Ozempic Babies? The Effects of GLP-1 Agonists on Fertility

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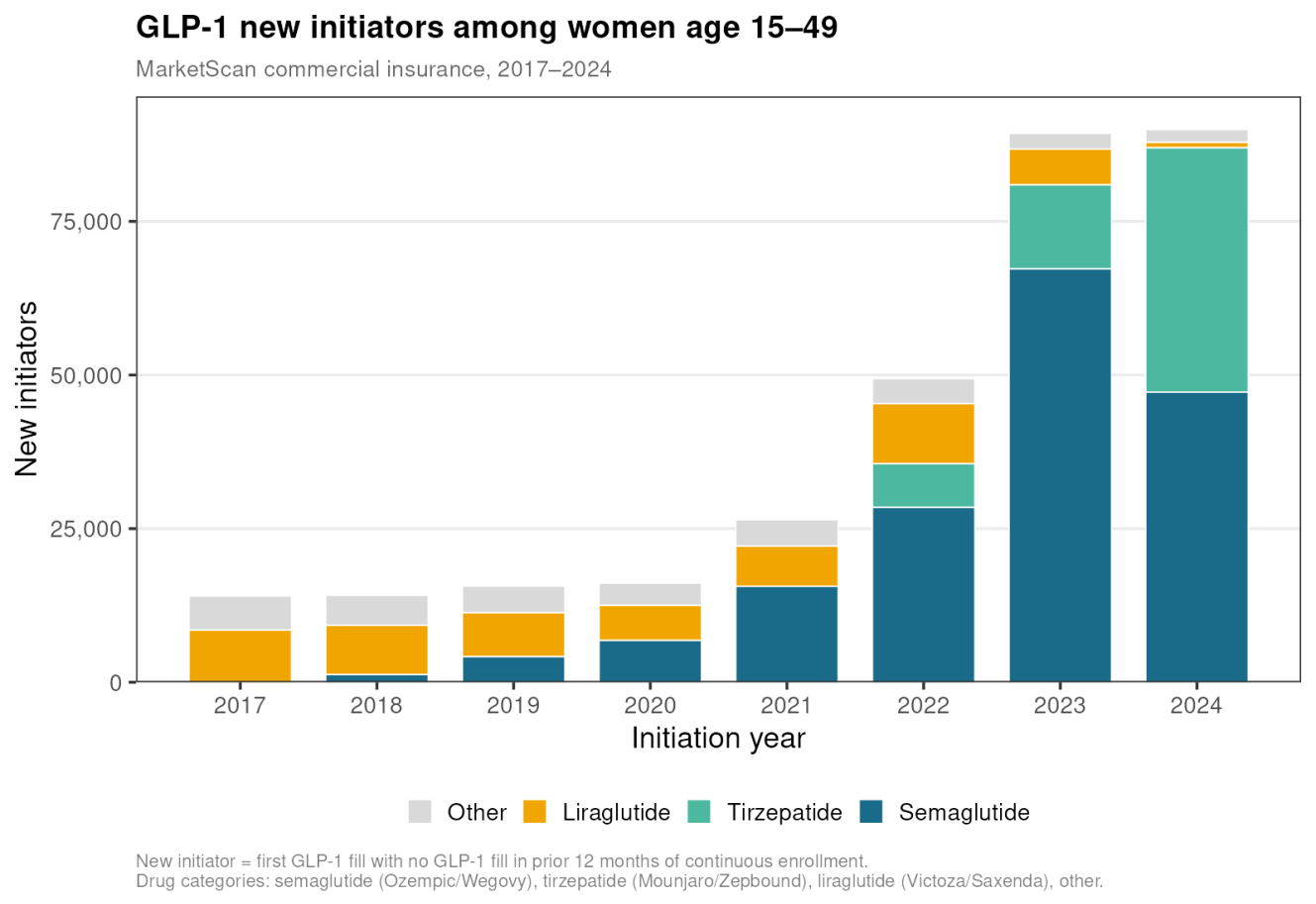
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The GLP-1 Boom Among Reproductive-Age Women (MarketScan)

- GLP-1 spending among adults with type 2 diabetes rose from 7.6% to 19.4% between 2018 and 2022, and reached 26.5% by 2024 (Hegland et al., 2024; Vahratian et al., 2025).
- Monthly dispensing to women ages 18–25 increased by 659% between 2020 and 2023 (Lee et al., 2024).
- By 2023, women accounted for 76% of all young-adult GLP-1 recipients (Lee et al., 2024).

