Gestational Diabetes, Elevated BMI, & eMOMS™ – Improving health via nutrition, physical activity, and breastfeeding/lactation among reproductive age populations in Kansas

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Land Acknowledgement

The University of Kansas Medical Center acknowledges that the KU Wichita Campus resides on the traditional homelands of several tribal nations, including the Gáuigú (Kiowa), 𐓏𐒰𐓓𐒰𐓓𐒷 𐒼𐓂𐓊𐒻 𐓆𐒻𐒿𐒷 𐓀𐒰^𐓓𐒰^ (Osage), Očhéthi Šakówiŋ (Dakota, Lakota, Nakota), and the Núu-agha-tʉvʉ-pʉ̱ (Ute) peoples.

In addition, we recognize, advocate and support the sovereignty of the four federally recognized tribes who have reservations in Kansas: the Prairie Band Potawatomi Nation, the Kickapoo Tribe, the Sac and Fox Nation of Missouri, and the Iowa Tribe

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Learning Objectives

1. Identify risk and protective factors of gestational diabetes
2. Describe a Diabetes Prevention Program (DPP)–based intervention coupled with lactation, eMOMS^{TM}, that could lower future risk of developing diabetes
3. Describe the results of a feasibility randomized controlled trial targeting pregnant populations with elevated BMI to improve postpartum weight and lactation
4. Describe an innovative community-driven approach to reach and engage pregnant populations with educational programs, resources, and support

Overview

- **Background**
  - Gestational diabetes, body mass index, barriers, maternal morbidity & mortality, breastfeeding/lactation
  - Pioneer Baby initiative: timeline, summary of findings
  - Gap in literature
- **Methods**
  - What is the eMOMS^{TM} study?
  - Study design - feasibility, randomized controlled trial (RCT)
    - Designed to improve postpartum weight retention and lactation
    - Aims, program curriculum, outcome measures, statistical methods
- **Results**
  - CONSORT flow diagram, health outcomes
  - Intervention uptake, in-depth participant exit interviews
- **Conclusion**
  - Insights and lessons learned, limitations, future direction

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Background

Gestational diabetes, elevated body mass index (BMI), maternal morbidity & mortality, breastfeeding

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Background

- Gestational diabetes mellitus (GDM) - **Increasing rate nationally**, currently at ~7-9%
  - Of these people, 20% have a subsequent diabetes diagnosis (Casagrande, Linder, & Cowie, 2018)
  - **Cumulative risk** of developing type 2 diabetes: (Lee, Hiscock, Wein, Walker, & Permezel, 2007)
    - 8.1% at 5 years post-diagnosis
    - 17.3% at 10 years post-diagnosis
    - 25.8% at 15 years post-diagnosis
- **GDM risk factors** - Advanced maternal age, family history of diabetes, being non-White, higher parity, previous GDM, high pre-pregnancy body mass index (BMI), poor diet, inactivity (Hansen & Moloney, 2020; Neggers, 2016)

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Background (2)

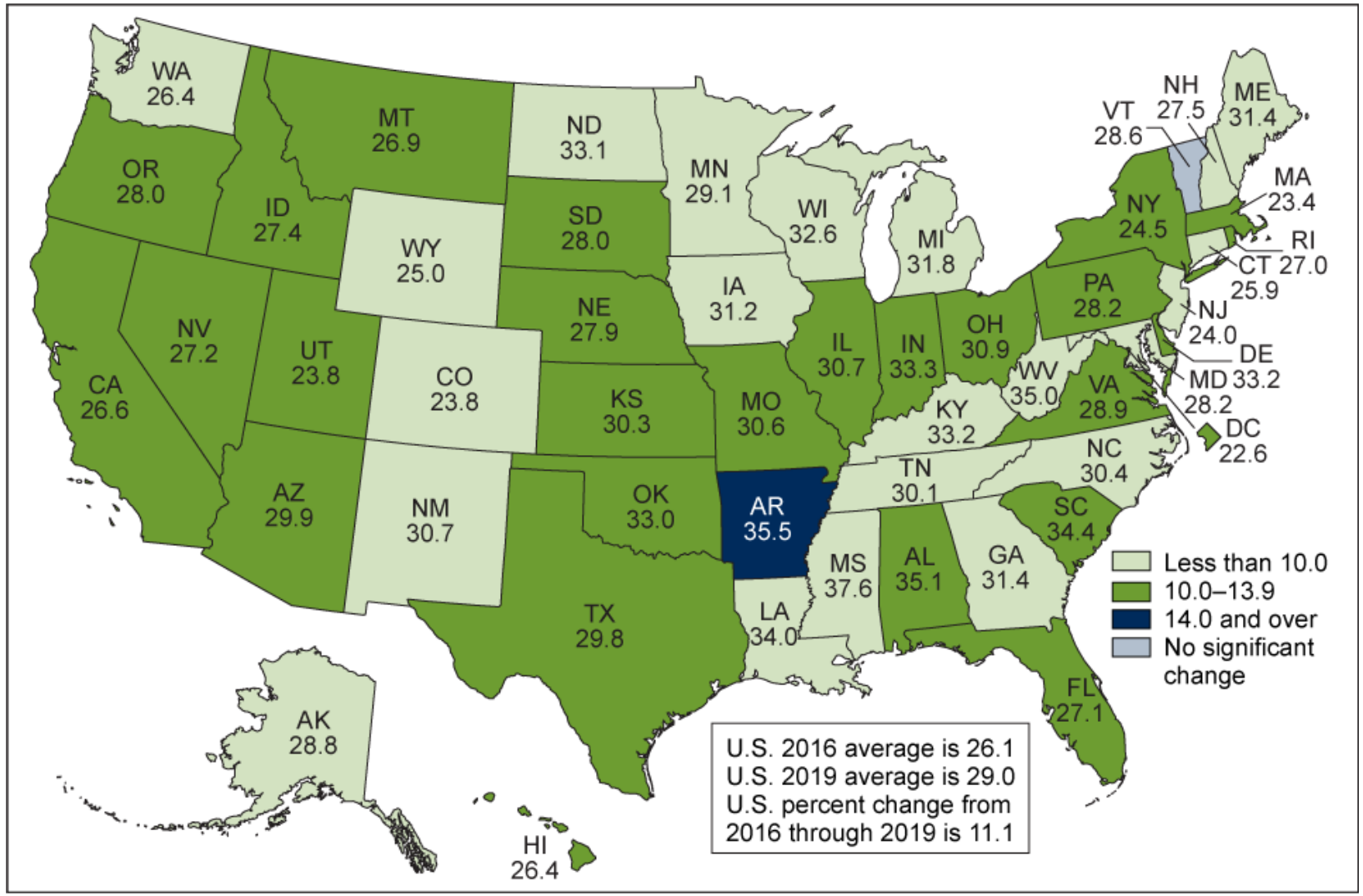
- Pre-pregnancy BMI ≥30 **major risk factor** for GDM
  (Fair, Ford, & Soltani, 2019; Much et al., 2014; Nguyen et al., 2019)

- **3 out of 10 U.S. women** have **pre-pregnancy BMI ≥30**
  (CDC Behavioral Risk Factor Surveillance System, 2021; Driscoll & Gregory, 2020; Hales, Carrol, Fryar, & Ogden, 2020)

  - Disproportionately higher rates among non-Hispanic Black (39.1%) and Hispanic (32.4%) populations, compared to non-Hispanic Whites (26.6%)

Pre-pregnancy obesity, 2019 and % change, 2016-2019, U.S. and each state

Figure 4. Prepregnancy obesity, 2019 and percent change, 2016–2019: United States and each state



NOTES: Obesity is a body mass index of 30.0 or higher. Increases from 2016 through 2019 are significant ($p < 0.05$). Access data table for Figure 4 at: https://www.cdc.gov/nchs/data/databriefs/db392-tables-508.pdf#4.
SOURCE: National Center for Health Statistics, National Vital Statistics System, Natality file.

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GDM and High BMI

GDM and BMI ≥30 → **Adverse pregnancy & birth outcomes**: pregnancy loss, pre-eclampsia, emergency c-section, congenital anomalies, depression, reduced lactation, prematurity, low birth weight, maternal and infant death

(Hansen & Moloney, 2020; Neggers, 2016)

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Barriers for reproductive age people

Complications of GDM and high BMI **increased** for people of color, people with low income, and people in rural areas due to:

"Touching the Clouds" photographed by Steven Marler in Stafford County

- Limited access to OB healthcare services
  (ACOG, 2014; Gallagher et al., 2013; Rayburn, Richards, & Elwell, 2012; Ross, 2013; Frey et al., 2022)
- Increased likelihood of low birth-weight babies and pre-term delivery (Blumenshine et al., 2010; McElroy et al., 2012; Strutz et al., 2012)
- Long drive times to hospitals, late entry into prenatal care (Hung et al., 2016; Meyer et al., 2016; Rayburn et al., 2012; Chandler, 2002; Frey et al., 2022; Hansen & Moloney, 2020; Sullivan et al., 2021)
- Societal injustices and structural racism
  (Dougherty et al., 2020; Molina et al., 2018)
- Low lactation rates
  (Jacobson et al.,2015; Grubesic & Durbin, 2017; Hamilton & Tarasenko, 2020)

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Increasing maternal morbidity and mortality in the U.S.

