Modes of Marijuana Administration Among Females Before and During Pregnancy in the Era of Legalization

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Amy Conway, MPH, Director, Early Start Program, Kaiser Permanente Northern California
Overview

- Kaiser Permanente Northern California (KPNC) Early Start Program
- KPNC Research on Prenatal Marijuana Use
- Modes of Marijuana Administration in Pregnancy
- Next Steps
- Final Considerations
4.2 million members
47,000 births in 2017
14 hospitals with labor and delivery units
57 outpatient prenatal clinics
Covers ~50,000 drivable sq. miles
What is Early Start?

- KPNC’s perinatal substance use screening and intervention program integrated into prenatal care

- Disseminated across KPNC in 2009
Four Objectives of Early Start

- Improve access to prenatal substance use services
- Decrease prenatal substance use
- Reduce negative birth outcomes and costs related to prenatal substance use
- Enhance provider satisfaction and efficacy
Key Components of Early Start

- Universal substance use screening by urine toxicology tests and self-report
- Substance use counseling by a licensed counselor linked with prenatal visits
- Assessment, education, and early intervention for patients
- Available at no cost, multiple languages
- Video appointments available
**Benefits of Early Start**

- Improves outcomes (lower risk of preterm delivery, ventilation, placental abruption, fetal death)
- Reduces the use of medical and social resources, decreases costs
- Enhances provider satisfaction

*Armstrong et al., 2003; Goler et al., 2008*
Early Start Workflow

Prenatal Patient Population

Screening Questionnaire & Urine Toxicology

Data from the screening can be extracted from the electronic health record

Early Start Assessment and Counseling

No further action

Individualized Care Plan (Counseling)
Gold-Standard Universal Substance Use Screening

- Urine toxicology test in panel of standard prenatal lab tests (at ~8 weeks gestation)
- Self-reported use of nicotine, alcohol, marijuana and other drugs in the year before pregnancy and since pregnancy
- Contemporary data
- Unique opportunity to study prenatal substance use
Addressing Gaps in the Literature: KPNC Research on Prenatal Marijuana Use
1. Is Prenatal Marijuana Use Increasing Over Time?

- Self-reported marijuana use increasing over time\(^1\)
- Likely underestimate use
- Biochemically verified data needed

\(^1\)Brown et al. JAMA, 2017

From 2002 to 2014, self-reported use in pregnancy increased from 2.4% to 3.9%
Prevalence of Marijuana Use in KPNC Pregnant Women, by Screening Type, 2009-2016 (N = 279,457)

Young-Wolff et al. JAMA. 2017
Prevalence of Marijuana Use in KPNC Pregnant Women, by Age, 2009-2016 (N = 279,457)

Adjusted Prevalence of Marijuana Use, % (95% CI)

Year


Marijuana use by self-report and/or positive toxicology test

Young-Wolff et al. JAMA. 2017

2019 North American Cannabis Summit
2. Is Prenatal Marijuana Use More Common Among Women with Nausea and Vomiting in Pregnancy (NVP)?

- Marijuana is an antiemetic
- >25% of online media items related to prenatal marijuana use mention treatment of NVP as marijuana health benefit\(^1\)
- In CO, 69% of dispensaries recommended marijuana to treat NVP and 36% endorsed safety of prenatal use\(^2\)
- Surveys find pregnant women use marijuana to treat NVP\(^3,4\)
- In Hawaii (2009-2011), self-reported prenatal marijuana use higher in women with (3.7%) vs. without (2.3%) NVP\(^5\)

\(^1\)Jarlenski et al. 2018; \(^2\)Dickson et al. 2018; \(^3\)Mark et al. 2017; \(^4\)Westfield et al. 2009; \(^5\)Roberson et al. 2014
Prevalence of Prenatal Marijuana Use in KPNC, by Nausea and Vomiting in Pregnancy (NVP), 2009-2016 (N = 220,510)

- Severe NVP (2.3%): aOR = 3.80 (3.19-4.52)
- Mild NVP (15.3%): aOR = 2.37 (2.17-2.59)
- No NVP (82.4%): aOR = 1 (Reference)
Prevalence of Marijuana Use in KPNC Pregnant Women, by NVP, 2009-2016 (N = 220,510)

Adjusted Prevalence of Marijuana Use, %


NVP (n = 38,831)  No NVP (n = 181,679)
3. Are Pregnant Women Using Marijuana More Frequently in Recent Years?

