# Completion rates for ecological momentary assessments of dietary behaviors during pregnancy and postpartum

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## Abstract

**Background:** Collection of dietary behavior data is crucial in childbearing populations. In addition to observed inequities in perinatal dietary intake and quality, burdensome assessment methods used (e.g., 24-hour dietary recall) may limit research participation for some groups. Ecological momentary assessment (EMA) is associated with reduced recall bias and participant convenience, but there is a dearth of studies with diverse cohorts.

**Objective:** Our aim is to describe participant completion of dietary intake items in EMA surveys, overall and across individual characteristics (e.g., pre-pregnancy body mass index).

**Methods:** Using EMA data from participants in a longitudinal study, we report average completion rates of survey items regarding dietary behavior (e.g., number of meals eaten in a day) across demographic variables (e.g., age) and intersectional strata (e.g., race + age) during late pregnancy and throughout 12 months' postpartum.

**Results:** In our analytic sample (N=310), average completion rates were 59.1% during pregnancy, dropping to 52.4% after giving birth. Participants who were older (>30 years), overweight before pregnancy, self-identified as white, working, or earning higher annual income (>$50,000) had higher average completion rates than their counterparts. Examining intersectional strata, we found some variation in survey completion within racial groups. Black participants using a study phone had higher average completion rates during pregnancy and postpartum, but this relationship was reversed for white participants.

**Conclusions:** Discussion: We showed relatively stable engagement with EMA surveys in a childbearing cohort across 15 months. Increased completion rates among privileged groups (e.g., white, higher income) may demonstrate the impact of socioeconomic advantages on individual health behaviors. Investigators should consider how intersections between race and other factors (e.g., employment) may impact participation and data collection.

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**Keywords:** dietary behavior; ecological momentary assessment; pregnancy; postpartum

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**Conflicts of interest:** ED is a member of the United States Preventive Services Task Force (USPSTF). This article does not necessarily represent the views and policies of the USPSTF. MLW is a consultant for Noctem, but the author's work is not related to this project.

## Background

The collection of dietary behavior data is integral to understanding how diet and eating patterns shape health for individuals and communities.[1,2] In childbearing populations, studies show that dietary intake patterns during pregnancy are critical to the health of both the mother and infant.[3] Inadequate nutrition during pregnancy can increase the risk of cardiometabolic comorbidities (e.g., hypertension disorders of pregnancy and gestational diabetes) during pregnancy and of low birthweight from fetal growth restriction and neurodevelopmental delays.[4,5] Additionally, research shows significant disparities in perinatal diet quality across social determinants of health (education, food security, income)[6-9], obliging studies to examine dietary behaviors across these strata. Racial inequities also exist where Black birthing populations report higher food insecurity[6] and lower quality diets[7-9]; and increased prevalence of perinatal and postnatal comorbidities compared to white populations.[10]

Commonly used dietary assessment methods include 24-hour dietary recalls, food frequency questionnaires, and food diaries, each presenting advantages and disadvantages in their administration and the quality of data collected.[11] The 24-hour dietary recall provides detailed information on dietary intake and has proven to be acceptable across diverse populations including pregnant individuals.[12-15] The major disadvantages of the 24-hour dietary recall measure are that it is prone to recall bias; it is limited by its reliance on an individual's episodic memory; there is potential for intentional misreporting; and it requires the greatest amount of time to complete.[11,13] Food frequency questionnaires also rely on participant memory and lack detailed collection of specific food intake. Food diaries and the 24-hour dietary recall are similar in recording detailed food intake, increasing the burden on study participants and potentially influencing their eating behavior on the days being recorded.[16]

Ecological momentary assessment (EMA) is a sampling method used to repeatedly collect information in "real time"[17] and in one's natural setting; it has been used to understand eating behaviors and food intake, typically via digital devices (e.g., smartphones).[18] EMA reduces retrospective bias and promotes reliability and ecological validity. Compared to more time-intensive methods, EMA reduces the burden of reporting, and often the time lapse between a behavior and recording it. Furthermore, the repeated sampling design facilitates a broader behavioral assessment over time.[17-22] Recent research using EMA to assess dietary behaviors has been conducted in diverse populations, including children[23,24]{Campbell, 2018 #9}, adolescents[25,26], mother-child dyads[27-29], individuals with eating disorders[30], and post-bariatric surgery patients.[31] The few EMA studies examining dietary behavior in perinatal populations report homogenous samples and also poor adherence to EMA completion, making a strong case for more demographically diverse cohorts in evaluating the usability of these assessment tools.[32,33]