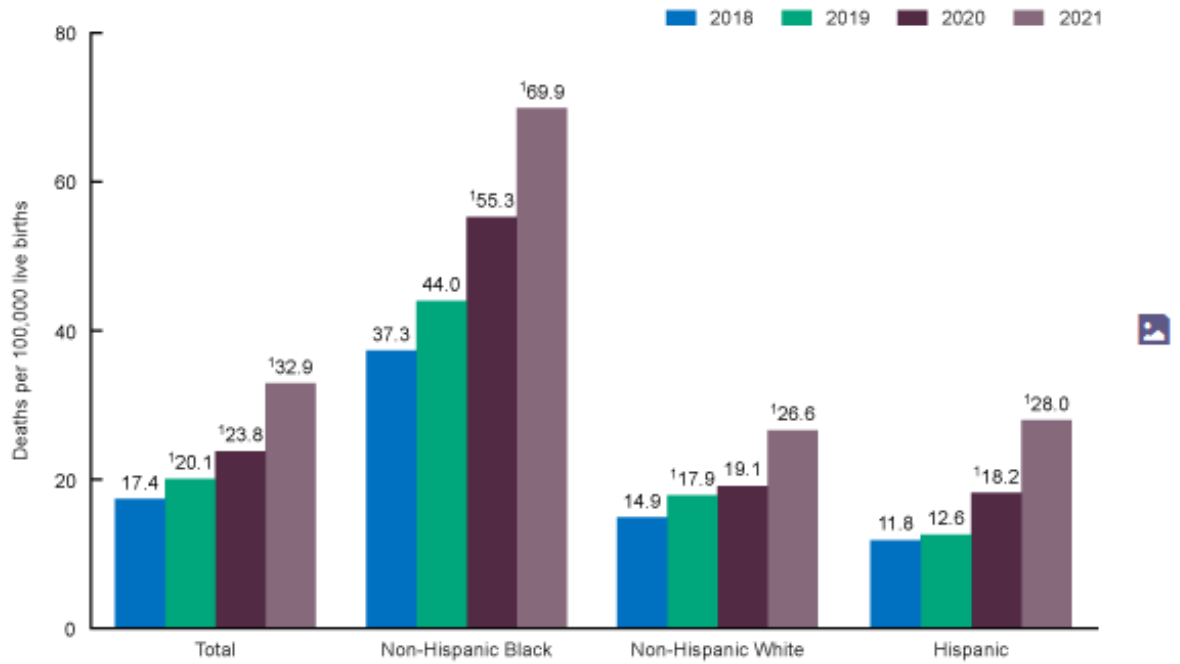
All factors combined ➡ **Increasing trend** in **maternal morbidity and mortality** with rural individuals, individuals of color, and individuals with low income at increased risk of pregnancy-related death

(Hoyert, 2023; Hansen & Moloney, 2020; Neggers, 2016)

Maternal morbidity and mortality in the U.S. (2)

- Between 1987-2021, **U.S. pregnancy-related mortality quadrupled**, from 7.2 to 32.9 maternal deaths per 100,000 live births (Hoyert, 2023)
- Maternal death defined by the WHO as “the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes” (WHO, 2009).

Figure 1. Maternal mortality rates, by race and Hispanic origin: United States, 2018–2021



[1]Statistically significant increase from previous year ($p < 0.05$).

NOTE: Race groups are single race.

SOURCE: National Center for Health Statistics, National Vital Statistics System, Mortality.

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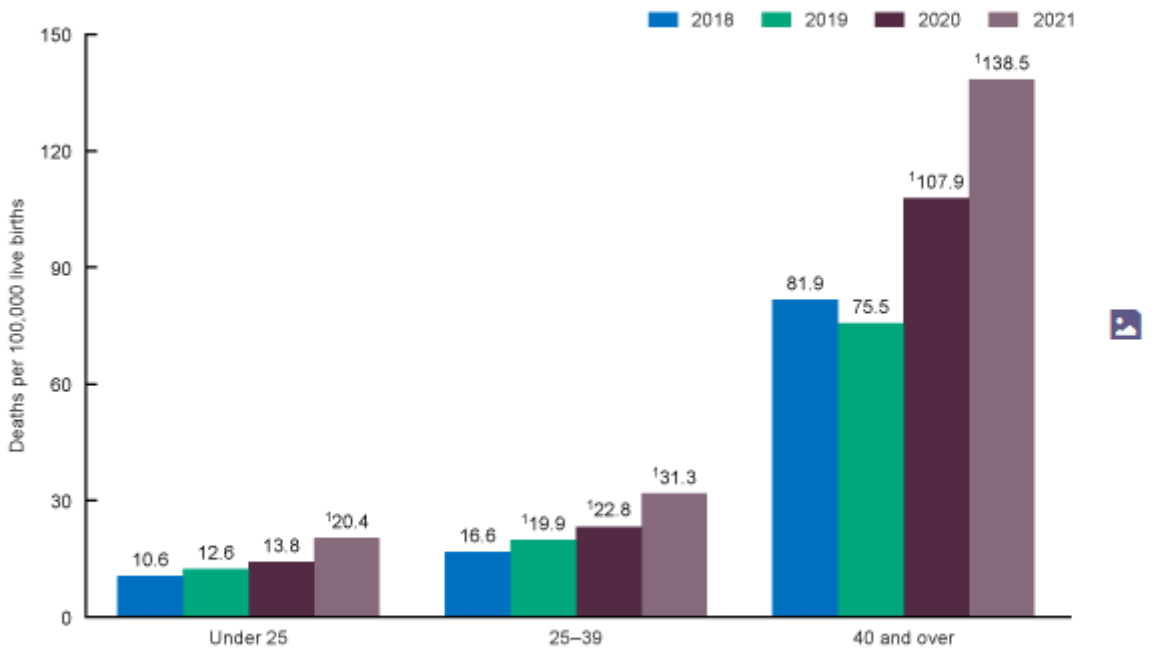
Maternal morbidity and mortality in the U.S. (3)

Rates in 2021 were:

- 20.4 deaths per 100,000 live births for women under age 25
- 31.3 for those aged 25–39
- 138.5 for those aged 40 and over (Hoyert, 2023)

Figure 2. Maternal mortality rates, by age group: United States, 2018–2021



[1]Statistically significant increase from previous year ($p < 0.05$).

SOURCE: National Center for Health Statistics, National Vital Statistics System, Mortality.

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Risk and protective factors

- Risk factors for pre-pregnancy high BMI and GDM well established
- Less is known about protective factors
- **Lactation/breastfeeding** = **Critical element** of postpartum health
- **<u>Benefits of lactation/breastfeeding</u>**
  - People who breastfeed for extended period of time –
    - Less likely to develop diabetes, obesity, hypertension, cardiovascular disease, and certain gynecologic cancers (Binns, Lee, & Low, 2016)
  - Lactation/breastfeeding + History of GDM = Improvement of metabolic markers, decreases risk of developing diabetes after pregnancy (Chu et al., 2021)

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Breastfeeding Benefits

For Mom

Breastfeeding burns as many as 500 extra calories each day, which may make it easier to lose the weight you gained during pregnancy.

Women who breastfeed longer have **lower rates of type 2 diabetes, high blood pressure, and heart disease.**

Women who breastfeed have **lower rates of breast cancer and ovarian cancer.**

Breastfeeding triggers the release of **oxytocin** that causes the **uterus to contract** and may **decrease** the amount of **bleeding you have after giving birth.**

For Baby

Breast milk has the right amount of fat, sugar, water, protein, and minerals needed for a baby's growth and development.

Breast milk is easier to digest than formula, and breastfed babies have less gas, fewer feeding problems, and less constipation.

Breast milk contains antibodies that protect infants from certain illnesses, such as ear infections, diarrhea, respiratory illnesses, and allergies.

Breastfed infants have a **lower risk of sudden infant death syndrome.**

If your baby is born preterm, **breast milk can help reduce the risk of many of the short-term and long-term health problems.**

Source: https://www.dietdetectiverd.com/benefits-of-breastfeeding-for-baby-and-mother/

U.S. and Kansas breastfeeding rates

- **Breastfeeding benefits optimized** when exclusively breastfeeding for 6 months (Meek & Noble, 2022)
- Breastfeeding **initiation** among children born in 2020 (CDC, 2023)
  - U.S. – 83.1%
  - Kansas – 86.2%
- **Exclusive breastfeeding duration** through 3 and 6 months among children born in 2020 (CDC, 2023)
  - U.S. – 45.3% through 3 mos., 25.4% through 6 mos.
  - Kansas – 46.3% through 3 mos., 22.2% through 6 mos.

Source: https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-state-2020.htm

