tr>
<th>Is there anything you would like to tell us about why you chose to receive the COVID-19 vaccine?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Theme 1:</strong> Protection for self and others; sense of responsibility or duty</td>
</tr>
<tr>
<td>“I am concerned about my own health, but particularly about the odds of my spreading covid to someone in a high-risk population”</td>
</tr>
<tr>
<td>“For my health and my family’s health. To do my part for the country. For the safety of my students.”</td>
</tr>
<tr>
<td>“It is the socially responsible thing to do”</td>
</tr>
<tr>
<td>“Seemed safer than taking the risk of getting COVID-19, especially with members of our family being high-risk”</td>
</tr>
<tr>
<td><strong>Theme 2:</strong> Received a COVID-19 vaccine, but still hesitant or newly hesitant</td>
</tr>
<tr>
<td>“I would probably not have it if it wasn’t required at work”</td>
</tr>
<tr>
<td>“I was told that it would not have any [effects] on fertility and would help protect me from covid, but after more information came out after I got the vaccine that the [effects] on fertility are more concerning. Since I am not at risk due to underlying conditions I did not receive a booster shot.”</td>
</tr>
</tbody>
</table>

**Figure 5.** Themes in responses about why participants who are already vaccinated chose to receive a COVID-19 vaccine
Please tell us why you would not accept a COVID-19 vaccine.

<table>
<thead>
<tr>
<th>Theme 1: Vaccine development was “rushed,” there is not yet enough research on vaccine safety and side effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>“It was too rushed and not enough research”</td>
</tr>
<tr>
<td>“It was produced very quickly under unprecedented circumstances and there is a lot of anecdotal concern about side effects”</td>
</tr>
<tr>
<td>“this vaccine hasn’t had the time to be properly studied yet for long term side effects. No one is able to tell me for sure what potential side effects there are 5-10 years down the road. At this time, the benefits of the vaccine do not outweigh the risks for me”</td>
</tr>
<tr>
<td>“The COVID19 shots on the market are still in the trial phase and I believe there has not been enough research on side effects regarding these shots and dosages.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Theme 2: COVID vaccine is ineffective or is not needed because of protection afforded from prior COVID infection</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I feel that the covid vaccine is not truly a vaccine at all, but rather a therapeutic treatment. I work [in health care] and have seen for myself how the covid vaccine has been largely ineffective in preventing the catching and spreading of the illness.”</td>
</tr>
<tr>
<td>“The immunity I have [received] from contracting the virus gives me safer protection and antibodies than the COVID19 shot.”</td>
</tr>
<tr>
<td>“I contracted covid in July 2020 (during the delta surge), and thus have some protection from the antibodies created during that time.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Theme 3: “Personal choice” or opinion</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Personal choice”</td>
</tr>
<tr>
<td>“I do not agree with this trial vaccine”</td>
</tr>
<tr>
<td>“I do not believe in it”</td>
</tr>
<tr>
<td>“don’t want [to]”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Theme 4: Mistrust in institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I’m not convinced the CDC is being forthright about [side effects of the vaccine] based on my conversations with medical professionals.”</td>
</tr>
<tr>
<td>“There are too many requirements concerning the Covid vaccine, and too many people are strongly benefitting financially. If there is a strong (financial) motive, I am reluctant to trust those who push the idea.”</td>
</tr>
</tbody>
</table>

Figure 6. Themes in responses about why participants declining vaccination would not accept a COVID-19 vaccine

Discussion

The reported COVID-19 vaccination coverage among Moms and Vaccines participants during the roll out period was 79.5%. This number is higher than we expected. We believe that our early advertising efforts (in the Medical Center) may have resulted in selection bias, as a majority or survey respondents were white, highly educated, married people who live in suburban areas.
We aim to expand our advertising and recruitment efforts to diversify our sample while significantly increasing our sample size. One way we plan to do this is by modifying the study to include social media advertising, which we have already obtained IRB approval for and plan to implement in the coming weeks. We have also been in contact with doulas and midwives in East Tennessee and in an effort to recruit participants who receive prenatal care from doulas, midwives, and other providers, in addition to those whose care is received primarily from physicians in a hospital or clinic setting.

The preliminary data also show important differences in the vaccinated and vaccine declining groups. Those declining vaccination demonstrated greater levels of misinformation and beliefs inconsistent with the scientific evidence about COVID-19 infection and vaccines, such as high perceived risk of vaccination, low perceived risk of infection, and concerns about the vaccine’s effects on fertility, which have been disproven [51]. Likewise, those already vaccinated demonstrated beliefs about COVID-19 infection and vaccination more consistent with scientific evidence such as lower perceived risk of COVID-19 vaccination and higher perceived risk of infection. This supports our hypothesis that those who accept COVID-19 vaccines will demonstrate high perceived risk of severe COVID-19 infection, low perceived risk of adverse outcomes from vaccination, and low levels of exposure to misinformation.