Since EMA is a novel approach to collecting dietary data, particularly over long periods of time (e.g., > 3 months), it is critical to assess participant adherence to the EMA protocol for reporting food intake. It is important to note that EMA surveys are designed to be briefer, making it ideal for studying the context of eating behaviors, rather than nutritional content, which may be measured more precisely in recalls and diaries. Leveraging EMA data from a diverse childbearing cohort within a longitudinal, observational investigation, this secondary analysis aimed to describe participant completion of dietary intake items in EMA surveys, overall and across individual characteristics (e.g., pre-pregnancy BMI).

## Methods

*Study Design*

The Postpartum Mothers Mobile Study (PMOMS) is a longitudinal, observational investigation[34] designed to examine factors associated with racial disparities in postpartum weight retention and cardiometabolic health. Pregnant people were recruited between 18-32 weeks' gestation and followed through 12 months' postpartum. Participants completed daily EMA surveys via smartphones, weighed themselves weekly using Bluetooth enabled scales, and attended follow-up visits for anthropometric measurements and biospecimen collection. The study applied EMA methods to better understand participants' experiences and exposures in their natural environment via real-time measurements of psychosocial (e.g., stress, discrimination), behavioral (e.g., eating behavior, consumption of foods with added sugars, physical activity), and contextual (e.g., geographic location) factors.

Brief EMA surveys were administered at the beginning of day (BOD) and end of day (EOD), representing time-contingent responses, and at random times throughout the day (signal-contingent responses). Participants selected times for receiving BOD and EOD surveys, with at least nine hours between the two surveys. Each participant contributed approximately 15 months of EMA data during the pregnancy and postpartum periods. The protocol for the study is described in more detail in a previous publication.[34] This study was approved by the University's Institutional Review Board within the Human Research Protection Office.

*Participants and Recruitment*

PMOMS was an ancillary study to a randomized clinical trial, the Comparison of Two Screening Strategies for Gestational Diabetes ($GDM^2$)[35,36], conducted at a women's hospital in southwestern Pennsylvania. The clinical trial visits provided two in-person opportunities for our staff to approach and recruit potential participants and determine eligibility between 18- and 32-weeks' gestation. Participants were recruited this way between December 2017 and March 2019. After the $GDM^2$ study ended recruitment, PMOMS staff recruited participants directly from December 2019 to March 2020, when study activities were interrupted by the COVID-19 pandemic.

After providing their written, informed consent at a baseline visit (between 18- and 32-weeks' gestation), participants completed demographic questionnaires and anthropometric measures. At this same visit, a research assistant facilitated setting up participants' smartphones for receiving daily

EMA surveys, which were scheduled to begin the following day.[34] For those without a suitable device for participating in the study, PMOMS offered a smartphone with a paid, unlimited data plan for the duration of the study. Upon completing the study, these participants had the option of keeping the smartphone provided by the study as an additional incentive.

Individuals were excluded from participating in PMOMS if they indicated any of the following: plan to deliver at a different hospital from the study recruitment site; multiple pregnancy; plan to move from the area before 12 months postpartum; history of type 1 or type 2 diabetes diagnosis; gestational diabetes diagnosis before 20 week's gestation in current pregnancy; consumption of oral glucocorticoids in last 30 days; history of "dumping syndrome" following gastric bypass surgery; hypertension diagnosis or medication for high blood pressure; and diagnosis of severe liver disease (e.g., cirrhosis). Further details about the PMOMS protocol can be found elsewhere.[34]

*Measures*

For every 28-day block of time after EMA prompts began, eating habits and intake of added sugar foods were assessed in EOD surveys on ten randomly selected weekdays and four randomly selected weekend days.[34] Participants were asked to report the number of meals and snacks they ate during the day. They were also asked to report whether they had any food or drinks with added sugar. If they answered yes to either, they were asked to report the number of foods with added sugar in four categories (cookies, cake, pie, donuts; candy; ice cream, frozen treats; other sugary food, as well as the number of drinks with added sugar in four categories (regular soda pop; juice drinks; coffee shop drink, frozen treats; other sugary drink). These EMA survey items were developed for the purposes of our study and were tested in a pilot study.[37] EMA surveys were designed to be brief (1-2 minutes in duration) and did not ask participants to specify sizes or types of added sugar items consumed.