- As prenatal use, acceptance, and accessibility of marijuana rise, frequency of use may also increase.
- Greater frequency may be associated with worse maternal and neonatal outcomes\(^1\).
- Frequency of prenatal marijuana use unknown.

\(^1\text{Conner et al. 2016}\)
Adjusted Prevalence of Self-Reported Marijuana Use Frequency (N = 367,018)

12-Months Before Pregnancy

Adjusted prevalence of Marijuana use %

- Monthly
- Weekly
- Daily

Young-Wolff et al. Under Review.
Frequency of Past Year Marijuana Use, Among Self-Reported Users

12-Months Before Pregnancy

2009
- Monthly or less: 63%
- Weekly: 20%
- Daily: 17%

2017
- Monthly or less: 54%
- Weekly: 22%
- Daily: 24%

2019 North American Cannabis Summit
Adjusted Prevalence of Self-Reported Marijuana Use Frequency During Pregnancy (N = 367,018)

During Pregnancy

Adjusted prevalence of Marijuana use %

- Monthly
- Weekly
- Daily

Year:
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
- 2016
- 2017
Frequency of Marijuana Use During Pregnancy, Among Self-Reported Users

During Pregnancy

2009
- Monthly or less: 61%
- Weekly: 25%
- Daily: 14%

2017
- Monthly or less: 52%
- Weekly: 27%
- Daily: 21%
Pilot Study: Modes of Marijuana Administration Before and During Pregnancy
Modes of Marijuana Administration

- Many ways to administer (smoking, vaping, ingestion of edible products, lotions, etc.)
- Smoking most prevalent in US adults; dual modes common (42% of past-month users report 2+ modes)¹
- Legalization for recreational use may increase use of vaping and edibles²

Mode of Administration May Influence Health Effects

- Unknown how women administer marijuana in pregnancy and whether the health effects vary with mode

- Timing, duration of onset and peak effects, psychoactive effects, and health effects vary with mode

1Borodovsky et al. 2016
Mode of Administration May Influence Health Effects

- **Smoking:** Greater potential health consequences due to vascular effects of smoke inhalation\(^1\)

- **Vaping:** Greater subjective effects, cognitive and psychomotor impairments, higher THC blood concentrations than same dose of smoked marijuana\(^2\)

- **Edibles:** Delayed onset of effects, inconsistent THC labeling, metabolized differently from inhaled products\(^3\)

\(^1\)Earleywine and Barnwell, 2007; \(^2\)Spindle et al. JAMA 2018; \(^3\)Cao et al. 2016
Pilot Study to Examine Mode of Marijuana Administration

- Change in Early Start prenatal substance use screening questionnaire
- Pilot Study to test the new questions
- New questionnaire will be implemented for all KPNC prenatal patients ~May 2019
### 12-months before pregnancy and since pregnancy

<table>
<thead>
<tr>
<th>Marijuana/Cannabis (including synthetic types)</th>
<th>Never</th>
<th>Monthly or less</th>
<th>Weekly</th>
<th>Daily</th>
<th>How much each time?</th>
</tr>
</thead>
</table>

Please indicate all the ways you used marijuana/cannabis in the 12 months before you were pregnant:

- Smoke
- Vape
- Blunts*
- Edible/Oral
- Lotion/Topical
- Dabs/Wax*
- Other (please describe) _______________________

* = added after the pilot study
Study Aims

- Examine prevalence and frequency of marijuana use in the year before and during pregnancy in 2018
- Describe demographic and clinical correlates of use
- Examine mode of marijuana administration before and during pregnancy and its relation to use frequency
Methods

- **Sample:** Pregnant women seeking prenatal care at 2 KPNC medical centers (N = 438)
- Received the pilot prenatal screening questionnaire during standard prenatal care (at ~8 weeks gestation)
- **Dates:** June 2018 to December 2018
- **Measures:** Toxicology test, demographics and pregnancy circumstances, mental health symptoms and diagnoses from EHR and prenatal questionnaire
Patient Demographics (N=438)