Further, the majority of those vaccinated against COVID-19 expressed that they trust the information they receive about COVID-19 infection and vaccines from both their primary and prenatal care providers (87.9% and 93.1%, respectively) and feel that they can openly discuss their concerns about infection and vaccination with both provider types (89.7% for primary care providers and 100% for prenatal care providers). On the other hand, only 9.1% of those declining vaccination expressed that they trust the information they receive about COVID-19 infection and
vaccination from both primary care providers and prenatal care providers. Interestingly, however, 72.7% of those declining vaccination reported that they felt they can openly discuss their concerns about COVID-19 vaccination with their prenatal care providers, compared to 54.5% who felt they could discuss their concerns with their primary care provider. This suggests that prenatal care provider-based interventions could be a promising strategy for increasing COVID-19 vaccine uptake among pregnant people, if planning an intervention in a traditional medical care setting. This also supports our hypothesis that COVID-19 vaccine uptake among pregnant people is associated with trust in mainstream medicine and participants’ prenatal care provider.

Similarly, when reported level of overall trust in primary care and prenatal care providers was assessed on a scale from 0-100, we found no significant difference in overall levels of trust in prenatal care providers between the vaccinated and vaccine declining groups. However, we did find statistically significant lower trust in primary care providers for the declining vaccination group. This further suggests that prenatal care providers could be more valuable, in terms of medical center-based interventions, to increase COVID-19 vaccine uptake among pregnant people. Greater trust in prenatal care providers could be due to the increased number of visits with prenatal care providers throughout pregnancy (a relatively narrow window) as compared to the frequency of visits with a primary care provider. Increased visits and interactions allow patients and prenatal care providers to build stronger patient-provider relationships and establish greater trust. One thing we are interested in exploring in the future is the type of prenatal care providers (e.g., physician, midwife, doula) that patients most trust and are most open to receiving information about COVID-19 vaccination from.

Additionally, given that fertility was one of the top three concerns that stood out among those declining vaccination, we would like to further investigate these concerns about fertility and
possible health system-based interventions to dispel misinformation surrounding COVID-19 vaccines’ impact on fertility. Obstetrician-gynecologists could discuss COVID-19 vaccination prior to pregnancy and assure patients that COVID-19 vaccines have no impact on their fertility. Further, we wonder what specific concerns those declining vaccination hold about fertility since they have already achieved pregnancy.

Conclusions

The study is ongoing, thus formal statistical testing across the full range of survey constructs will be performed at its conclusion. These preliminary descriptive analyses of the Moms and Vaccines study roll out data suggest that COVID-19 vaccination among pregnant people may be higher than hypothesized and associated with greater trust in mainstream medicine and healthcare providers, as well as perceived risk of adverse outcomes due to COVID-19 infection and an understanding of vaccine safety consistent with scientific evidence. Those declining vaccination reported much lower levels of trust in medical advice regarding COVID-19 infection and vaccination, but similar levels of trust in their prenatal care provider overall when compared to the vaccinated group. This indicates that prenatal care provider-based interventions may be a promising health system-based strategy to address the unique concerns of this population and increase COVID-19 vaccine uptake.

Acknowledgements

I would like to thank Dr. Kimberly Fortner, Dr. Jill Maples, Dr. Nikki Zite, and Dr. Alissa Paudel of the University of Tennessee Medical Center Graduate School of Medicine Department of Obstetrics and Gynecology for their assistance in developing survey instruments and advertising
the survey to patients. I also want to thank Owen Queen, a student at the University of Tennessee, Knoxville, for his assistance performing statistical testing on these preliminary results.

My Contributions and Reflection

My work on the Moms and Vaccines project has allowed me significant leadership experience in undergraduate research. I first began discussing the project with Dr. Samantha Ehrlich, my research mentor since Spring 2020, in Spring 2021. I began developing the survey with guidance and feedback from Dr. Ehrlich in May 2021. I worked with Dr. Ehrlich to submit the IRB application and began building the survey in REDCap (Appendix A) once we obtained approval. I independently designed the REDCap survey and included advanced branching logic, skip patterns, and even learned and employed HTML to improve the visual appearance of the survey for better user experience. We began rigorously testing the survey in fall 2021, and I fixed any bugs we encountered to ensure proper flow and optimal data capture. I designed all recruitment materials and graphics (Appendix B) as well as thank you cards for participants (in which their gift cards were mailed). I have even begun learning to use SAS, a statistical software suite, with the guidance of Dr. Ehrlich and her PUBH 640 Advanced Epidemiology course. I hope to eventually apply these skills to data analysis for this project and others.

The Moms and Vaccines project has been an incredible learning experience for me and has provided me an invaluable, in-depth experience of the research process. I have greatly enjoyed my time working on this project and hope to continue this work after graduation, and ultimately continue similar work as I pursue a master’s degree in public health concentrated in epidemiology. This project has been instrumental in directing my future plans and I am extremely grateful for the
opportunity to work on this project with Dr. Ehrlich and for her continued support and faith in me to grant me such a significant role in this work.
References

28. CDC Statement on Pregnancy Health Advisory.
APPENDIX A: Moms and Vaccines Survey

*All survey questions are displayed in the survey PDF file, so branching logic and skip patterns are not displayed in the exported survey as participants would see them within the online survey instrument.
# Screening Questions

Please complete the screening questions below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521.