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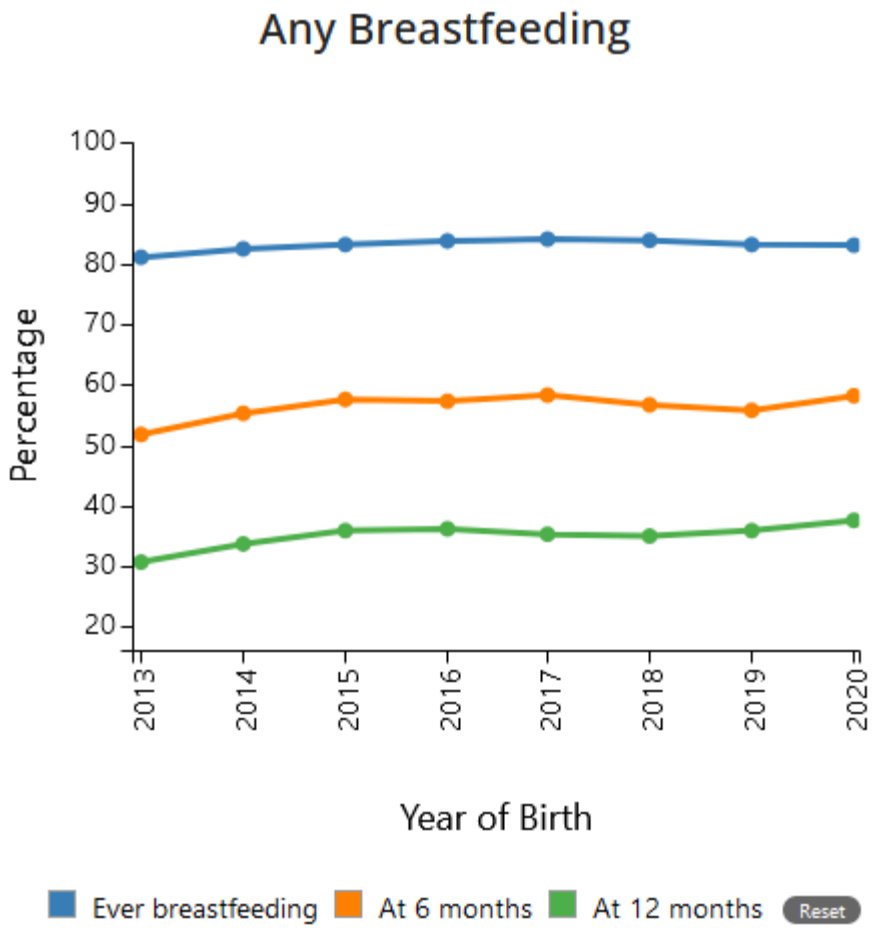
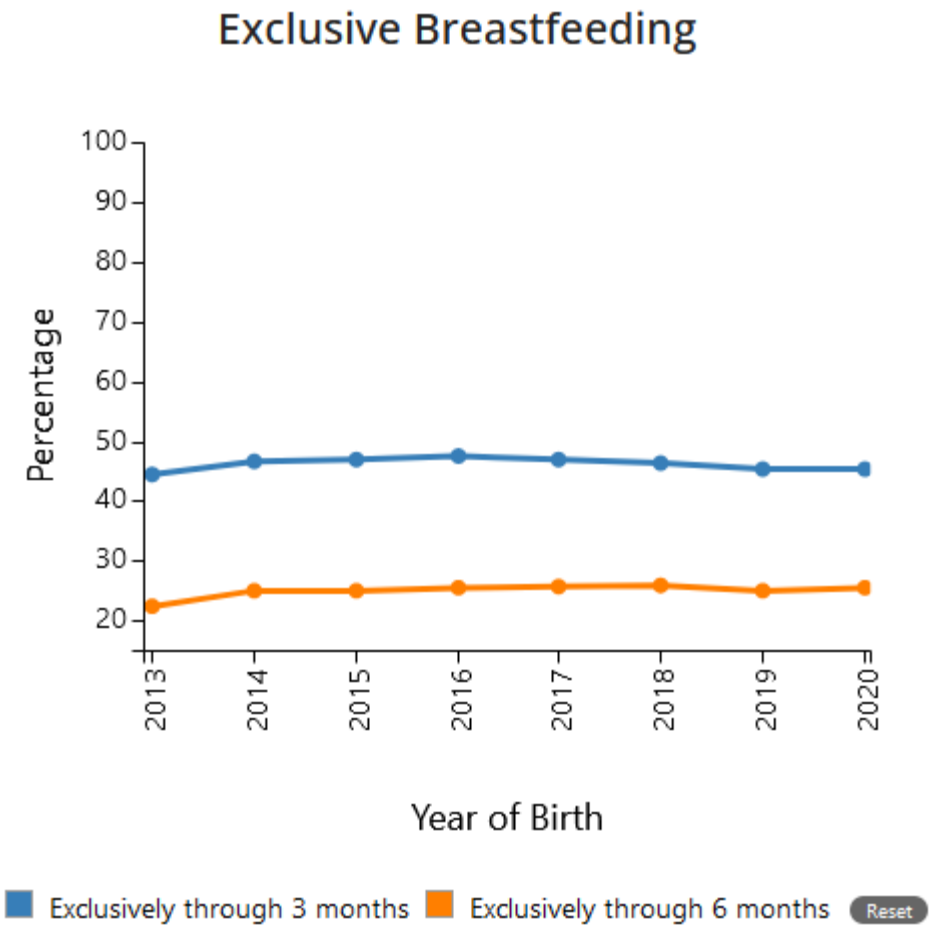
Breastfeeding among U.S. children born 2013-2020

Percentage of U.S. Children Who Were Breastfed, By Birth Year





Source: https://www.cdc.gov/breastfeeding/data/nis_data/results.html

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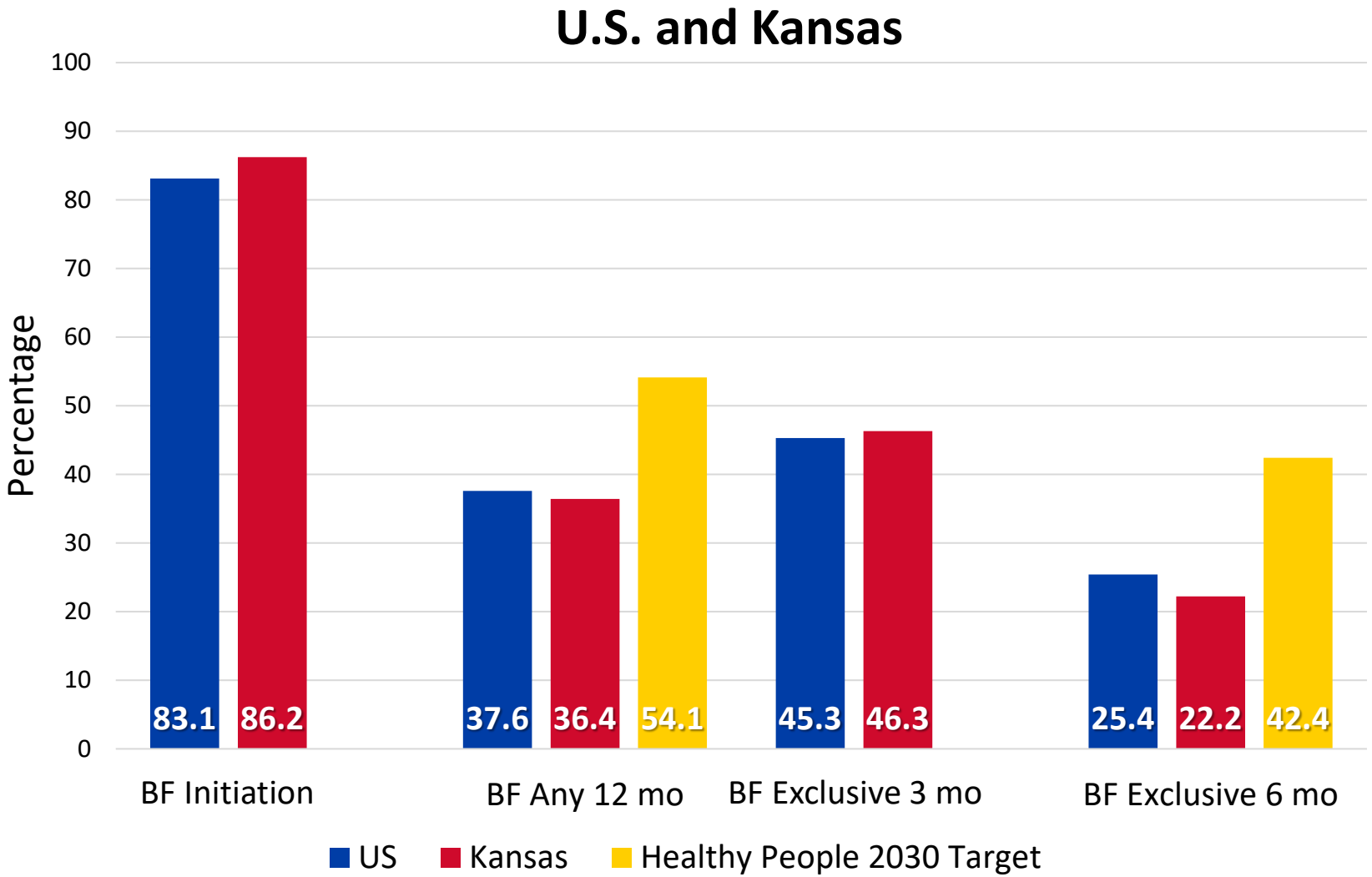
Breastfeeding rates among children born in 2020



Source: https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-state-2020.htm
https://health.gov/healthypeople/objectives-and-data/browse-objectives/infants

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U.S. Breastfeeding rates by socio-demographics

- **Lower rates** by socio-demographic characteristics in 2020 (US only) (CDC, 2023)
  - Initiation
    - Non-Hispanic Asian (87.1%), Hispanic (81.9%), **non-Hispanic Black (77.3%)**
    - Metropolitan (83.9%), **non-metropolitan (76.7%)**
    - **Less than high school (72.5%)**, some college/technical school (83.3%)
  - Duration – **exclusive** through **3 mos**.
    - Non-Hispanic Asian (43.1%), Hispanic (43.0%), **non-Hispanic Black (39.2%)**
    - Metropolitan (45.6%), **non-metropolitan (43.2%)**
    - **Less than high school (35.9%)**, some college/technical school (45.3%)
  - Duration – **exclusive** through **6 mos**.
    - Non-Hispanic Asian (29.1%), Hispanic (24.3%), **non-Hispanic Black (20.4%)**
    - Metropolitan (25.7%), **non-metropolitan (23.0%)**
    - **Less than high school (19.0%)**, some college/technical school (23.9%)

Source: https://www.cdc.gov/breastfeeding/data/nis_data/rates-any-exclusive-bf-socio-dem-2020.htm

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Background: Pioneer Baby

What is Pioneer Baby?