<table>
<thead>
<tr>
<th>Age categories</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-24</td>
<td>21%</td>
</tr>
<tr>
<td>25-34</td>
<td>62%</td>
</tr>
<tr>
<td>35-45</td>
<td>17%</td>
</tr>
<tr>
<td>Age, mean ± SD</td>
<td>29.5 ± 5.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>47%</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>32%</td>
</tr>
<tr>
<td>Asian/HP</td>
<td>10%</td>
</tr>
<tr>
<td>Black</td>
<td>5%</td>
</tr>
<tr>
<td>Other</td>
<td>6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary language</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>96%</td>
</tr>
<tr>
<td>Spanish</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>1%</td>
</tr>
</tbody>
</table>
## Patient Characteristics (N=438)

<table>
<thead>
<tr>
<th>Living situation</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>With baby’s father</td>
<td>89%</td>
</tr>
<tr>
<td>Family</td>
<td>6%</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>5%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pregnancy intentions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wanting to get pregnant</td>
<td>65%</td>
</tr>
<tr>
<td>Wanting to get pregnant, but not at this time</td>
<td>21%</td>
</tr>
<tr>
<td>Not wanting to get pregnant at all</td>
<td>8%</td>
</tr>
<tr>
<td>Missing</td>
<td>6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Comorbidities</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea and vomiting in pregnancy</td>
<td>14%</td>
</tr>
<tr>
<td>Depression in pregnancy (PHQ-9 ≥10)*</td>
<td>11%</td>
</tr>
<tr>
<td>Anxiety disorder**</td>
<td>12%</td>
</tr>
<tr>
<td>Substance use disorder**</td>
<td>2%</td>
</tr>
</tbody>
</table>

* = PHQ = 9-Item Patient Health Questionnaire
** = in the past year
## Self-Reported Substance Use (N=438)

<table>
<thead>
<tr>
<th></th>
<th>Year before pregnancy (%)</th>
<th>During pregnancy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marijuana</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Alcohol</td>
<td>66%</td>
<td>10%</td>
</tr>
<tr>
<td>Tobacco</td>
<td>6%</td>
<td>2%</td>
</tr>
<tr>
<td>E-cigarettes/vaping</td>
<td>3%</td>
<td>1%</td>
</tr>
<tr>
<td>Prescription sleep medication</td>
<td>3%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Prescription opioid pain medication</td>
<td>2%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Anxiety medicine</td>
<td>5%</td>
<td>1%</td>
</tr>
</tbody>
</table>
## Self-Reported Marijuana Use by Patient Demographics

<table>
<thead>
<tr>
<th>Age Categories</th>
<th>N</th>
<th>Marijuana use before pregnancy (row %)</th>
<th>Marijuana use during pregnancy (row %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-24</td>
<td>94</td>
<td>24%</td>
<td>8%</td>
</tr>
<tr>
<td>25-34</td>
<td>265</td>
<td>11%</td>
<td>4%</td>
</tr>
<tr>
<td>35-45</td>
<td>71</td>
<td>6%</td>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Race/ethnicity</th>
<th>N</th>
<th>Marijuana use before pregnancy (row %)</th>
<th>Marijuana use during pregnancy (row %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>199</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>139</td>
<td>17%</td>
<td>5%</td>
</tr>
<tr>
<td>Asian/HP</td>
<td>44</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Black</td>
<td>22</td>
<td>9%</td>
<td>9%</td>
</tr>
<tr>
<td>Other</td>
<td>26</td>
<td>19%</td>
<td>11%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary language</th>
<th>N</th>
<th>Marijuana use before pregnancy (row %)</th>
<th>Marijuana use during pregnancy (row %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>413</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Spanish/Other</td>
<td>17</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

*Bold indicates significant differences (p < .05) from chi-square or Fisher’s Exact Test*
## Self-Reported Marijuana Use by Patient Characteristics

<table>
<thead>
<tr>
<th>Living situation</th>
<th>N</th>
<th>Marijuana use before pregnancy (row %)</th>
<th>Marijuana use during pregnancy (row %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>With baby’s father</td>
<td>383</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>Family</td>
<td>27</td>
<td>30%</td>
<td>11%</td>
</tr>
<tr>
<td>Other/unknown</td>
<td>20</td>
<td>20%</td>
<td>11%</td>
</tr>
<tr>
<td>Pregnancy intentions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wanting to get pregnant</td>
<td>279</td>
<td>10%</td>
<td>2%</td>
</tr>
<tr>
<td>Wanting to get pregnant, but not at this time</td>
<td>89</td>
<td>20%</td>
<td>7%</td>
</tr>
<tr>
<td>Not wanting to get pregnant at all</td>
<td>34</td>
<td>21%</td>
<td>12%</td>
</tr>
<tr>
<td>Unknown</td>
<td>28</td>
<td>4%</td>
<td>4%</td>
</tr>
</tbody>
</table>