Thank you!

## Screening Questions

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are you comfortable communicating in English?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This survey is only available in English. Thank you for your time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you 18 years of age or older?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This survey is only available to individuals who are 18 years of age and older. Thank you for your time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you currently pregnant?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This survey is only available to individuals who are currently pregnant. Thank you for your time.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is your expected delivery date (due date)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(MM/DD/YYYY)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This survey is only available to those whose due dates are within 8 months of today's date. Thank you for your time and congratulations on your pregnancy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is your residential zip code?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(five digit zip code)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6. Do you live or receive medical care in any of the following Tennessee counties?  

- Anderson
- Bledsoe
- Blount
- Bradley
- Campbell
- Carter
- Claiborne
- Cocke
- Cumberland
- Grainger
- Greene Hamblen
- Hamilton
- Hancock
- Hawkins
- Jefferson
- Johnson
- Knox
- Loudon
- Marion
- McMinn
- Meigs Monroe
- Morgan
- Polk
- Rhea
- Roane
- Scott
- Sevier
- Sullivan
- Unicoi
- Union
- Washington

This survey is only available to those who live or receive medical care in East Tennessee. Thank you for your time and have a great day.
Consent to Participate

You are eligible to complete the Moms and Vaccines Survey. Please continue below. If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521.

Thank you!

Survey 2% Complete

Physicians and researchers at the University of Tennessee Knoxville and the University of Tennessee Graduate School of Medicine are conducting a study called the Moms and Vaccines Survey. This online survey is to help us better understand your thoughts and feelings on COVID-19 and other vaccinations during pregnancy, as well as childhood vaccines. Participation in this study is completely voluntary. Saying no will not affect your rights to health care or services. Participation requires that you are currently: 18 years of age or older and pregnant.

The survey questions are in English and it will take you approximately 30 minutes to complete them all. There are 8 sections (Sections A-H) with approximately 140 questions in total. You may withdraw at any point during the survey by closing your web browser. You may also skip any questions that you are not comfortable answering. The last questions of the survey will ask if you are sure that you want to submit your responses to the research team, or if you wish to withdraw from the study.

After submitting their survey responses, study participants will have the option to provide an email address and mailing address if they wish to receive a $10 Walmart gift card. The mailing address provided will only be used to distribute the gift card and the email address will only be used to confirm that you receive the gift card. Your mailing address and email address will not be linked to your survey responses.

The information collected by this survey will be kept strictly confidential.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521.

By completing this survey, you are consenting to participate in this study. ☐ I agree
Moms and Vaccines Survey - Section A. Demographic Information

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

---

Survey 14% Complete

1. In the past 4 weeks, how would you say your health has been in general?
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor

2. Compared to before you were pregnant with this baby, how would you rate your health now?
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor

3. What is your current age?
   (age in years)

4. What is your current weight? (indicate units)
   (___)

5. How much did you weigh before this pregnancy? (indicate units)
   (___)

6. What is your height? (please report in feet and inches OR centimeters but NOT BOTH)
   ______ ft
   ______ in
   OR
   ______ cm

7. Please select the category that you think best describes the community where you live:
   - [ ] Urban
   - [ ] Suburban
   - [ ] Large Rural
   - [ ] Small Rural
   - [ ] Isolated
   - [ ] Don't know
8. My ethnic origin is: (check all that apply)

- Black/African American
- Latina/Hispanic/Latin American
- White
- Middle Eastern (Arab, Israeli, etc.)
- Chinese
- Filipina
- Japanese
- Korean
- Vietnamese
- Asian Indian
- Pakistani
- Afghan
- Cambodian
- Other Asian (specify below)
- Native Hawaiian/Pacific Islander
- Native American/American Indian
- Inuit/Eskimo/Aleut
- Other (specify below)
- Prefer not to answer

Please specify "Other Asian":

Please specify "Other":

9. What is your highest level of schooling?

- 8th grade or less
- Some high school, but did not graduate
- High school graduate or GED
- Technical/trade school, some college or a 2-year college degree
- 4-year college graduate (e.g., BA, BS)
- Postgraduate degree (PhD, MD, JD, Masters, or other professional degree)

10. What is your estimated total household income before taxes?

- Less than $15,000 per year
- $15,000 to $24,999 per year
- $25,000 to $34,999 per year
- $35,000 to $49,999 per year
- $50,000 to $64,999 per year
- $65,000 to $79,999 per year
- $80,000 to $99,999 per year
- $100,000 to $149,999 per year
- $150,000 to $199,999 per year
- $200,000 to $249,999 per year
- $250,000 and greater per year
- Prefer not to answer