Timeline, summary of findings

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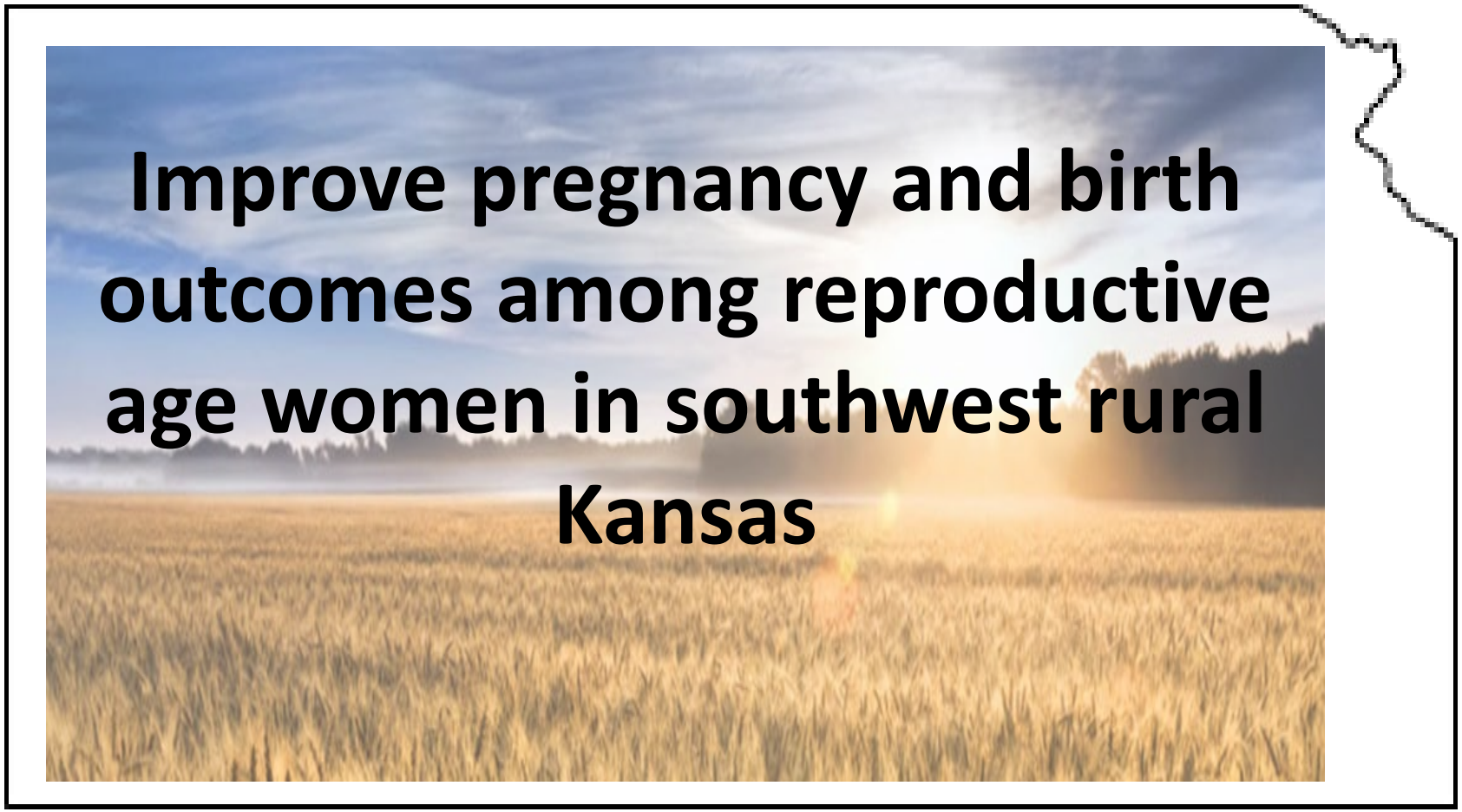
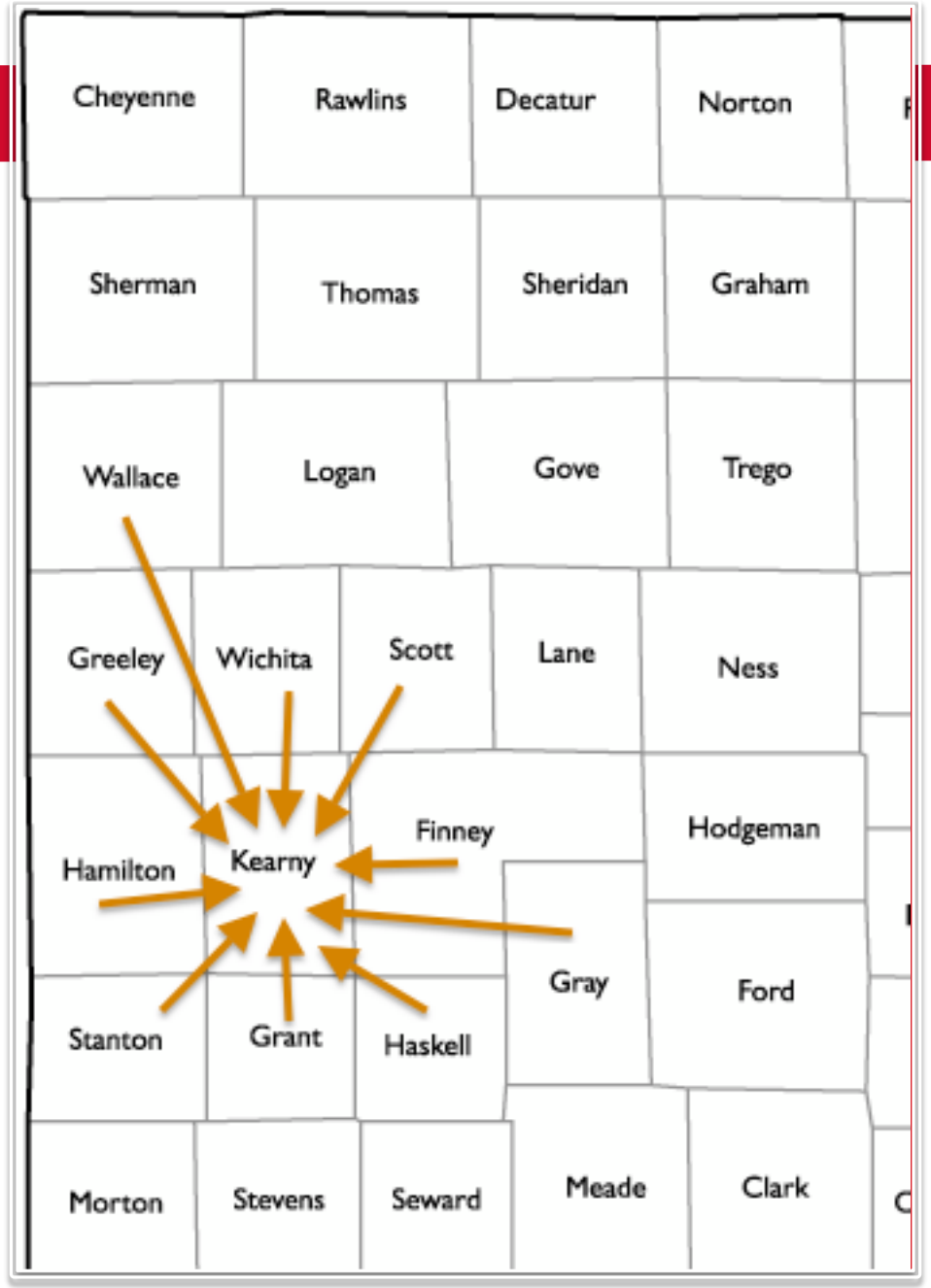
Pioneer Baby: A Quality Improvement Initiative – Overarching Goal



Pioneer Baby



- Critical access full-spectrum hospital located in rural southwest Kansas
- In 2015, ~ **200 deliveries** per year (currently at 350+ deliveries/year)
- Serves 11 counties, 22 nationalities
- **High rate of pregnancy complications** including gestational diabetes mellitus (GDM): 11% vs. ~6% nationally (DeSisto, Kim, & Sharma, 2014)

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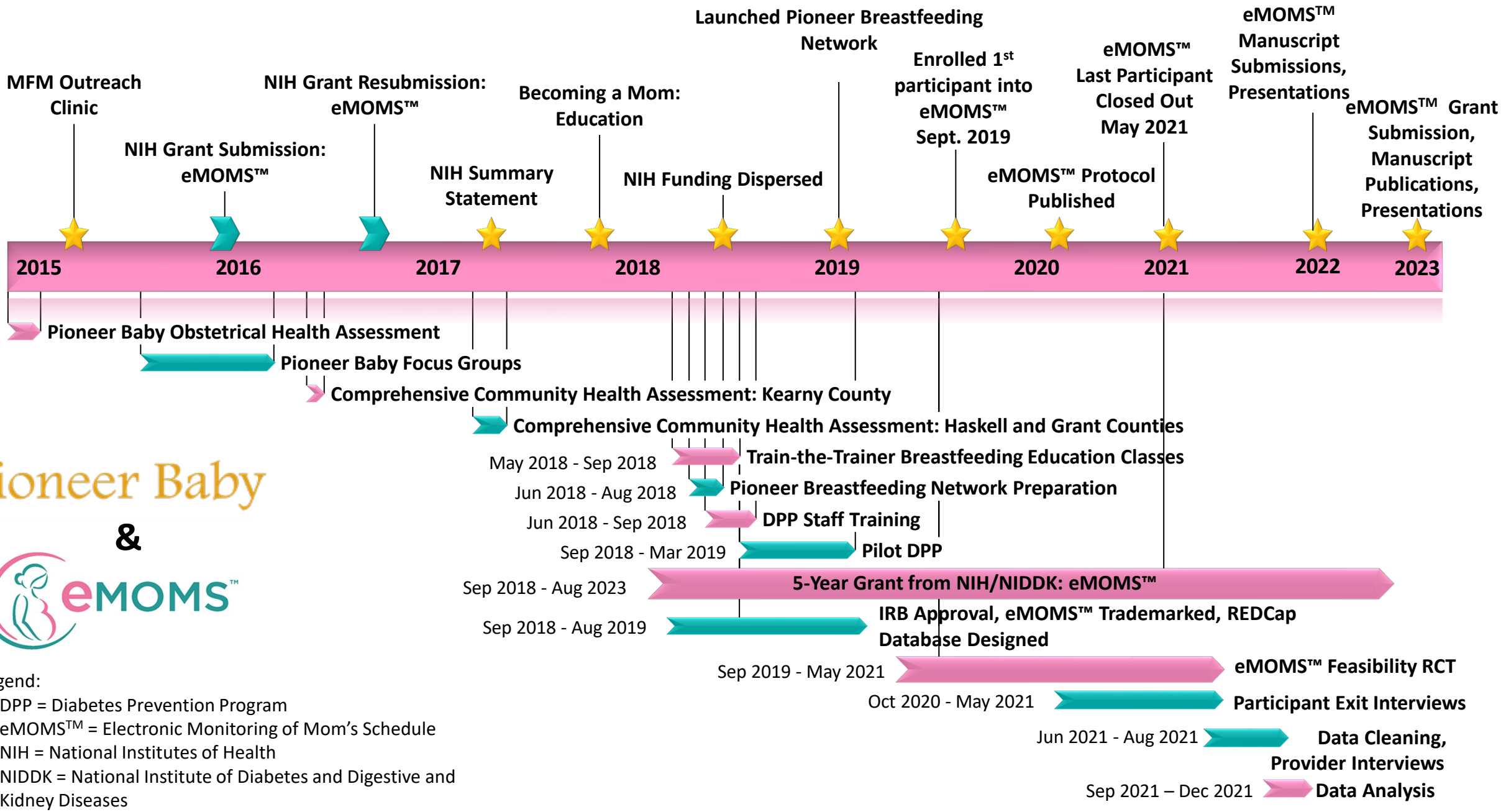
Pioneer Baby and our population of interest