* **Bold** indicates significant differences (p < .05) from Fisher’s Exact Test
# Self-Reported Marijuana Use by Comorbidities

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Marijuana use before pregnancy (row %)</th>
<th>Marijuana use during pregnancy (row %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea and vomiting in pregnancy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>62</td>
<td>11%</td>
<td>3%</td>
</tr>
<tr>
<td>No</td>
<td>368</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Depression in pregnancy (PHQ-9 ≥10)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>21%</td>
<td>2%</td>
</tr>
<tr>
<td>No</td>
<td>373</td>
<td>12%</td>
<td>5%</td>
</tr>
<tr>
<td>Anxiety disorder**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>49</td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>No</td>
<td>381</td>
<td>13%</td>
<td>4%</td>
</tr>
<tr>
<td>Substance use disorder**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10</td>
<td>50%</td>
<td><strong>44%</strong></td>
</tr>
<tr>
<td>No</td>
<td>420</td>
<td>12%</td>
<td>3%</td>
</tr>
</tbody>
</table>

* = 9-item Patient Health Questionnaire; ** = in the past year; Bold indicates significant differences (p < .05) from chi-square or Fisher’s Exact Test.
Positive cannabis toxicology test during pregnancy

- Self-reported marijuana use in year before pregnancy: 31% Yes, 4% No
- Self-reported marijuana use during pregnancy: 50% Yes, 5% No
Substance Use in Year Before Pregnancy

- Alcohol: 85% (Marijuana users) vs. 63% (Marijuana non-users), P = .001
- Tobacco: 13% (Marijuana users) vs. 5% (Marijuana non-users), P = .07
- E-cig/vaping: 13% (Marijuana users) vs. 2% (Marijuana non-users), P < .001
Substance Use in Year Before Pregnancy

Marijuana users (N=55)  Marijuana non-users (N=375)

- Prescription sleep medication: 11% (P = .002)
- Prescription opioid pain medication: 2% (P > .99)
- Anxiety medicine: 18% (P < .001)

Substance Use During Pregnancy

Marijuana users (N=18) vs. Marijuana non-users (N=413)

- Alcohol: 39% (P < .001) vs. 8% (P = .049)
- Tobacco: 11% (P = .049) vs. 2% (P = .12)
- E-cig/vaping: 6% (P = .12) vs. 0.5%
Substance Use During Pregnancy

Marijuana users (N=18)  Marijuana non-users (N=413)

Prescription sleep medication
P = .04

Prescription opioid pain medication
P > .99

Anxiety medicine
P = .005
Frequency of Self-Reported Marijuana Use

- Year before pregnancy (N=430)
  - Daily: 12.8% (Total: 2.6%)
  - Weekly: 2.6% (Total: 2.6%)
  - Monthly or less: 7.7% (Total: 2.6%)

- During pregnancy (N=431)
  - Daily: 4.2% (Total: 0.7%)
  - Weekly: 0.9% (Total: 0.9%)
  - Monthly or less: 2.6% (Total: 2.6%)
Frequency of Self-Reported Marijuana Use Among Users

Year before pregnancy, N=55
- Monthly or less: 60%
- Weekly: 20%
- Daily: 20%

During pregnancy, N=18
- Monthly or less: 61%
- Weekly: 22%
- Daily: 17%
Marijuana Mode of Administration Among Users

Note: Women could indicate more than one mode. Not all self-reported users responded to mode of administration.
Women could indicate more than one mode, the combinations reported were:

**Year before pregnancy:**
- 2 modes: smoke + vape: 12%; smoke + edible: 16%; smoke + lotion: 2%; edible + lotion: 5%
- 3 modes: smoke + vape + edible: 7%

**During pregnancy:**
- 2 modes: smoke + vape: 7.7%; smoke + edible: 7.7%
- 1 mode: 85%
Frequency of Use by Marijuana Mode of Administration, Among Users