11. Where are you receiving care from during your pregnancy? (select all that apply)

- UT Medical Center
- An Obstetrician/Gynecologist or nurse practitioner not associated with UT Medical Center
- A midwife or doula not associated with UT Medical Center
- Other (please describe below)

Please describe "Other":

---
11B. Which UT Medical Center clinic(s) are you receiving care from? (select all that apply)

- [ ] University Women’s Specialists
- [ ] High Risk Obstetrical Consultants (HiROC)
- [ ] UT OB/GYN clinic
- [ ] University Midwives
- [ ] Women's Care Group
- [ ] I don't know which UT Medical Center clinic(s) I am receiving care from during my pregnancy

12. What is your political affiliation?
Section B. Demographic Information B

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

Survey 26% Complete

1. What was your employment status prior to becoming pregnant?
   - Employed full-time (at least 35 hours per week)
   - Employed, but work less than 35 hours per week
   - Employed, but on maternity/medical leave
   - Not employed outside the home, not looking for work
   - Not employed outside the home, looking for work
   - Student (either full-time or part-time)

2A. What is your current employment status?
   - Employed full-time (at least 35 hours per week)
   - Employed, but work less than 35 hours per week
   - Employed, but on maternity/medical leave
   - Not employed outside the home, not looking for work
   - Not employed outside the home, looking for work
   - Student (either full-time or part-time)

2B. If you currently work or volunteer, are you able to conduct your work remotely and/or socially distanced from other people or do you have to be in contact with other people?
   - I can conduct my work (paid or volunteer) remotely
   - I am in close contact with other people while working (paid or volunteer)
   - Not applicable

2C. I am in close contact with other people while working (paid or volunteer)...
   - indoors
   - outdoors
   - both indoors and outdoors

3. What is your current marital status?
   - Married/Civil Union
   - Not married, but living with partner
   - Divorced
   - Separated
   - Single (never married)
   - Widowed

4. How many people are currently living in your household including yourself and children living with you part-time?
   (people)

5. How many people currently living at least part-time in your household are children under the age of 18?
   (children)

6. Are you currently in the WIC program?
   - Yes
   - No

(WIC is a federal program for women, infants, and children. WIC provides nutritious foods, nutrition education, and referrals to health and other social services to participants at no charge.)
7. What type of health insurance do you currently have?  
- Private health insurance through my employer or a family member's employer  
- Private health insurance purchased through the exchange (i.e., HealthCare.gov)  
- Private health insurance NOT purchased through the exchange  
- Medicaid (e.g., TennCare, Healthy Connections, Kentucky Medicaid, or other state Medicaid program)  
- Other (please specify below)

Please specify "Other":

8A. Including this pregnancy, how many times have you been pregnant?  
(total pregnancies)

8B. How many of your prior pregnancies resulted in a live birth? (Twins, triplets, etc. count as one live birth)  
(live births)

9. Have you ever been told that you have or had any of the following conditions when NOT pregnant?  
- High blood pressure (hypertension)  
- Diabetes  
- Guillain-Barre syndrome (GBS)  
- Heart Disease  
- Cancer

10. Have you been told that you have or had any of the following medical conditions during your current pregnancy?  
- High blood pressure (hypertension)  
- Gestational Diabetes (GDM)  
- Guillain-Barre syndrome (GBS)  
- Preeclampsia

11. Have you ever been told that you have or had any of the following conditions during a previous pregnancy?  
- High blood pressure (hypertension)  
- Gestational Diabetes (GDM)  
- Guillain-Barre syndrome (GBS)  
- Preeclampsia  
- Pre-term birth
Section C. Maternal Vaccinations

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

Survey 38% Complete

1. Do you get a seasonal flu vaccine every year?  Yes  No

2. Have you received your flu vaccine since you have been pregnant?  Yes  No

2B. Are you planning to get your flu vaccine before you deliver?  Yes  No  Undecided

3. Did your prenatal care provider recommend that you receive a flu vaccine during pregnancy?  Yes  No  Don't know

4. In general, do you believe the flu vaccine is effective?  Yes  No  Not sure

5. Have you received your Tdap vaccine since you have been pregnant?  Yes  No

5B. Are you planning to get your Tdap vaccine before you deliver?  Yes  No  Undecided

6. Did your prenatal care provider recommend that you receive a Tdap vaccine during pregnancy?  Yes  No  Don't know

7. In general, do you believe the Tdap vaccine is effective in preventing pertussis (whooping cough)?  Yes  No  Not sure

8. Please rank your level of agreement with the following statements about questions and concerns regarding vaccines during pregnancy.