GLP-1 drugs have become a defining pharmaceutical event for reproductive-age women in the 2020s.

The GLP-1 Boom Among Reproductive-Age Women (MarketScan)



Pregnancy, Obesity, and Long-Run Metabolic Risk

- Overweight and obesity affect a substantial share of reproductive-age U.S. women (Ogunwole et al., 2021).
- Pregnancy can accelerate this trajectory: postpartum weight retention ("baby weight") raises the risk of lasting overweight or obesity (Endres et al., 2015).
- GLP-1 may offer a new tool to interrupt this cycle before or between pregnancies.
- GDM is common and not merely a pregnancy complication: women with a history of GDM face substantially elevated risk of type 2 diabetes (Vounzoulaki et al., 2020).

This makes GDM a high-stakes outcome, not just a pregnancy event.

Why GLP-1 May Matter for Fertility

Ex-Post: Delivery Costs

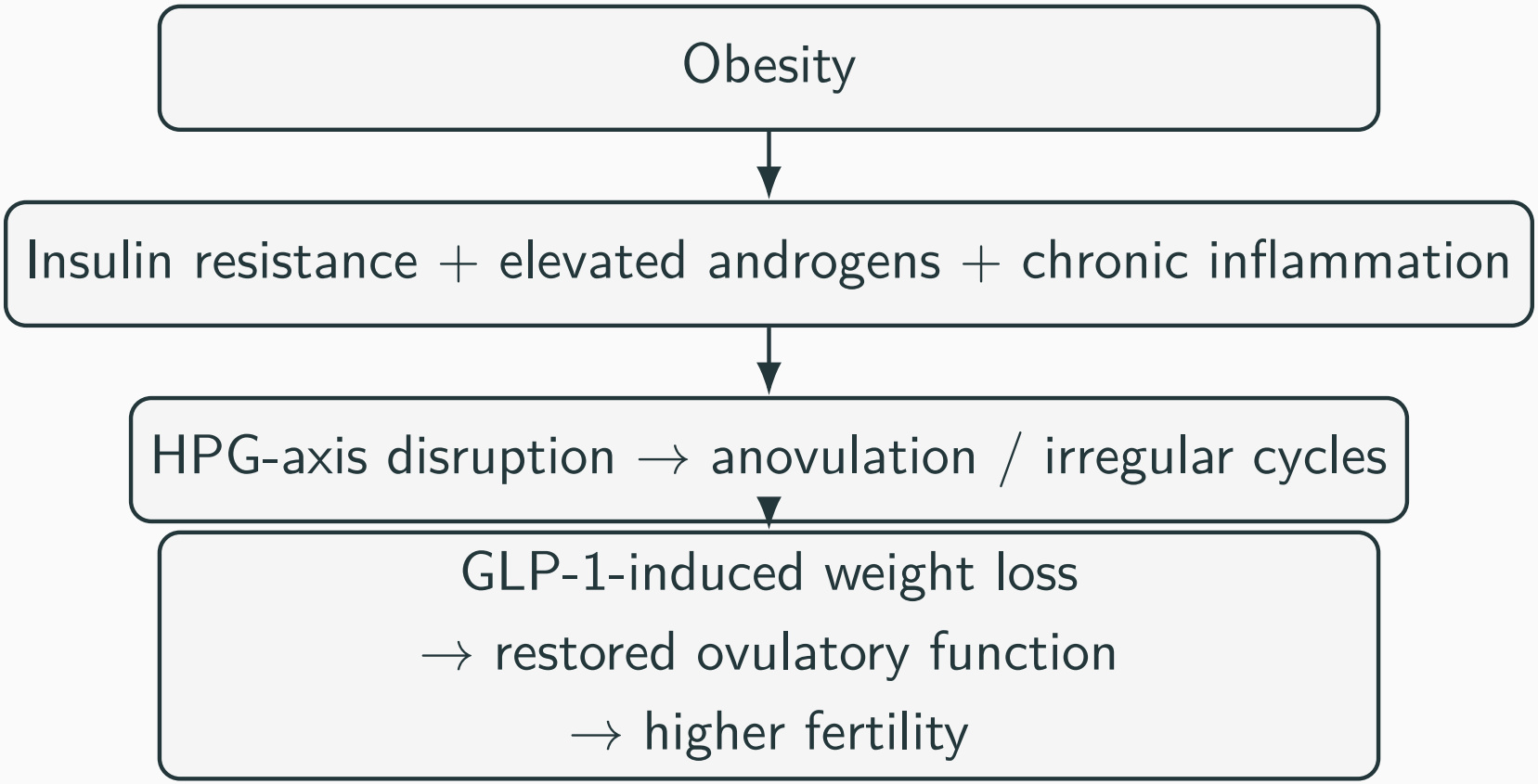
- Helps reduce postpartum weight retention ("baby weight")
- May lower long-run obesity risk after delivery
- May reduce later type 2 diabetes risk, especially after GDM
- Lowers the lasting health cost of pregnancy