Upon enrollment, we collected data on maternal age, education, race, ethnicity, employment status, marital status, and annual household income. We dichotomized some demographic variables for descriptive statistics: age as ≤30 years old and >30 years (based on the sample median), employment status as working (part-time, full-time) vs. not working (unemployed, on disability), and annual household income as ≤$50,000 per year vs. >$50,000 per year (based on the sample median). In this study we also examined EMA completion between participants using their own phone and those using a smartphone provided by PMOMS. Study staff measured participant height at the first clinical trial visit, and participants self-reported their pre-pregnancy weight at the second clinical trial visit. We calculated pre-pregnancy body mass index (BMI) by dividing participant weight in kilograms by their height in meters squared, and categorized participants as normal/healthy (BMI=18.0-24.9) and overweight (BMI≥25.0).[38]

*Data Analysis*

We excluded participants from the analytic sample only if they were determined to be ineligible for PMOMS at the study enrollment phase. We report frequencies and percentages for categorical variables and means and standard deviations (SDs) for continuous variables for all demographic and anthropometric measures.

Completion rates were calculated for all participants included in the analytic sample by dividing the number of responses to dietary intake questions by the number of EOD surveys delivered, during both pregnancy and postpartum periods. Given the sampling design described above, we only considered EOD surveys with the dietary intake questions in these completion calculations. We then stratified the study sample across demographic and clinical measures, describing average completion rates for each pair. In addition to the subgroups described above (by age, employment status upon study enrollment, household income), we examined average completion rates for participants by pre-pregnancy BMI (healthy [18.0-24.9] vs. overweight [≥25.0]; study phone usage; and by race (Black vs. white). Lastly, we looked at average completion rates across intersectional sample strata (e.g., by race and age). We focused specifically on Black/African American and White participants in describing completion rates in subgroups due to sample size limitations in other racial groups.

## Results

Table 1 provides an overall description of the analytic sample (N=310), which attempted a total of 36,687 EOD surveys that included dietary intake items, with a mean of 216.2 EOD surveys attempted per person (median=232.0) and a range of 1.0-417.0 EOD surveys attempted. Just three participants were excluded from these analyses due to being deemed ineligible to participate PMOMS after enrolling in the study.

**Table 1. Descriptive statistics of participant demographics and average EOD completion rates in the analytic sample (N=310).**

| | % (n) of sample |
|---|---|
| **Using study phone** | 28.1 (87) |
| **≤30 years old** | 55.5 (172) |
| **Healthy pre-pregnancy BMI (18.5-24.9)** | 26.1 (81) |
| **Employment** | |
| *Full-time* | 55.5 (172) |
| *Part-time* | 14.8 (46) |
| *Disability* | 1.6 (5) |
| *Unemployed/not working* | 28.1 (87) |
| **Annual household income** | |
| *< $20k* | 24.8 (77) |
| *$21-30k* | 13.2 (41) |
| *$31-40k* | 5.5 (17) |
| *$41-50k* | 6.1 (19) |
| *$51-60k* | 7.1 (22) |
| *$61-70k* | 3.9 (12) |
| *$71-80k* | 6.1 (19) |
| *> $81k* | 33.2 (103) |
| **Education** | |
| *< high school* | 5.2 (16) |
| *High school (or equivalent)* | 18.4 (57) |
| *Some college* | 21.0 (65) |
| *College degree* | 26.5 (82) |
| *Masters degree* | 17.7 (55) |
| *Doctoral degree +* | 11.3 (35) |
| **Marital status** | |
| *Single (never married)* | 39.4 (122) |
| *Separated/divorced* | 3.6 (11) |
| *Married* | 56.5 (175) |
| *Other* | 1.0 (2) |
| **Hispanic/Latina** | 5.8 (18) |
| **Race** | |
| *Asian* | 3.9 (12) |
| *NHOPI* | 0.3 (1) |
| *Black/African American* | 28.1 (87) |
| *White* | 60.3 (187) |
| *More than 1 race* | 3.6 (11) |
| *Other* | 3.2 (10) |

BMI: body mass index; NHOPI: Native Hawaiian or other Pacific Islander

Table 2 shows the average completion rates of dietary intake items during pregnancy (third trimester) and postpartum periods (up to 12 months after giving birth), as well as across sample strata (e.g., study phone vs. own phone). We note that values are missing for 11 participants (3.5%) during pregnancy and six participants (1.9%) during postpartum, due to no EOD surveys being delivered to these participants during that time. Rate calculations for the four dietary intake items in EOD surveys did not vary between the items, so the completion rates for just one item (meals) are presented as proxy rates for overall completion of these items.