A. Pregnant women who get the flu can become much sicker than non-pregnant women who get the flu.  Strongly Agree  Agree  Not Sure or Neutral  Disagree  Strongly Disagree

B.
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Getting the flu vaccine during pregnancy is safe for the pregnant woman.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>C. Getting the flu vaccine during pregnancy is safe for the baby.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>D. Getting the flu vaccine during pregnancy creates antibodies in the mom that are passed along to the baby and helps the baby's immune system.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>E. Getting the flu vaccine during pregnancy provides protection for the baby against the flu until about 6 months of age.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>F. Pertussis (whooping cough) is rare and people no longer need to get immunized against it.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>G. Getting the Tdap vaccine during pregnancy is safe for the pregnant woman.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>H. Getting the Tdap vaccine during pregnancy is safe for the baby.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>I. Giving the Tdap vaccine to pregnant women will help protect newborn babies from getting pertussis (whooping cough).</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>J. Parents and those in close contact to newborns should receive the Tdap vaccine to prevent passing pertussis (whooping cough) to their babies.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>K. In general, I am concerned about the side effects of vaccines given during pregnancy on me (the pregnant person).</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>L. In general, I am concerned about the side effects of vaccines given during pregnancy on my baby.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>M. I understand why Tdap and flu vaccinations are recommended in pregnancy.</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
9A. On a scale from 0-100, how doubtful do you consider yourself to be about receiving the flu vaccine during pregnancy, overall? (0 = not at all doubtful that I should get the flu vaccine, to 100 = extremely doubtful that I should get the flu vaccine)

<table>
<thead>
<tr>
<th>0, not at all doubtful</th>
<th>100, extremely doubtful</th>
</tr>
</thead>
</table>

(Place a mark on the scale above)

9B. On a scale from 0-100, how doubtful do you consider yourself to be about receiving the Tdap vaccine during pregnancy, overall? (0 = not at all doubtful that I should get the Tdap vaccine, to 100 = extremely doubtful that I should get the Tdap vaccine)

<table>
<thead>
<tr>
<th>0, not at all doubtful</th>
<th>100, extremely doubtful</th>
</tr>
</thead>
</table>

(Place a mark on the scale above)
Section D. Childhood Vaccinations

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

Survey 50% Complete

The next set of questions are about all recommended childhood vaccines. Please select one answer for each question.

1. Please rank your level of agreement with each of the following statements regarding childhood vaccines.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Childhood vaccines are important for my child's health.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Generally I will do what my doctor or health care provider recommends about vaccines for my child/children.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Following the shot schedule recommended by my child's doctor is a good idea.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>It is my role as a parent to question shots recommended by my child's doctor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>Children get more shots than are good for them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>I believe that many of the illnesses shots prevent are severe.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>It is better for my child to develop immunity by getting sick than to get a shot.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>It is better for children to get fewer vaccines at the same time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>I trust the information I receive about shots from my child's doctors.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td></td>
<td>I am able to openly discuss my concerns about shots with my child's doctor.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. On a scale from 0-100, how doubtful do you consider yourself to be about childhood vaccines, overall? (0 = not at all doubtful to 100 = extremely doubtful)

0, not at all doubtful

100, extremely doubtful

(Place a mark on the scale above)
Section E. COVID-19 Vaccines

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

Survey 62% Complete

1. Would you accept a COVID-19 vaccine if it were recommended by your doctor and was approved safe and effective by the government?
   ○ I've already received a COVID-19 vaccine.
   ○ Yes, I would accept a COVID-19 vaccine but have not yet been vaccinated.
   ○ No, I would not accept a COVID-19 vaccine.

1B. Which vaccine(s) did you receive?
   - Pfizer-BioNTech
   - Moderna
   - Johnson & Johnson's Janssen
   - Other (please describe below)
   - Don't Know

Please describe "other" vaccine: ________________________________________________________________

1C. What date(s) did you receive the vaccine? (enter multiple dates if applicable)
   1st dose ______
   2nd dose ______
   3rd dose ______
   4th dose ______

1B. Please tell us why you would not accept a COVID-19 vaccine.
   ________________________________________________________________

2. Have those eligible for the COVID-19 vaccine in your household received a COVID-19 vaccine?
   ○ Yes, all eligible members of my household have received a COVID-19 vaccine.
   ○ No, one or more eligible members of my household have not received a COVID-19 vaccine.
   ○ Don't know

3. Did your prenatal care provider recommend that you receive a COVID-19 vaccine before or during pregnancy?
   ○ Yes
   ○ No
   ○ Don't know

4. Please rate your level of agreement with each of the following statements.

I am concerned that...

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>4A. the COVID-19 vaccine will affect my fertility or ability to become pregnant again in the future.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

4B.
the COVID-19 vaccine will give me COVID-19-like symptoms.

4C. a COVID-19 vaccine will affect my sex life.

4D. COVID-19 infection will be more severe if I do not get the COVID vaccine.

4E. receiving a COVID-19 vaccine during pregnancy is unlikely to protect my baby from COVID-19.

4F. receiving a COVID-19 vaccine during pregnancy will increase my risk of miscarriage or spontaneous abortion.

4G. receiving a COVID-19 vaccine during pregnancy will harm my baby.

4H. the COVID-19 vaccine could infect me with COVID-19.

4I. my baby is at increased risk of infection if others in my household do not get the COVID-19 vaccine.

4J. the COVID-19 vaccine could contain a microchip.