Four phases to reach Pioneer Baby's overarching goal -

- Phase 1 - 3 (2015-2017) – Studies/projects:
  - Health assessment of obstetrical population
  - Outreach clinic: Maternal-fetal medicine
  - Follow-up focus groups
  - Community health assessments in rural Kansas counties
  - "Becoming A Mom" - Prenatal education provided by state
- Phase 4 (2018 – Present) – Intervention programming: eMOMS™ study



Pioneer Baby

&

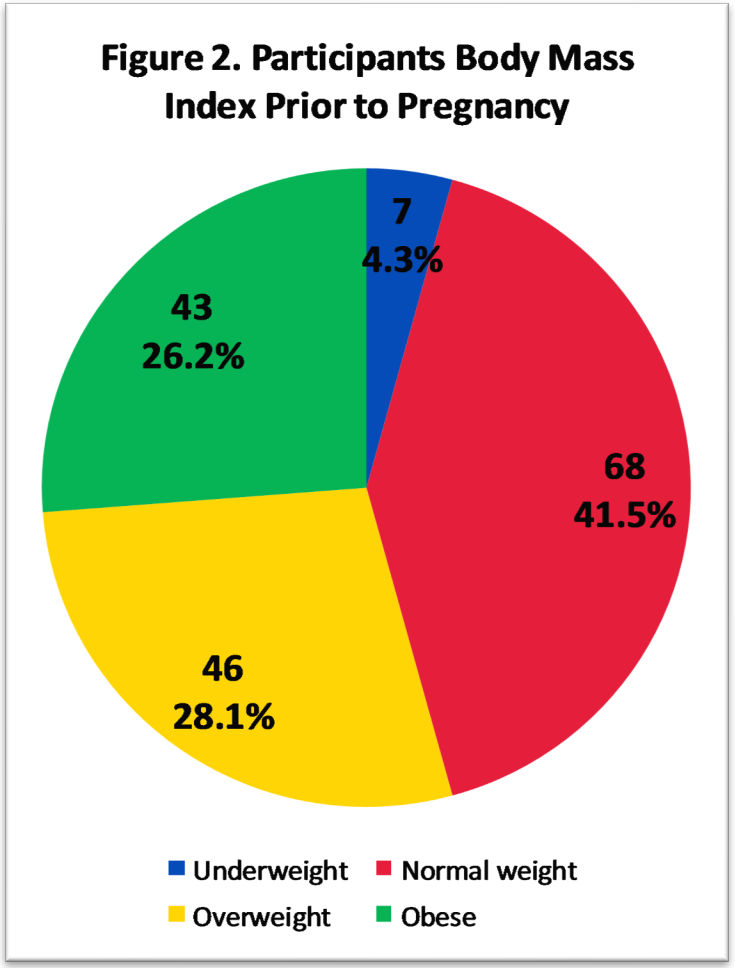
eMOMS™

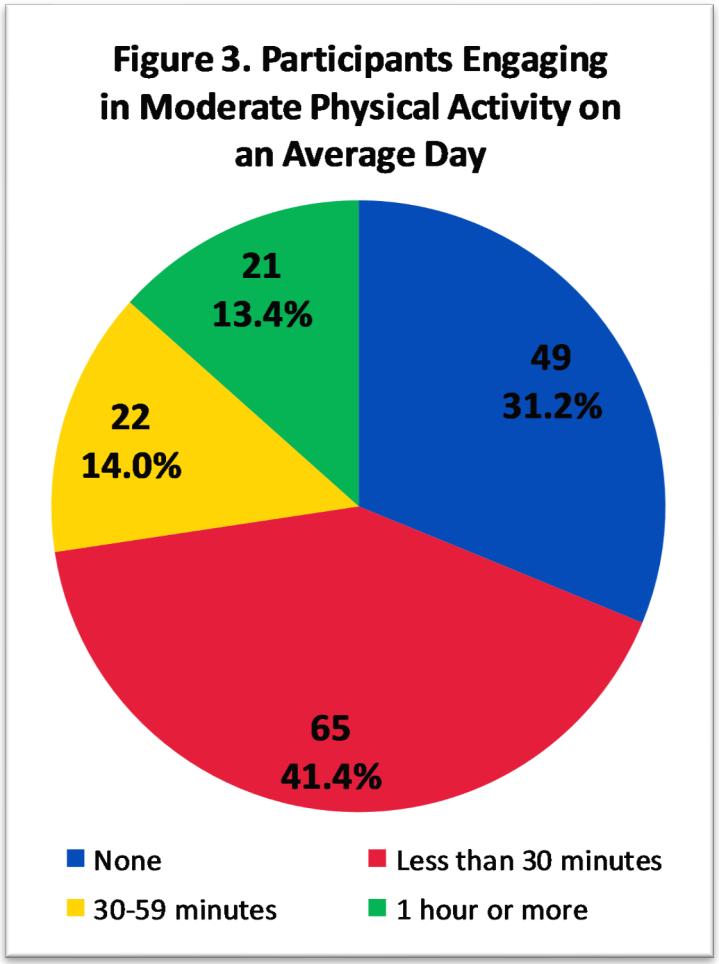
Legend:

- DPP = Diabetes Prevention Program
- eMOMS™ = Electronic Monitoring of Mom's Schedule
- NIH = National Institutes of Health
- NIDDK = National Institute of Diabetes and Digestive and Kidney Diseases
- RCT = Randomized Controlled Trial

Pioneer Baby: Health assessment of obstetrical population

- **<u>Study Purpose</u>**: To learn about characteristics & health behaviors of rural, pregnant people
- 185 Surveys distributed (response rate: 96%)
- Survey: English & Spanish
- Demographics (N = 177)
  - Non-Hispanic White (45.8%)
  - Hispanic (50.3%)
  - 18-25 y/o (48.6%)
  - Some high school (20.5%), HS (30.7%)
  - <$25,000/yr. (54.2%)
  - WIC enrolled (51.7%)
- Immediate **family history of diabetes** (30.5%)





Jacobson LT, Duong J, Grainger DA, Collins TC, Farley D, Wolfe M, Dong F, Anderson B. Health assessment of a rural obstetrical population in a Midwestern state. *Journal of Pregnancy and Child Health.* 2016;3(2).

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Pioneer Baby: Follow-up focus groups

Study purpose -
To gain **in-depth information** from rural, pregnant people on what they **value** in a **health promotion program**

Key findings –

- Demographics (N = 35)
  - Non-Hispanic White (41.4%)
  - Hispanic (55.2%)
  - Age: 18-25 (42.9%), 26-35 (46.4%)
  - Some high school (34.5%), high school graduate (17.2%)
  - WIC enrolled (72.4%)
  - Earn < $25,000/yr. (48.3%)

Overarching Themes
Limited availability of programs that focus on physical activity, nutrition, and lactation support during and after pregnancy
Need to **improve health communication** on physical activity, nutrition and fetal movement/kick counts
Need for **support group** during and after pregnancy
Mixed emotions about overall use of technology
Peer education on all topics throughout all sessions

Jacobson LT, Zackula R, Redmond ML, Duong J, Collins TC. Pioneer baby: suggestions for pre- and postnatal health promotion programs from rural English and Spanish-speaking pregnant and postpartum women. *Journal of Behavioral Medicine.* 2018;41(5):653-667.