Overall, participants had higher average completion rates for dietary intake items during pregnancy (59.1%) compared to the postpartum period (52.4%). Looking at subgroup strata, participants using a study phone had lower completion rates on average (46.7%) compared to those using their own phone (54.7%) after giving birth, but this difference was not as present during pregnancy (59.2% vs. 59.0%, respectively). Across both pregnancy and postpartum periods, participants who had an overweight BMI before pregnancy (>24.9), were older (>30 years), self-identified as white, were working, or earned a higher income (>$50k annually) had higher average completion rates of dietary intake items.

**Table 2. Average completion rates for dietary items during pregnancy and postpartum in the overall cohort (N=310), as well as by subgroups and intersectional strata.**

| | **Average completion rate during pregnancy** % (n) | **Average completion rate during postpartum** % (n) |
|---|---|---|
| **OVERALL** | 59.1 (304) | 52.4 (299) |
| *Study phone* | 59.2 (85) | 46.7 (86) |
| *Own phone* | 59.0 (219) | 54.7 (213) |
| *BMI <25.0* | 56.7 (80) | 49.2 (77) |
| *BMI ≥25.0* | 59.9 (224) | 53.5 (222) |
| *≤30yo* | 54.5 (169) | 44.0 (163) |
| *>30yo* | 64.9 (135) | 62.5 (136) |
| *Black/AA* | 51.3 (85) | 37.3 (85) |
| *White* | 62.8 (183) | 58.5 (179) |
| *Working* | 59.4 (214) | 56.3 (211) |
| *Not working* | 58.4 (90) | 43.2 (88) |
| *≤$50k/yr* | 55.1 (150) | 41.9 (148) |
| *>$50k/yr* | 63.0 (154) | 62.7 (151) |
| **BLACK/AA + another variable** | | |
| *Study phone* | 57.3 (44) | 40.9 (46) |
| *Own phone* | 44.9 (41) | 33.1 (39) |
| *BMI <25.0* | 45.9 (24) | 31.1 (24) |
| *BMI ≥25.0* | 53.4 (61) | 39.8 (61) |
| *≤30yo* | 50.5 (65) | 34.3 (65) |
| *>30yo* | 53.9 (20) | 47.2 (20) |
| *Working* | 46.9 (47) | 39.3 (45) |
| *Not working* | 56.8 (38) | 35.2 (40) |
| *≤$50k/year* | 51.0 (79) | 37.1 (79) |
| *>$50k/year* | 55.2 (6) | 41.0 (6) |
| **WHITE + another variable** | | |
| *Study phone* | 58.5 (29) | 52.3 (28) |
| *Own phone* | 63.6 (154) | 59.6 (151) |
| *BMI <25.0* | 60.3 (45) | 56.6 (42) |
| *BMI ≥25.0* | 63.6 (138) | 59.0 (137) |
| *≤30yo* | 57.6 (85) | 51.3 (80) |
| *>30yo* | 67.2 (98) | 64.3 (99) |
| *Working* | 63.3 (143) | 60.5 (142) |
| *Not working* | 60.8 (40) | 50.5 (37) |
| *≤$50k/year* | 60.4 (54) | 46.1 (53) |
| *>$50k/year* | 63.7 (129) | 63.7 (126) |