Year before pregnancy (N=43)
- Smoke: 42% Daily, 45% Weekly, 60% Monthly or less, 80% More than Monthly
- Vape: 27% Daily, 27% Weekly, 27% Monthly or less
- Edible: 27% Daily, 27% Weekly, 27% Monthly or less
- Lotion: 13% Daily, 20% Weekly, 20% Monthly or less

During pregnancy (N=13)
- Smoke: 50% Daily, 67% Weekly, 67% Monthly or less, 100% More than Monthly
- Vape: 25% Daily, 33% Weekly, 33% Monthly or less
- Edible: 25% Daily, 33% Weekly, 33% Monthly or less
- Lotion: 100% Daily

Note: Women could indicate more than one mode.
Marijuana Mode of Administration by Frequency of Use

Year before pregnancy (N=43)

- Monthly or less: Smoke (30%), Vape (20%) Edible (15%) Lotion (10%)
- Weekly: Smoke (20%), Vape (25%), Edible (20%), Lotion (15%)
- Daily: Smoke (15%), Vape (20%), Edible (25%), Lotion (20%)

During pregnancy (N=13)

- Monthly or less: Smoke (30%), Vape (25%), Edible (20%), Lotion (5%)
- Weekly: Smoke (20%), Vape (25%), Edible (20%), Lotion (10%)
- Daily: Smoke (15%), Vape (20%), Edible (25%), Lotion (10%)

Note: Women could indicate more than one mode; totals can sum to more than 100%
Summary

- 4% of women self-report marijuana use during pregnancy
- Associated with:
  - Younger age
  - Black and other race/ethnicity
  - Unintended pregnancy
  - Past-year substance use disorder
  - Prenatal use of other substances
- Monthly or less use most common, but 17% report daily use
- Smoking most prevalent, then edibles and vaping
- Multiple modes of administration more common before pregnancy
- Daily marijuana use highest among those who smoke
Gaps in Knowledge and Next Steps
Remaining gaps in knowledge

We need better data on the effects of prenatal marijuana use and whether use prenatal use rises after legalization

*Data Are Needed on the Potential Adverse Effects of Marijuana Use in Pregnancy*

Nancy Goler, MD; Amy Conway, MPH; and Kelly C. Young-Wolff, PhD, MPH

The adverse effects of prenatal marijuana use remain unclear (1), yet more pregnant women are using marijuana in the United States than ever before (2, 3). Self-reported marijuana use during pregnancy increased...
Prior Research Suggests Adverse Health Effects of Prenatal Marijuana Use

- Marijuana crosses placenta, can impact fetal development\(^1\)
- Low birth weight, pregnancy complications, NICU\(^2\)
- Prior research has methodological limitations\(^3\)
  - Self-reported use, single time point
  - Small non-generalizable samples
  - Doesn’t adequately account for co-use of other drugs, frequency of use, or mode of administration

\(^1\)Bailey et al., 1987; \(^2\)National Academy of Sciences. 2017; \(^3\)Young-Wolff et al. Annals of Internal Medicine. 2018
Two R01 Grants Under Review

- Using data from >400,000 pregnant women in KPNC from 2009-2022, the study aims to examine:

- Whether prenatal marijuana use is associated with:
  - Maternal, fetal and neonatal outcomes
  - Impairments in offspring neurodevelopment
  - Behavioral disorders and mental health outcomes

- Assess whether prenatal marijuana use rises after state recreational marijuana legalization in CA in 2018
  - Focus on local regulatory practices (e.g., retail bans, density)
Additional Next Steps

- Focus groups with pregnant women
- Surveys with Early Start Specialists
- Larger studies on mode of marijuana administration and blunt use and relation to use frequency and adverse outcomes
Final Considerations
Women Want Information!