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Pioneer Baby: Follow-up community health assessment (Johnston & Jacobson, 2016, 2017)

- **Objective**: Assess knowledge, beliefs and perceptions of health information, health care resources, and social services among multiple economic sectors in the community
- **Setting**: Largest communities within three rural southwest Kansas counties (Kearny, Haskell, Grant)
- Survey: English & Spanish

Key findings -

- Response rate
  - At city level – Ranged from 62% to 90%
  - At county level – Ranged from 49% to 65%
- Within **top 5 health priorities**:
  - High-risk obstetrical care
  - Weight management coaching
- Within **top 10 health priorities**:
  - Diabetes prevention support
  - Professional lactation support
  - Nutrition/diet counseling

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Pioneer Baby: In summary

- **Summary findings** from all studies/projects:
  - Majority of pregnant people high pre-pregnancy BMI, limited exercise, family history of diabetes
  - Half of respondents were of low socio-economic status and self-identified as Hispanic
  - Limited access to health promotion programs and lactation support services
  - Top health priority: Weight management coaching

- Demonstrated need for <u>long-term</u> health behavior change

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Gap in literature

- **Lifestyle modifications** and **lactation** may reverse the effect of gestational diabetes and high BMI on women's health
- No studies on role of lactation support combined with an efficacious weight loss program to reduce postpartum weight, **thereby reducing progression to type 2 diabetes after pregnancy**

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eMOMS™ Methods

Foundation, study design, aims, intervention curriculum, outcome measures, statistical methods

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Diabetes Prevention Program (DPP) – Evidence-based program, reduces the risk of developing type 2 diabetes by 58% through effective diet, exercise, and behavior modification counseling (Knowler et al., 2002)

- Evidence to support **use of DPP** to **reduce postpartum weight**
  (Ferrara et al., 2011; Nicklas et al., 2014)
- Evidence suggests **lactation duration** associated with:
  - **Lower incidence** of developing **diabetes**
  - Reduction of maternal postpartum **weight**
  - **Resetting** of maternal **metabolism** after pregnancy

(Binns et al., 2016; Chouinard-Castonguay et al., 2013; Chu et al., 2021; Gunderson et al., 2012, 2015; Kirkegaard et al., 2014; Martin et al., 2015; Stuebe & Rich Edwards, 2009)

eMOMS™ Study design

- Intervention: Combined lactation education and support with DPP, 12-months long, with individual health coaching

- A feasibility, unmasked, parallel randomized controlled 3-arm trial
- Registered at ClinicalTrials.gov, Identifier: NCT04021602
- Study approved by Institutional Review Board (IRB) - Ascension Via Christi Hospitals Wichita, Inc., University of Kansas School of Medicine

eMOMS™

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eMOMS™ Study design, aims

- **Three study arms**
  1. DPP+LC+HC: DPP + Lactation + Health Coaching
  2. DPP+HC: DPP + Health Coaching
  3. HCO: Health Coaching Only
- **Overarching goal**
  - Improve pregnancy and birth outcomes among populations with elevated BMI
- **Project/study goal**
  - Assess intervention feasibility and acceptability
- **Specific study aims**
  - **Aim 1**: Measure weight retention, lactation duration, hemoglobin A1c, and mean arterial blood pressure through 6 months postpartum
  - **Aim 2**: Quantify interest in the use of a DPP-lactation support program

eMOMS™ KU SCHOOL OF MEDICINE WICHITA The University of Kansas

eMOMS™ Intervention/Curriculum

- **Program content:** Evidence-based educational videos on lactation, nutrition, and physical activity delivered via Facebook
- **Lactation**
  - 4 pre-recorded 30-minute videos on lactation (based on *Your Guide to Breastfeeding*) (Office on Women's Health (OWH))
- **Diabetes Prevention Program (DPP)**
  - Phase 1 (antepartum): 15 pre-recorded 15-minute videos on nutrition and physical activity
  - Phase 2 (postpartum): 6 pre-recorded 15-minute videos on nutrition and physical activity
- **Health Coach**
  - Weekly to bi-weekly telephone calls (as needed) by a lactation-trained, certified DPP health coach that lasted up to 15 minutes
- **Incentives:** Free supplies and gift cards for mother and baby for participation

Aim 1 – Outcome Measures

Primary outcome measures through 6 months postpartum -

- Weight retention
- Lactation duration (exclusive and any)
- Hemoglobin A1c
- Mean arterial blood pressure

Aim 1 – Outcome Measures (2)

Secondary outcome measures through 6 months postpartum -

1. **Lactation knowledge questionnaire** (OWH)
   - Assessed physiology, nursing positions, birthing experience, signs lactation goes well, milk supply & supplementation, common concerns
2. **Breastfeeding Self-Efficacy Scale – Short Form (BSES-F)** (Dennis, 2003)
   - A validated 14-item questionnaire to assess breastfeeding self-efficacy
3. **Kaiser Physical Activity Survey (KPAS)** (Schmidt et al., 2006)
   - A validated survey for pregnant populations to assess 4 activity domains
4. **Fruit & Vegetable Intake Screener (Eating at America's Table Study, EATS)** (Thompson, 1994)
   - A validated 10-item questionnaire to assess fruit and vegetable intake
5. **Edinburgh Postnatal Depression Scale (EPDS)** (Cox, Holden, & Sagovsky, 1987; Cox, 2019)
   - A validated 10-item questionnaire to assess symptoms of depression

Aim 2 – Quantify Interest in Program Use

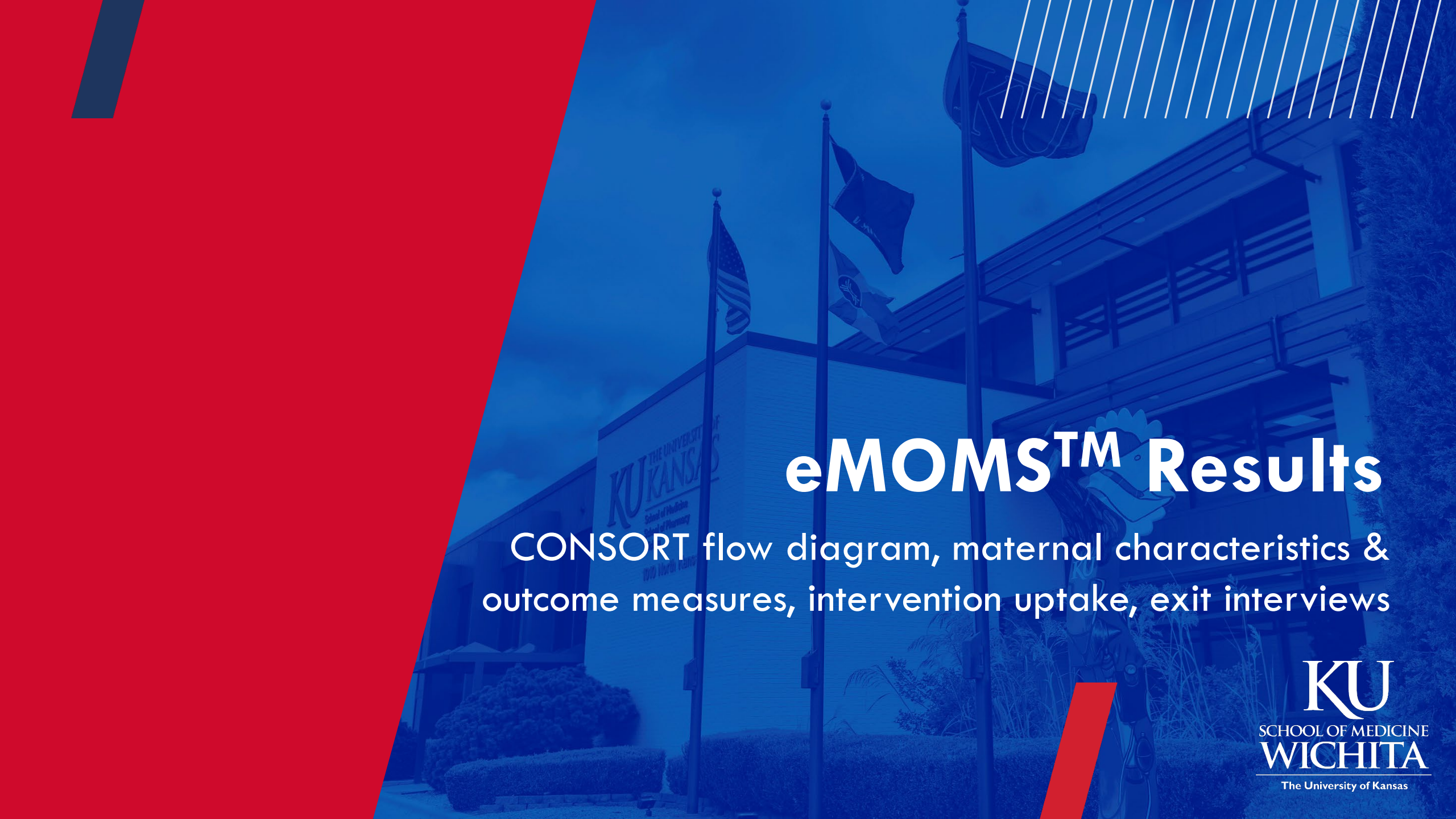
- **Study #1** – **Purpose**: Assess intervention uptake of pregnant individuals in feasibility RCT
  - **Design**: Evaluative study guided by RE-AIM framework (Reach, Effectiveness, Adoption, Implementation, Maintenance)
    (Glasgow, Vogt, & Boles, 1999; Kessler et al., 2013; Glasgow et al., 2019)
  - **Measures**:
    - Participation and retention rates (reach)
    - Characteristics of intervention completers vs. other eligible participants (reach)
    - Provider experiences with screening/enrolling participants (adoption)

Aim 2 – Quantify Interest in Program Use (2)

- **Study #2** – **Purpose**: To elicit feedback from participants who completed the feasibility RCT on their perceptions of program strengths and weaknesses
  - **Design**: Qualitative study using semi-structured, telephone interview guide with open-ended questions
  - **Areas of inquiry**: reasons for joining, program content, communication, pregnancy and birth during COVID-19, advice for other pregnant individuals
  - Exit interviews completed between Oct. 2020-May 2021
  - Audio-recordings transcribed verbatim, organized in Microsoft 365