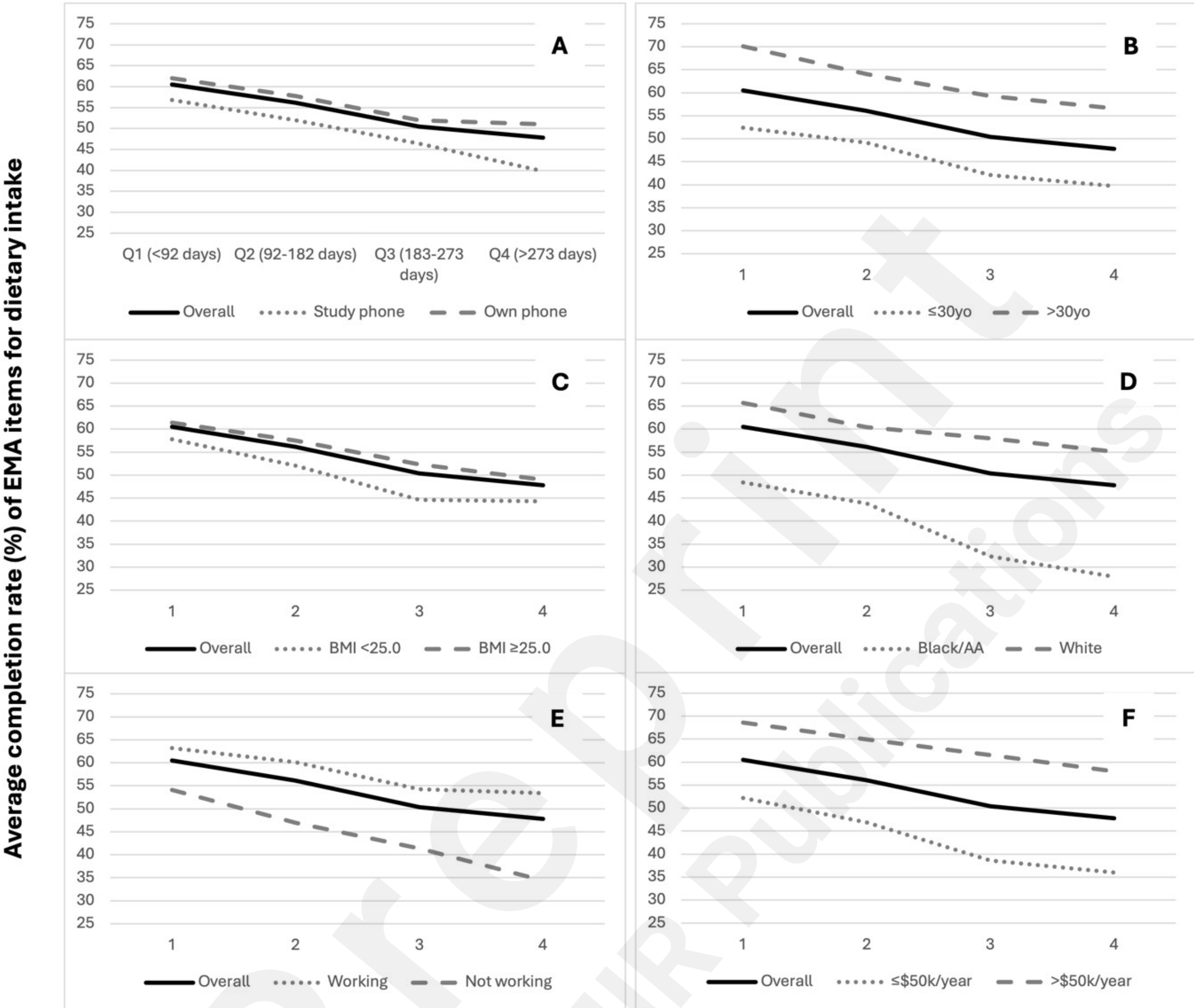
AA: African American; BMI: body mass index

We also examined completion rates within intersectional strata, which consisted of race (Black or white) and another variable (e.g., phone use), to have a better understanding of variation in responding to EMA surveys within racial groups (Table 2). Here we see some variation in EMA survey completion within racial groups. Black participants using the study phone had considerably higher completion rates on average compared to those using their own phone in both pregnancy and postpartum periods. During pregnancy, Black participants who were not working at the time of study enrollment (e.g., unemployed, on disability) had higher average completion rates (56.8%) compared to those who were working (46.9%), but this was reversed in the postpartum period (35.2% vs. 39.3%, respectively). The largest pregnancy-to-postpartum decreases in average completion rates observed for Black strata were among those not working (decreased 61%), those with a healthy pre-pregnancy BMI (decreased 48%), and those ≤ 30 years old (decreased 47%).

There was considerably less variation observed in average completion rates within the white strata, although there were some remarkable changes from pregnancy to postpartum periods. For example, white participants </= $50,000 annually had an average completion rate of 46.1% after giving birth, a 31% decrease from pregnancy.