Ex-Ante: Fertility

- Obesity can disrupt ovulation and fertility
- GLP-1-induced weight loss may restore ovulatory function
- May make conception easier for some women
- Biological mechanism discussed next

GLP-1 could matter both by reducing the health costs of pregnancy and by improving fecundability before conception.

Ex-Ante: A Fertility Channel



- PCOS is the leading clinical case: the most common cause of anovulatory infertility, with obesity often exacerbating dysfunction.

Research Questions

- Descriptive
  - How large is the reproductive-age GLP-1 candidate population?
  - How often does GLP-1 use overlap with pregnancy?
- Causal
  - Does GLP-1 initiation change subsequent fertility outcomes?

Challenges in Causal Analysis

- Fertility selection: women may initiate GLP-1 because they are trying to conceive.
- GLP-1 is contraindicated in pregnancy, so discontinuation complicates treatment timing.
- Recent pregnancy can shape treatment timing: many women initiate GLP-1 after delivery, so pregnancy may affect treatment rather than treatment affecting pregnancy.

This Paper's Approach

1. **Descriptive:** document the diffusion of GLP-1 into the reproductive years — who uses it, for what indications, and how it overlaps with pregnancy.
2. **Causal:** estimate the effect of GLP-1 initiation using stacked DiD with cohort-specific sub-experiments and individual fixed effects.
3. **Heterogeneity:** use TTC stratification as a selection test and PCOS as the subgroup where the biological mechanism should be strongest.

Trying-to-Conceive (TTC) population

- We look for TTC-related claims in the 12 months before GLP-1 initiation for treated women, and in the analogous pre-anchor window for controls.
- Diagnosis-based TTC signals: infertility diagnoses and fertility-management visits (for example, infertility workup or procreative management).
- Procedure-based TTC signals: fertility-treatment procedures such as insemination, IVF, and embryo/oocyte lab work.
- In principle we would also use fertility-drug fills, but the generic drug-name field needed for that is missing in these MarketScan files.
- So the implemented TTC measure is a claims-based lower bound: women with observable infertility or fertility-treatment claims before initiation.

Data: MarketScan Commercial Claims (2016–2024)

- MarketScan commercial insurance claims covering roughly 40–50 million insured individuals per year.
- Unit of observation in the analysis panel: person-month.
- Outcome claims are merged across inpatient (`_i`), outpatient (`_o`, `_f`), and pharmacy (`_d`) files.
- Main pregnancy and fertility outcomes:
  - delivery (`Z37`, `O80`, `O82`)
  - prenatal care (`Z34`)
  - gestational diabetes (`O24.4`)
  - termination (`O04`, `Z33.2`)
  - miscarriage (`O03`)

Focus of the study: women ages 15–49 observed in monthly claims histories before and after GLP-1 initiation.