Statistical Methods/Data Management

- **Statistical analysis (Aim 1)**
  - Means (SD's) and medians (IQR's) reported for continuous variables, frequencies and percentages reported for categorical variables
  - Means and 95% confidence intervals from 5,000 bootstrapped samples
  - Cox regression models (breastfeeding vs. not breastfeeding), adjusting for educational attainment and parity, and trend analysis (time from birth to breastfeeding cessation)
- **Statistical analysis (Aim 2)**
  - Study #1 – Intervention uptake
    - Means compared w. independent samples t-tests and categorical data compared w. Fisher's exact test, descriptive data presented
  - Study #2 – Qualitative, exit interviews
    - Use of exploratory, inductive thematic analysis
- **Data collection:** Research Electronic Data Capture (REDCap) (Harris et al., 2009)



eMOMS™ Results

CONSORT flow diagram, maternal characteristics & outcome measures, intervention uptake, exit interviews

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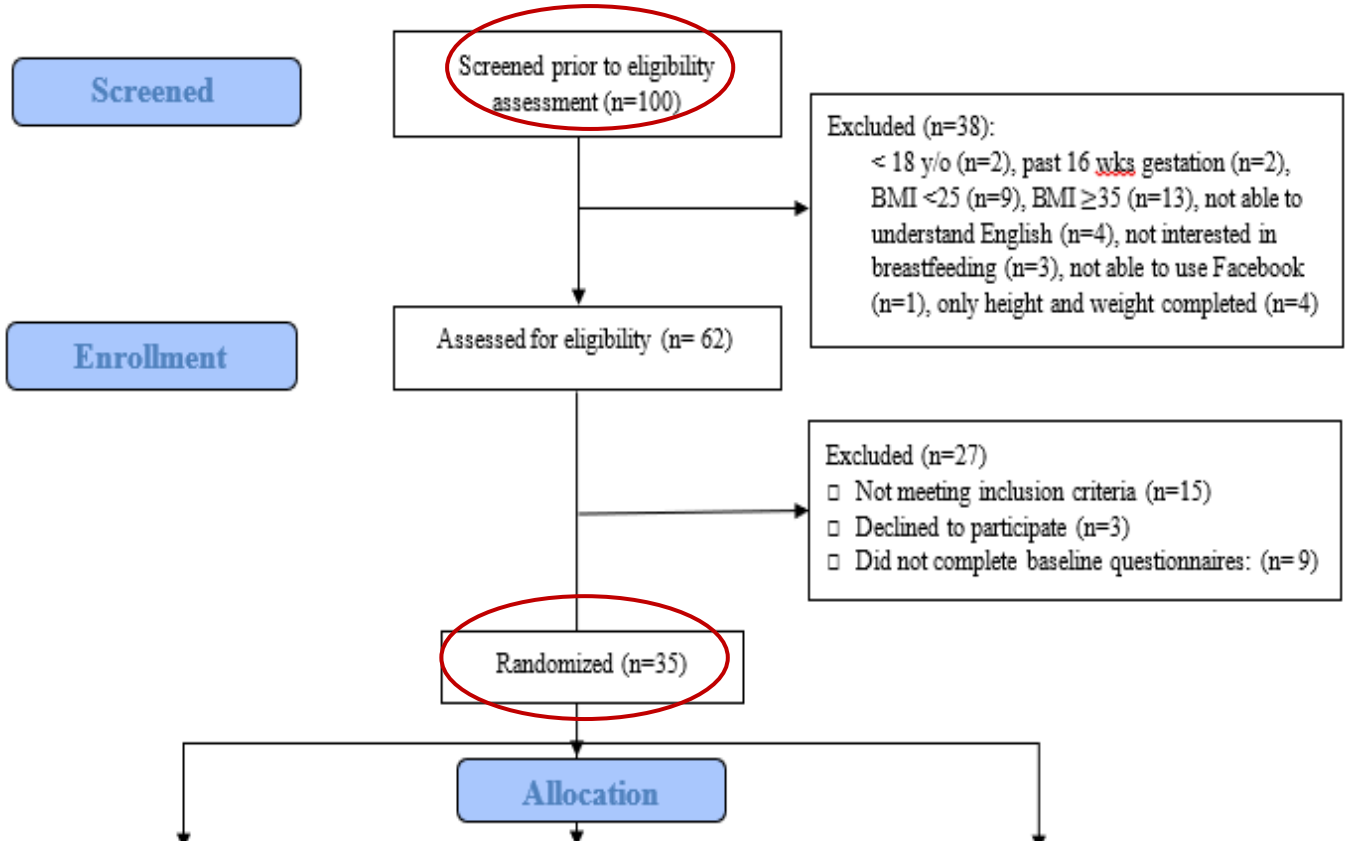
eMOMS™ Results

- **Study eligibility criteria:** Intended to obtain a study population with a low likelihood of developing pregnancy complications
  - 18 years or older
  - Understand English
  - Less than 4 months pregnant
  - Have a BMI of ≥25 and <35 kg/m^2
  - Have a cellphone and/or internet access
- **Recruitment:** Sept. 2019 – Dec. 2020
  - Screened: 100 individuals
  - Randomized: 35 individuals

CONSORT Flow Diagram

CONSORT
TRANSPARENT REPORTING of TRIALS



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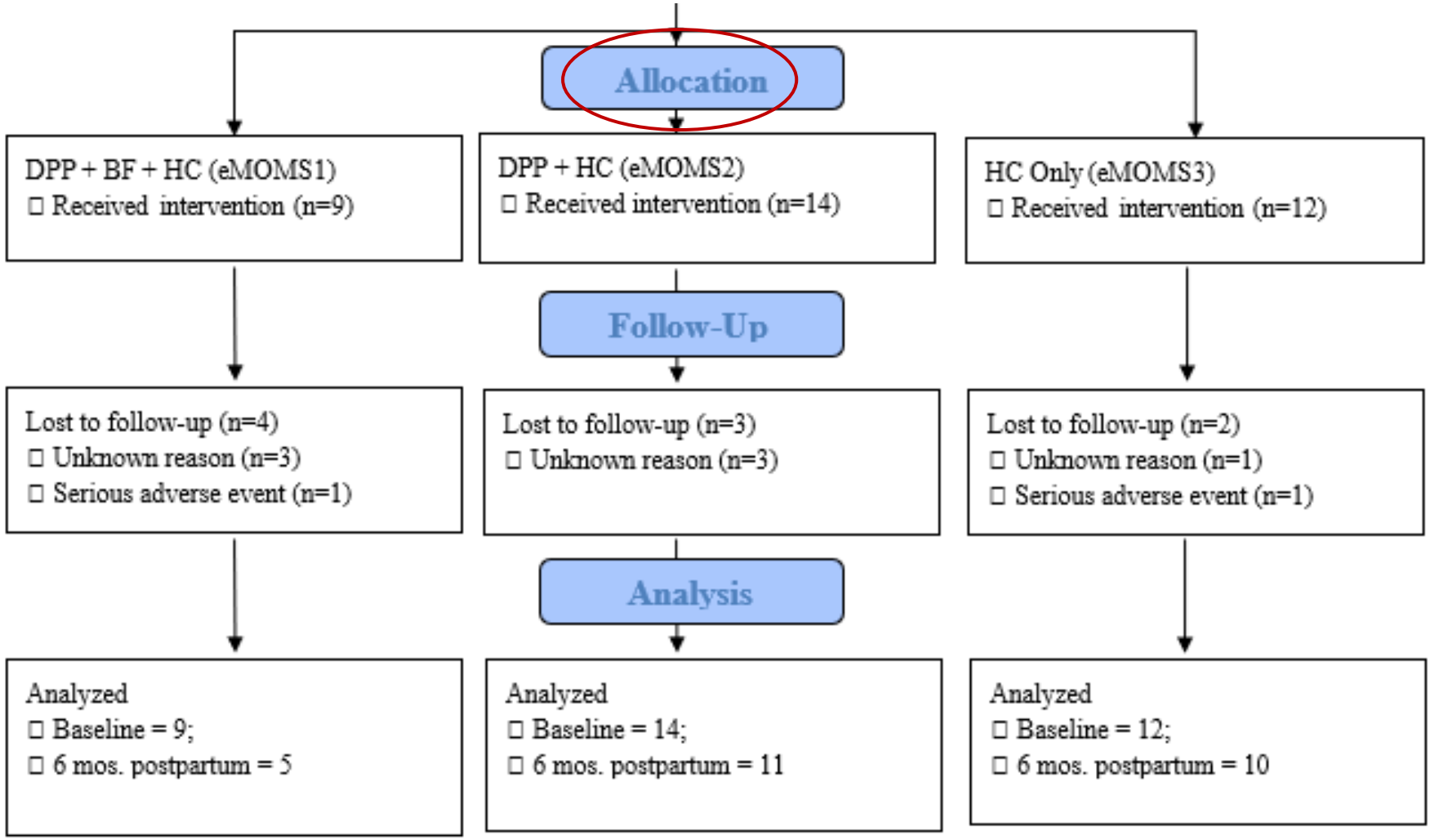
CONSORT Flow Diagram (2)



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Results – Table 1. Maternal characteristics by treatment group

	DPP+LC+HC (n = 9)	DPP+HC (n = 14)	HC (n = 12)	Overall
Age (mean ± sd)	27.9 ± 7.4	27.1 ± 5.2	27.6 ± 5.4	27.5 ± 5.7
Pre-Pregnancy BMI	28.7 ± 3.4	30.0 ± 2.7	30.2 ± 3.1	29.7 ± 3.0
Pregnancy in weeks	13.8 ± 1.1	12.7 ± 3.2	12.8 ± 2.3	13.0 ± 2.5
First Pregnancy	22.2%	42.9%	50.0%	40.0%
Ethnicity/Race				
Non-Hisp White	77.8%	57.1%	66.7%	65.7%
Hispanic	11.1%	14.3%	16.7%	14.3%
Non-Hisp Black	0%	21.4%	8.3%	11.4%
Other	11.1%	7.1%	8.3%	8.6%
Location				
Rural	0%	7.1%	16.7%	8.6%
Urban	100%	92.9%	83.3%	91.4%
WIC				
Yes	33.3%	21.4%	8.3%	20.0%
No	66.7%	78.6%	91.7%	80.0%