Lastly, given the length of the postpartum period (12 months), we reported completion rates for each postpartum quarter (approximately 3 months or 91 days) in the overall sample and across subgroup strata (Figure 1). With very few exceptions, completion rates generally decreased over time during the postpartum period, with the lowest rates for all subgroups in the fourth quarter (>273 days after giving birth). We saw similar declining trends in average completion rates for the same intersectional strata across postpartum quarters (Supplemental Table).

**Figure 1.** Line graphs depicting average completion rates (%) of EMA items for dietary intake across four postpartum quarters (~ 91 days) for overall sample, compared against individual characteristics: study phone usage (A); age at study enrollment (B); pre-pregnancy BMI (C); self-reported race (D); employment status at study enrollment (E); and annual household income (F).




AA: African American; BMI: body mass index; EMA: ecological momentary assessment

**Discussion**

The present study is innovative in its examination of completion rates for EMA surveys of dietary behavior in a longitudinal, childbearing cohort (~15 months, from late pregnancy to one year postpartum), including across individual characteristics. Overall, the analytic sample (N=310) had average completion rates of 59.1% during pregnancy (approximately 3 months) and 52.4% during the first postpartum year (12 months). This relationship generally held true across subgroups, with average completion rates decreasing during the postpartum period, compared to pregnancy. The architects of EMA in health and social sciences research have cited 80% as the minimum threshold for "adequate" levels of compliance[39]; and most dietary behavior studies using EMA report adherence rates close to this level or higher.[19] Even so, very few of these studies employed EMA for more than a month, with many of them having study durations of just one week.[19,40,41] PMOMS is unique in its application of EMA, where participants responded to daily surveys for over a year (approximately 15 months), reframing the acceptability of completion rates around 50%. Furthermore, our findings align with previous research that demonstrates reduced adherence to EMA protocols over time.[19,20,42] For PMOMS participants, we can attribute this decline to survey burden, as well as changing parental obligations, which may impact some populations more than others. In the last postpartum quarter (>273 days after giving birth), our overall cohort had a completion rate of 47.8%. It is also important to highlight previous evidence demonstrating increased EMA adherence in the morning[20,42,43], whereas the dietary intake items being examined here appeared on the EOD survey.

We observed considerable disparities between subgroups in average completion rates, some of which provide insights into how racial and socioeconomic privilege may impact participation in research applying EMA. Participants who were >30 years old, self-identified as white, were working (upon study enrollment), and earning >$50,000 annually had higher completion rates than their counterparts across both prenatal and postpartum periods. Although research examining demographic differences in EMA adherence is limited, a nine-week smoking cessation study found greater declines in adherence for participants who were younger, working full-time, and not white.[43] These differences in EMA completion rates may be attributable to the socioeconomic advantages associated with privileged groups, such as increased access to resources (e.g., employment, childcare) and reduced exposure to stressors (e.g., food insecurity, housing instability). Chronic exposure to stressors, particularly related to caregiving, may exacerbate EMA burden for participants, even from one day to the next.[41]

During the first postpartum year, average completion rates decreased by 38%, 35%, 32%, and 24% for participants who self-identified as Black, reported not working (upon study enrollment), had lower income (≤$50,000 annually), and were ≤30 years old, respectively. These decreases were more considerable than those observed among the privileged subgroups, which ranged from 0.5-7%. Beyond the experience of survey burden for participants, these findings suggest that the postpartum period carries additional burdens for childbearing people from racially and socioeconomically oppressed groups, potentially inhibiting their participation in research.

Examining intersectional strata here provided additional insights that would not have been afforded us if we had ceased the analysis at single-identity categories. Black participants using the study phone had average completion rates approximately 20% higher than those using their own phone, across the study period, contrasting results from both the overall study cohort and white strata. We consider this a novel finding in EMA research, where study designs typically leverage use of the participant's current mobile device, potentially excluding those who lack compatible devices or access to quality phone/internet service.[40] Additionally, it is interesting to note that higher-income Black participants (n=6) dropped about 35% in average EMA completion from pregnancy (55.2%) to postpartum periods (41.0%), while the parallel white strata (n=129) showed no change (63.7%). This echoes research on racial health inequities, where increases in socioeconomic status do not have the same protective role for Black childbearing people as they do for their white counterparts.[44-46]