4K. the COVID-19 vaccines were developed too quickly to be safe and effective.

4L. the COVID-19 vaccine could alter my DNA.

4M. the risks of the COVID-19 vaccine are greater than the risks of infection with COVID-19.

4N. Is there anything else we didn't ask about that may influence your decision to receive a COVID-19 vaccine?

5. Please rate your level of agreement with each of the following statements.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5A. It is safe to receive a COVID-19 vaccine during pregnancy.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>5B.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5C. All healthcare providers should be required to receive the COVID-19 vaccine.

5D. Schools should require teachers, staff, and eligible students to receive the COVID-19 vaccine.

6. Indicate below whether the following would make you more willing to receive the COVID-19 vaccine.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A. Being entered into a drawing to win cash prizes would make me more willing to receive a COVID-19 vaccine.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6B. If someone helped me with childcare so I could go get the vaccine it would make me more willing to receive a COVID-19 vaccine.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6C. Support (e.g. childcare) if I were to experience symptoms from the vaccine and need help would make me more willing to receive a COVID-19 vaccine.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6D. Time off from work so that I could go get the vaccine would make me more willing to receive a COVID-19 vaccine.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6E. Needing to show proof of vaccination to get into a restaurant or community event would make me more willing to receive a COVID-19 vaccine.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6F. Needing to show proof of vaccination to get on an airplane, train, boat, etc. (travel) would make me more willing to receive a COVID-19 vaccine.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

6G.
6. Indicate below whether the following influenced your decision to receive the COVID-19 vaccine.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>6A.</td>
<td>Being entered into a drawing to win cash prizes</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6B.</td>
<td>Someone helped me with childcare so I could go get the vaccine</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6C.</td>
<td>Support (e.g. childcare) if I were to experience symptoms from the vaccine and need help</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6D.</td>
<td>Time off from work so that I could go get the vaccine</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6E.</td>
<td>Needing to show proof of vaccination to get into a restaurant or community event</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6F.</td>
<td>Needing to show proof of vaccination to get on an airplane, train, boat, etc. (travel)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6G.</td>
<td>Increased health insurance premiums if I did not get a COVID-19 vaccine</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>6H.</td>
<td>My job required the COVID-19 vaccine</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

6I. Is there anything else you would like to tell us about why you have not received a COVID-19 vaccine and what would help you overcome those barriers?  

6I. Is there anything else you would like to tell us about why you chose to receive the COVID-19 vaccine?

7. On a scale from 0-100, how concerned are you about experiencing side effects from COVID-19 vaccination during pregnancy? (0 = not at all concerned to 100 = extremely concerned)

0, not at all concerned 100, extremely concerned

(Place a mark on the scale above)
8. On a scale from 1-100, how severe do you think the side effects from COVID-19 vaccination during pregnancy would be? (0 = not at all severe to 100 = extremely severe)

<table>
<thead>
<tr>
<th>0, not at all severe</th>
<th>100, extremely severe</th>
</tr>
</thead>
</table>

9. On a scale from 1-100, how fearful do you feel about the COVID-19 vaccination during pregnancy? (0 = not fearful at all, 100 = extremely fearful)

<table>
<thead>
<tr>
<th>0, not at all fearful</th>
<th>100, extremely fearful</th>
</tr>
</thead>
</table>

10. On a scale from 0-100, how doubtful do you consider yourself to be about COVID-19 vaccines during pregnancy, overall? (0 = not at all doubtful to 100 = extremely doubtful)

<table>
<thead>
<tr>
<th>0, not at all doubtful</th>
<th>100, extremely doubtful</th>
</tr>
</thead>
</table>

11. Indicate your level of agreement with each of the following statements about your primary care provider. (Your primary care provider is who you see for basic medical care when you are NOT pregnant.)

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

11A. I trust the information that I receive about COVID-19 vaccination from my primary care provider.

11B. I feel that I can openly discuss my concerns about COVID-19 vaccination with my primary care provider.

12. Indicate your level of agreement with the following statements about your prenatal care provider. (Your prenatal care provider is who you see for medical care DURING pregnancy.)

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

12A. I trust the information that I receive about COVID-19 vaccination from my prenatal care provider.

12B. I feel that I can openly discuss my concerns about COVID-19 vaccination with my prenatal care provider.
Section F. COVID-19

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

Survey 74% Complete

For the following questions, healthcare provider means a doctor, nurse practitioner, nurse midwife, physician assistant or anyone you go to for medical care.