	DPP+LC+HC (n = 9)	DPP+HC (n = 14)	HC (n = 12)	Overall
Household Income				
$9,999>	11.1%	28.6%	33.3%	25.7%
$10-$24,999	11.1%	21.4%	0.0%	11.4%
$25-$49,999	44.4%	21.4%	16.7%	25.7%
$50-$74,999	22.2%	7.1%	16.7%	14.3%
$75-99,999	0.0%	14.3%	33.3%	17.1%
$100,000>	11.1%	7.1%	0.0%	5.7%
Education				
Some HS	11.1%	14.3%	0.0%	8.6%
High School	33.3%	21.4%	0.0%	17.1%
Some College	11.1%	42.9%	25.0%	28.6%
Associate's	22.2%	0.0%	25.0%	14.3%
Bachelor's	22.2%	21.4%	41.7%	28.6%
Advanced Deg	0.0%	0.0%	8.3%	2.9%
Family History DM				
Yes	55.6%	35.7%	33.3%	40.0%
No	44.4%	64.3%	66.7%	60.0%

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Results – Table 2. Primary outcome measures by treatment group (Aim 1)

Description (median, IQR)	n	DPP+LC+HC	n	DPP+HC	n	HC
Maternal Weight (in lbs)						
Baseline	5	160 (150, 170)	11	173 (160, 175)	10	183.5 (170, 194)
6 Months Postpartum (PP)	5	164.4 (164, 186)	11	171 (160, 193)	8	194.9 (179.7, 210.2)
Maternal Weight Retention (in lbs)						
Baseline – 6 Months PP	5	9 (4.4, 12.6)	11	7.7 (9.4, 15.8)	8	12.9 (8.9, 22.6)
Maternal HbA1c						
Baseline	3	5.2 (4.7, 5.4)	11	5.2 (4.8, 5.8)	9	5 (5.0, 5.2)
6 Months PP	5	5.3 (5.2, 5.4)	11	5.4 (5, 5.7)	8	5.1 (5.0, 5.2)
Mean Arterial Blood Pressure						
Baseline	5	85 (82, 85.3)	11	90.7 (77.7, 94.0)	10	89.7 (86.7, 95.3)
6 Months PP	5	92.7 (87.3, 94)	11	91.3 (81.3, 98.7)	8	90.8 (85, 95)

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eMOMS™ Results (Aim 1, Primary outcome)

With 5,000 bootstrapped samples:

Description (mean, CI)	DPP+LC+HC	DPP+HC	HC
Maternal Weight Retention (in lbs)			
Baseline – 6 Months Postpartum	8.9 (3.6, 13.7)	8.1 (-4.0, 21.7)	16.5 (9.1, 25.5)
Lactation (in weeks)			
Any Breastfeeding	11.3 (1.3, 21.2)	14.9 (9.9, 20.0)	16.7 (9.4, 23.3)
Exclusive Breastfeeding	9.3 (0.4, 26.1)	9.6 (4.4, 15.7)	15.1 (6.5, 23.3)

eMOMS™ Results (Aim 1, Primary outcome)

Lactation duration among our population of study:

Lactation by treatment group					
Completers: n=26					
	Proportion who continue any breastfeeding				
Group	n	day 10	6 weeks	3 months	6 months
DPP+LC+HC	5	72%	57%	50%	30%
DPP+HC	11	67%	36%	23%	17%
HC	10	67%	42%	30%	12%

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eMOMS™ Results (Aim 1, Secondary outcomes)

Pre-post maternal matched measures by group: baseline vs. 6 months

Description (median, IQR)	DPP+LC+HC (n =5)	p	DPP+HC (n =11)	p	HC (n=10)	p	Overall p
KPAS Weighted Total							
Baseline	12.1 (12.0, 12.9)	0.625	10.1 (9.3, 11.1)	0.010	10.6 (9.7, 11.3)	0.020	0.902
6 Months Postpartum	12.4 (11.7, 15.1)		12.2 (10, 13.4)		12.7 (11.9, 13.7)		
EATS							
Baseline	1.6 (1.2, 2.8)	>0.999	1.8 (1.1, 2.5)	0.520	1.9 (1.3, 2.7)	0.014	0.207
6 Months PP	1.9 (1.4, 2.2)		1.8 (1.3, 2.7)		3.1 (1.9, 4.5)		
BSES-SF							
Baseline	33.0 (28.0, 50.0)	0.625	35.0 (20.0, 44.0)	0.142	41.0 (32.0, 49.0)	0.266	0.904
6 Months PP	49.0 (26.0, 52.0)		52.0 (27.0, 70.0)		62.5 (30.0, 65.0)		

Results - Aim 2: Quantify Interest (Recruitment & Retention, Study #1)

Study #1 – Intervention uptake

- Study **participation** rate: 35%
- **Retention** rate: 74%
- **Completers**: first-time mothers, slightly older, higher educational attainment, slightly more culturally diverse
- **Provider experiences**:
  - Reported willingness to participate
  - Believed study aligned with their organization's mission
  - Reported satisfaction with using iPads for screening study participants

Lessons Learned

It is possible to achieve **successful recruitment and retention** of individuals who are pregnant and have elevated BMI

Designated research staff in combination with **support of the patient's prenatal care provider** may yield **better recruitment**

User-friendly technology is a **key tool** to mitigate time burden on physicians and their staff involved in the **screening and enrollment process**

Jacobson et al. Electronic Monitoring Of Mom's Schedule (eMOMS™): Recruitment of pregnant populations with elevated BMI in a feasibility randomized controlled trial. *Prev Med Rep*. 2023;34:102254

Results - Aim 2: Quantify Interest (Exit Interviews, Study #2)

Study #2 – Exit interviews

- Of 26 individuals who completed the study, **24 consented** to an exit interview
  - Mean age: 27.5 (±5.4)
  - Mean pre-pregnancy BMI: 29.5 kg/m^2 (±2.7)
  - Non-Hispanic White (71%), Hispanic (17%), non-Hispanic Black (8%)
  - 54% high school education/some college
  - Annual household income <$50,000 (67%)
  - Entered study: 12.5 (±2.4) wks. gestation (67%)
  - Immediate family member diagnosed/treated for diabetes (46%)

Main Themes
Positivity, perseverance, and taking small steps toward one's health
Health coach as a valuable source of support
Consciousness of health behaviors and maternal weight
Convenience of online program access using Facebook
Importance of online interaction
Grief over the loss of expectations surrounding birth within the **COVID-19** environment

Jacobson et al. Electronic Monitoring Of Mom's Schedule (eMOMS™): A Qualitative Study of Experiences in a Lifestyle Change Program with Lactation Support. *Am J Health Promot*. 2023;37(7):953-963. doi:10.1177/08901171231189540

Results - Aim 2: Quantify Interest (Exit Interviews, Study #2, cont'd)

Additional interesting themes
Breastfeeding educational need varied for first-time vs. repeat mothers
Importance of educational materials on **depression**

"I was excited to have someone as a support for breastfeeding [...] if I did have a question and it was within her scope, she definitely would answer that for me [...] it is exhausting sometimes, but keep pushing on, and I have been really very successful."

"every breastfeeding mom that I have ever met asks the question, how do I know if my baby is getting enough, and I know you guys give resources and information regarding that and [health coach] did a great job of talking to me about that, but it is scary, and you monitor the poops and pees, but it's scary not to know how much am I producing."

"another thing that I kind of liked about the eMOMS program is it does touch on depression and depression is such a real thing during pregnancy and postpartum so I feel like that is a good safety check."

Jacobson et al. Electronic Monitoring Of Mom's Schedule (eMOMS™): A Qualitative Study of Experiences in a Lifestyle Change Program with Lactation Support. *Am J Health Promot*. 2023;37(7):953-963. doi:10.1177/08901171231189540

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eMOMS™ Conclusion

Limitations, insights & lessons learned, future research

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eMOMS™ Conclusion

Main conclusion: Use of DPP-curriculum and health coach appears to have a positive impact on postpartum weight retention and breastfeeding duration

Limitation: Small sample size, impact of COVID-19 on recruitment

Insights & Lessons Learned:

- Study confirms important role of health coach in supporting individuals with behavior change techniques toward weight management and breastfeeding/lactation duration
- Combination of providers and social media adequate for recruitment
- Program delivery should incorporate additional compliance measures related to DPP curriculum

eMOMS™ Conclusion (2)

Insights & Lessons Learned (cont'd):

- Incorporating culturally informed and linguistically appropriate educational materials on lactation
- Offering a "menu" of lactation education topics depending on mothers' experiences

Implications for future research:

- Delineating health coach's role to support weight management & lactation
- Delivery of evidence-based programs using mHealth technology
- Adaptation of lifestyle change programs coupled with lactation to unique populations

Next Steps for eMOMS™…

- eMOMS™ 2.0 – Advancing maternal-child wellness through nutrition, physical activity, and lactation
  - Intervention will be delivered using mHealth application starting in Spring 2024
  - Funded by National Institute of General Medical Sciences (NIGMS) & National Heart, Lung, and Blood Institute (NHLBI), under award number P20GM144269-02S2
- A large-scale, multi-site, randomized controlled trial testing intervention efficacy with a larger sample of ethnically/racially diverse, rural and urban pregnant populations

eMOMS™

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eMOMS™ – A Collaborative Partnership

Ascension Via Christi

KU School of Medicine
The University of Kansas

Kearny County Hospital
Family, Friends, Neighbors

Kansas Breastfeeding Coalition, Inc.

WSU Wichita State University

Kansas Department of Health and Environment

March of Dimes

Kansas Maternal & Child Health

KU Endowment
The University of Kansas

KU School of Medicine Wichita
The University of Kansas

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Thank you for your time!!!

Questions???

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