*Strengths & Limitations*

While this study offers novel, scientific insights into demographic and socioeconomic factors associated with completion of EMA surveys in a longitudinal, childbearing cohort, it is not without its limitations. First, stratifying our cohort to examine variation across intersectional lines (e.g., race and income) resulted in some small samples, making our study under-powered to conduct comparative analyses or reporting statistical significance. For this reason, we decided to provide descriptive results only. Second, we conducted our assessment of employment status upon study enrollment (during late pregnancy). We asked about employment status in an exit survey within an administrative supplement of the study meaning only a subset of the population had employment information at the conclusion of the study. Lastly, we would also like to qualify that our study findings do not include information about any technical issues (e.g., device malfunction, survey delivery failure), which would likely impact participants' EMA completion. Although the PMOMS team documented these issues throughout the study period to assist participants and troubleshoot, these data were not prepared to be included in these analyses.

*Public Health Implications*

The findings presented here are novel and valuable to perinatal health research, particularly that which applies EMA or telehealth technologies to collect data in diverse, representative cohorts for longer periods (e.g., several weeks, months). Although PMOMS is considerably longer than most EMA studies, here we demonstrated relatively stable engagement (average completion rate of 59%) in a childbearing population over the course of 15 months. Given evidence linking contextual factors (e.g., stress) to parental behavior, including dietary behaviors[40], EMA may serve as a better methodological tool in maternal health research compared to more burdensome dietary recalls.

We also provided an intersectional, descriptive analysis of EMA completion rates with important implications for future research and intervention designs, including the generalizability of findings. In particular, we recommend that investigators consider the intersections between race and other factors (e.g., employment) in relation to study participation; and develop strategies to improve EMA completion (e.g., study-provided smartphone) among participants who are likely to face more socioeconomic burdens.

**Supplemental Table.** Average completion rates (%) for dietary intake items by postpartum quarter (~91 days) across intersectional strata (race + another variable).

| | **Postpartum** | | | |
|---|---|---|---|---|
| | Q1 (<92 days) | Q2 (92-182 days) | Q3 (183-273 days) | Q4 (>273 days) |
| **Black/AA + Study phone** | 53.7 | 47.6 | 37.2 | 31.9 |
| **Black/AA + Own phone** | 42.1 | 38.8 | 26.8 | 23.7 |
| **White + Study phone** | 60.0 | 56.1 | 57.9 | 45.4 |
| **White + Own phone** | 66.7 | 61.3 | 57.9 | 56.9 |
| | | | | |
| **Black/AA + BMI <25.0** | 43.4 | 36.3 | 23.6 | 23.6 |
| **Black/AA + BMI ≥25.0** | 50.3 | 46.2 | 35.6 | 29.6 |
| **White + BMI <25.0** | 64.3 | 57.0 | 53.7 | 52.3 |
| **White + BMI ≥25.0** | 66.1 | 61.5 | 59.2 | 55.8 |
| | | | | |
| **Black/AA + ≤30yo** | 44.8 | 40.7 | 29.8 | 26.4 |
| **Black/AA + >30yo** | 59.9 | 51.9 | 39.2 | 33.1 |
| **White + ≤30yo** | 58.3 | 54.6 | 51.6 | 50.1 |
| **White + >30yo** | 71.7 | 65.1 | 62.6 | 58.5 |
| | | | | |
| **Black/AA + Working** | 48.4 | 47.5 | 36.5 | 35.4 |
| **Black/AA + Not working** | 48.2 | 39.1 | 27.8 | 19.5 |
| **White + Working** | 66.8 | 62.2 | 59.1 | 57.8 |
| **White + Not working** | 61.3 | 54.1 | 54.0 | 44.9 |
| | | | | |
| **Black/AA + ≤$50k/yr** | 47.9 | 43.9 | 32.1 | 27.3 |
| **Black/AA + >$50k/yr** | 54.6 | 37.2 | 34.8 | 35.9 |
| **White + ≤$50k/yr** | 57.0 | 48.8 | 45.8 | 45.1 |
| **White + >$50k/yr** | 69.3 | 65.3 | 62.6 | 58.4 |

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## Abbreviations

BMI: body mass index
BOD: beginning-of-day
EMA: ecological momentary assessment
EOD: end-of-day
GDM$^2$: Comparison of Two Screening Strategies for Gestational Diabetes
PMOMS: Postpartum Mothers Mobile Study