1. Has a healthcare provider every told you that you have, or are likely to have, COVID-19 (Coronavirus)?
   - Yes
   - No

1B. When did they tell you that you had or likely had COVID-19? (enter multiple dates if applicable)
   (approximate date(s) (MM/DD/YYYY))

2. Did you likely have COVID-19 but were not seen/told by a healthcare provider and did not get tested?
   - Yes
   - No

2B. When did you first notice symptoms? (enter multiple dates if applicable)
   (approximate date(s) when you first noticed symptoms of COVID-19 (MM/DD/YYYY))

3. Which of the following symptoms have you had at any point since becoming pregnant? (check all that apply)
   - Fever or chills
   - Cough
   - Shortness of breath
   - Sore throat
   - Headache
   - Muscle or body aches
   - Runny nose
   - Fatigue or excessive sleepiness
   - Nausea, or vomiting
   - Loss of sense of smell or taste
   - Itchy/red eyes
   - None of the above

3B. Which of the following occurred as a result of your symptom(s)? (check all that apply)
   - I was kept in a hospital because a healthcare provider thought I had COVID-19
   - I saw a healthcare provider in person, such as: in a clinic, doctor’s office, urgent care, or Emergency Room (ER) and/or Emergency Department (ED)
   - I spoke to a healthcare provider, either over the phone, by email, and/or online
   - I self-isolated or quarantined at home
   - None of the above
3C. In the two weeks before you had symptoms, did you:
(check all that apply)

☐ Have contact with someone who tested positive for COVID-19
☐ Have contact with someone who likely had COVID-19 (e.g., was not tested but had symptoms; was told by a healthcare provider they he/she likely had it)
☐ Travel to a different state or country (please specify below)
☐ None of the above

Please specify what different state or country you travelled to in the two weeks before developing symptoms:
______________________________

4. Have you had the nose swab test for the virus that causes COVID-19 at any point in the past year?

☐ No, I never tried to get tested
☐ No, I tried to get tested but was not able to
☐ Yes, I have had one or more nose swab tests in the past year

4B. In the past year, about how many times have you had the nose swab test for the virus that causes COVID-19? (this does not have to be exact)

______________________________

4C. When was the date of your most recent nose swab test?

______________________________

☐ Check here if you are currently waiting for the results of a nose swab test

4D. Have you had a positive COVID-19 test result since becoming pregnant?

☐ Yes
☐ No

4E. How many times have you had a negative test result in the last year?

______________________________

5. Have you had a blood test to see whether you have already had the COVID-19 virus (also known as an antibody test or serology)? (check all that apply)

☐ No, I never tried to get tested
☐ No, I tried to get tested but was not able to
☐ Yes, and I am waiting for the results
☐ Yes, and the test showed that I DID NOT have it ("NEGATIVE" test)
☐ Yes, and the test showed that I DID have it ("POSITIVE" test)

5B. When was the date of your most recent blood test to see whether you already had the COVID-19 virus?

______________________________

6. Has anyone else living in your home had, or probably had, COVID-19?

☐ Yes
☐ No
☐ Don't know

7. On a scale from 0 to 100, how concerned are you about becoming infected with COVID-19 during your pregnancy? (0 = not at all concerned to 100 = extremely concerned)

0, not at all concerned

100, extremely concerned

______________________________

(Place a mark on the scale above)
8. On a scale from 0 to 100, how severe do you think COVID-19 infection during pregnancy would be? (0 = not at all severe to 100 = extremely severe)

0, not at all severe

100, extremely severe

(Place a mark on the scale above)

9. On a scale from 0 to 100, how fearful do you feel about COVID-19 infection during pregnancy? (0 = not at all fearful to 100 = extremely fearful)

0, not at all fearful

100, extremely fearful

(Place a mark on the scale above)

10. Indicate your level of agreement with each of the following statements about your primary care provider. (Your primary care provider is who you see for basic medical care when you are NOT pregnant.)

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>10A. I trust the information that I receive about COVID-19 infection from my primary care provider.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>10B. I feel that I can openly discuss my concerns about COVID-19 infection with my primary care provider.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

11. On a scale from 0 to 100, all things considered, how much do you trust your primary care provider? (0 = do not trust at all to 100 = completely trust)

0, do not trust at all

100, completely trust

(Place a mark on the scale above)

12. Indicate your level of agreement with each of the following statements about your prenatal care provider. (Your prenatal care provider is who you see for medical care DURING pregnancy.)

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure or Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>12A. I trust the information that I receive about COVID-19 infection from my prenatal care provider.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>12B. I feel that I can openly discuss my concerns about COVID-19 infection with my prenatal care provider.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

13. On a scale from 0 to 100, all things considered, how much do you trust your prenatal care provider? (0 = do not trust at all to 100 = completely trust)

0, do not trust at all

100, completely trust

(Place a mark on the scale above)
Section G. COVID-19 Behaviors

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

---

Survey 86% Complete

1. Which of the following precautions do you take to decrease your risk of getting COVID-19? (check all that apply)
   - Avoiding crowds and public events
   - Social distancing indoors (staying approx. 6 ft away from other people while indoors)
   - Social distancing outdoors
   - Trying to socialize outdoors when possible
   - Participate in events remotely when possible
   - Reducing or avoiding travel
   - Keeping household members at home
   - Washing hands frequently
   - Other prevention activities (please specify below)

Please specify "other prevention activities":