- 80% of pregnant women with past-month marijuana use perceive little-to-no harm to their baby\(^1\)

- Pregnant women express a desire for better information\(^2\)
  - Obstetric providers respond inadequately or not at all
  - Women report searching online, seeking anecdotal experiences

\(^1\)Ko et al., 2015; \(^2\)Jarlenski et al. 2016
Clinical Implications

- Enough is known about effects on fetal growth and neurodevelopment to advise against prenatal use.
- Clinicians can reduce the potential harms via:
  - Awareness, screening, patient education
  - Encouragement of patients to stop marijuana use
- This is in line with recommendations from the American College of Obstetricians and Gynecologists.
Final Considerations

- **As of January 2019**
  - 24 states and Washington DC require clinicians to report suspected prenatal drug use
  - 8 states require clinicians to test for prenatal drug exposure if they suspect drug use
  - 23 states + DC consider prenatal substance use child abuse
  - 3 states consider prenatal substance use grounds for civil commitment

https://www.guttmacher.org/state-policy/explore/substance-use-during-pregnancy
Final Considerations

- In CA, clinicians not required to report prenatal substance use
- Data should NOT be used to penalize women or reinforce punitive laws
- Need to change culture of punishment to one of love and dignity
## Substance Use Research at Division of Research

### Principal Investigators
- Constance Weisner, DrPH, LCSW
- Cynthia Campbell, PhD
- Stacy Sterling, DrPH, MSW
- Derek Satre, PhD
- Lyndsay Avalos, PhD
- Mary Anne Armstrong, MA
- Stacey Alexeeff, PhD
- Kelly Young-Wolff, PhD

### Health Economist
- Sujaya Parthasarathy, PhD

### Senior Research Administrator
- Alison Truman, MHA

### Analysts/Biostatisticians
- Sara Adams, MPH
- Varada Sarovar, PhD
- Lue-Yen Tucker, BA
- Felicia Chi, MPH
- Andrea H Kline Simon, MS
- Wendy Lu, MPH
- Tom Ray, MBA
- Boriska Toth, PhD

### Interview Supervisor
- Gina Smith Anderson

### Project Managers
- Monique Does, MPH
- Andrea Altschuler, PhD

### Research Associates
- Georgina Berrios
- Agatha Hinman, BA
- Nancy Charvat-Aguilar
- Rahel Negusse
- Elinette Nicolas
- Virginia Browning
- Melanie Jackson
- Diane Lott-Garcia

### Research Clinicians
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- Ashley Jones, PsyD
- Amy Leibowitz, PsyD
- Cate Marino, PsyD
- Genny Lamore, MFT

### Fellows
- Esti Iturralde, PhD

### Research Administrator
- Patrick Ryan, BS

### KPNC Members
- KPNC OB/GYN and Early Start Program
- KPNC Chemical Dependency Quality Improvement
- KPNC Chronic Pain Programs
- KPNC Adolescent Medicine Specialists Committee
- KPNC Regional Mental Health and Chemical Dependency

### Early Start Leaders
- Amy Conway, MPH
- Nancy Goler, MD
- Deb Ansley, MD

### Other Clinical Partners
- Anna Wong, PhD
- David Pating, MD
- Barry Levine, MD
- Monika Koch, MD
- Don Mordecai, MD
- Cosette Taillac, LCSW
- Murtuza Ghadiali, MD
- Mason Turner, MD
- Chris Zegers, MD
- Melissa Rose, PhD
- Andrea Rubenstein, MD
- Sameer Awsare, MD
- Karen Peters, PhD
- Kavitha Rao, MD
- Sheryl Sun, MD
<table>
<thead>
<tr>
<th>Substance</th>
<th>Prevalence, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>20.7</td>
</tr>
<tr>
<td>Nicotine</td>
<td>17.4</td>
</tr>
<tr>
<td>Opioid Pain Medication</td>
<td>7.0</td>
</tr>
<tr>
<td>Cocaine/Crack</td>
<td>2.3</td>
</tr>
<tr>
<td>Methamphetamine/Amphetamine</td>
<td>2.1</td>
</tr>
<tr>
<td>Heroin</td>
<td>0.6</td>
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<tr>
<td>Other Illicit Drugs</td>
<td>0.8</td>
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<tr>
<td>Any of the Above</td>
<td>34.9</td>
</tr>
<tr>
<td>&gt;2 of the Above</td>
<td>11.2</td>
</tr>
<tr>
<td>Marijuana Only</td>
<td>65.1</td>
</tr>
</tbody>
</table>
Early Start Mission

- Every woman deserves a non-punitive health care environment where she has access to services and support to have an alcohol, tobacco and drug free pregnancy, allowing the delivery of a healthy baby.