2. Which of the following best describes your mask-wearing habits while indoors?
   - ALWAYS wear a mask indoors in public spaces
   - SOMETIMES wear a mask indoors in public spaces
   - NEVER wear a mask indoors in public spaces

3. Which of the following best describes your mask-wearing habits while outdoors?
   - ALWAYS wear a mask outdoors when I cannot maintain social distancing
   - SOMETIMES wear a mask outdoors when I cannot maintain social distancing
   - NEVER wear a mask outdoors

4. Is there anything else you’d like to tell us about mask-wearing?

   ____________________________________________________________

5. I get my information about COVID-19 from: (check all that apply)
   - Family
   - Friends and neighbors
   - My employer
   - CDC website
   - My state's Department of Health website
   - My county's Department of Health website
   - Public service announcements
   - Personal doctor, midwife, or nurse practitioner that I see for my prenatal care
   - Personal doctor or other provider that I see for my general healthcare
   - News outlets -- please specify below
   - Social media -- please specify which platform(s) and what account(s) below
   - Other (please describe below)

Please specify what news outlets you get your information about COVID-19 from:

   ____________________________________________________________

Please specify which social media platform(s) and what account(s) you get your information about COVID-19 from:

   ____________________________________________________________

---

05/12/2022 3:23pm

projectredcap.org
Please describe "other":

________________________________________
Section H. Impacts Of The COVID-19 Outbreak On You

Please complete the survey below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

Survey 98% Complete

1. What have been your greatest sources of stress from the COVID-19 outbreak? (check all that apply)

- Health concerns
- Financial concerns
- Impact on work
- Impact on your child(ren)
- Impact on your community
- Impact on family members
- Access to food
- Access to baby supplies (e.g., formula, diapers, wipes)
- Access to personal care products or household supplies
- Access to medical care, including mental health care
- Social distancing or being quarantined
- I am not stressed about the COVID-19 outbreak
- Other -- please tell us about your greatest sources of stress from the COVID-19 outbreak in the box below

Please describe other sources of stress from the COVID-19 outbreak:

________________________________________________________________________________________

2. The COVID-19 pandemic may bring up different types of thoughts and feelings during pregnancy.

Please read the following statements and answer on the following scale from "Very Little" to "Very Much"

<table>
<thead>
<tr>
<th>Statement</th>
<th>Very Little</th>
<th>Little</th>
<th>Some</th>
<th>Much</th>
<th>Very Much</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. I am concerned about going to prenatal care appointments due to COVID-19</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>B. I am concerned that I won't get the prenatal care I need because of COVID-19</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>C. I am worried that I might get COVID-19 when I go to the hospital to deliver</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>D. I am worried that my baby could get COVID-19 at the hospital after birth</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>E.</td>
<td></td>
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<td>---</td>
</tr>
<tr>
<td>I.</td>
<td>I feel that COVID-19 is helping me appreciate my pregnancy more</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>F.</td>
<td>I am worried I will not be able to have someone with me during my delivery</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>G.</td>
<td>I am worried I will not be prepared for the birth due to the pandemic restrictions</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>H.</td>
<td>I feel that being pregnant is giving me strength during the pandemic</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>I.</td>
<td>I am concerned that I am not getting enough healthy food or sleep or exercise because of COVID-19 restrictions</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>J.</td>
<td>I am concerned that a COVID-19 infection could harm my baby</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>K.</td>
<td>I am concerned that a COVID-19 infection could harm my pregnancy (such as miscarriage or preterm birth)</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>L.</td>
<td>I am worried that the pandemic could ruin my birth plans</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>M.</td>
<td>I am concerned about being separated from my baby after the delivery because of the pandemic</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>N.</td>
<td>I think about having a baby to help me get through the pandemic hardships</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>O.</td>
<td>I am concerned that people won’t be able to help me care for my baby after birth</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
</tr>
</tbody>
</table>
Survey Conclusion

Please confirm that you would like to submit your survey responses below.

If you have any questions, please email us at momsandvaccines@utmck.edu or call (865) 245-9521. Thank you!

Survey 99% Complete

Are you sure you want to submit your survey responses to the research team?

- I am sure, submit my responses now
- I do NOT want to submit my survey responses to the research team, I wish to withdraw from the study

If you would like to receive a $10 gift card for completing the survey, follow the instructions on the following page to enter your mailing address and your email address. The mailing address and email address you provide will only be used to send the gift card.
APPENDIX B: Survey recruitment materials (poster and two-sided flyer)
PREGNANT?
Share your thoughts on the COVID-19 vaccines

The Moms and Vaccines Study

Researchers at the University of Tennessee are conducting a study to better understand your thoughts and feelings about the COVID-19 vaccines during pregnancy.

TO PARTICIPATE YOU MUST BE...
• 18+ years of age
• currently pregnant
• comfortable answering questions in English

Get a $10 Walmart gift card for completing the survey

follow this QR code or go to redcap.link/momsandvaccines to learn more and complete the survey today

If you have any questions, call 865-245-9512 or email momsandvaccines@utmck.edu
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