Constructing the Treated Group

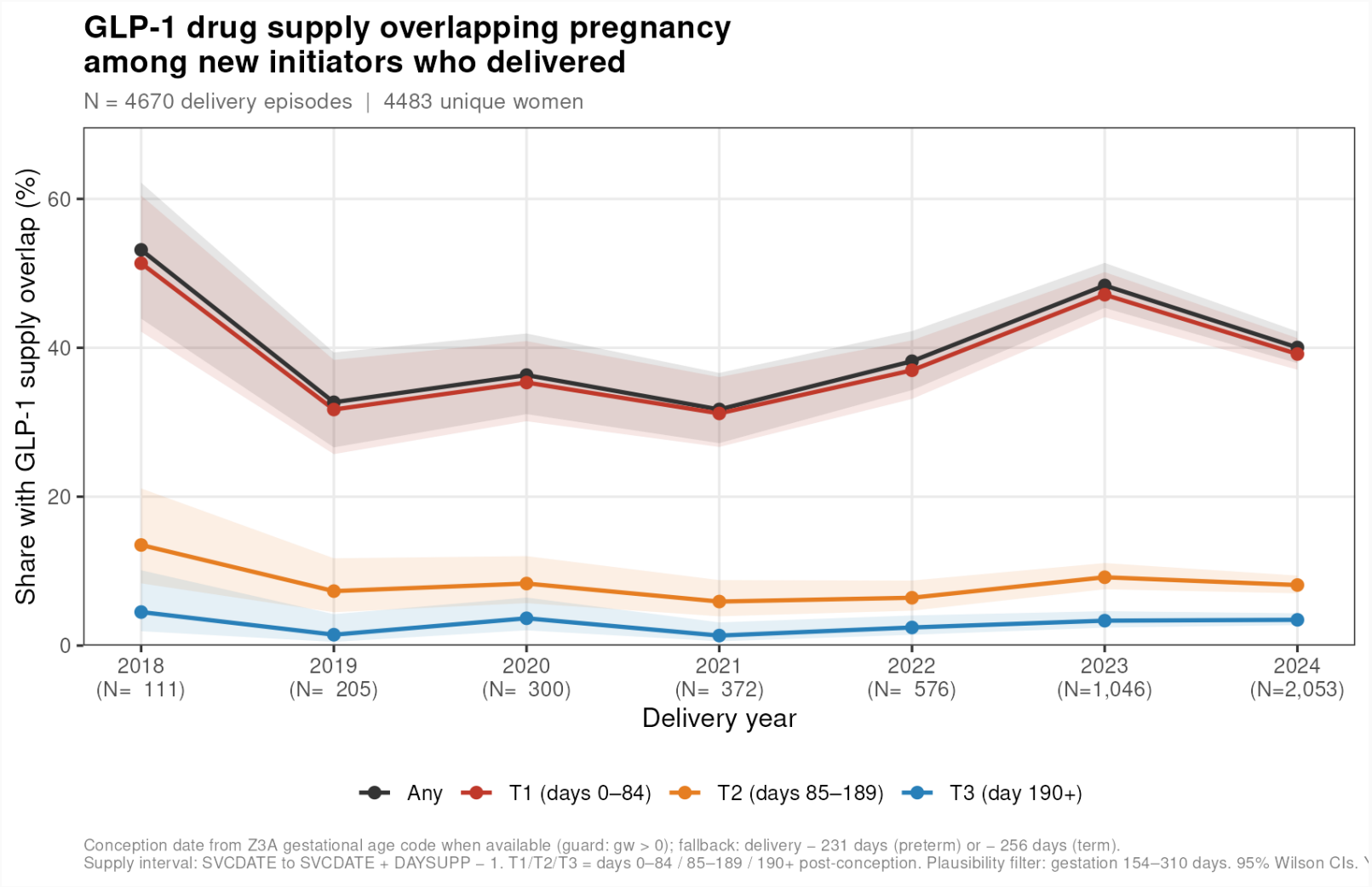
1. All GLP-1 new initiators, women ages 15–49, 2016–2024: 526,910 unique women
2. Require 12-month continuous pre-initiation enrollment: 315,106 unique women
3. Restrict to obesity in the pre-initiation lookback (`E66.*`): 188,679 unique women

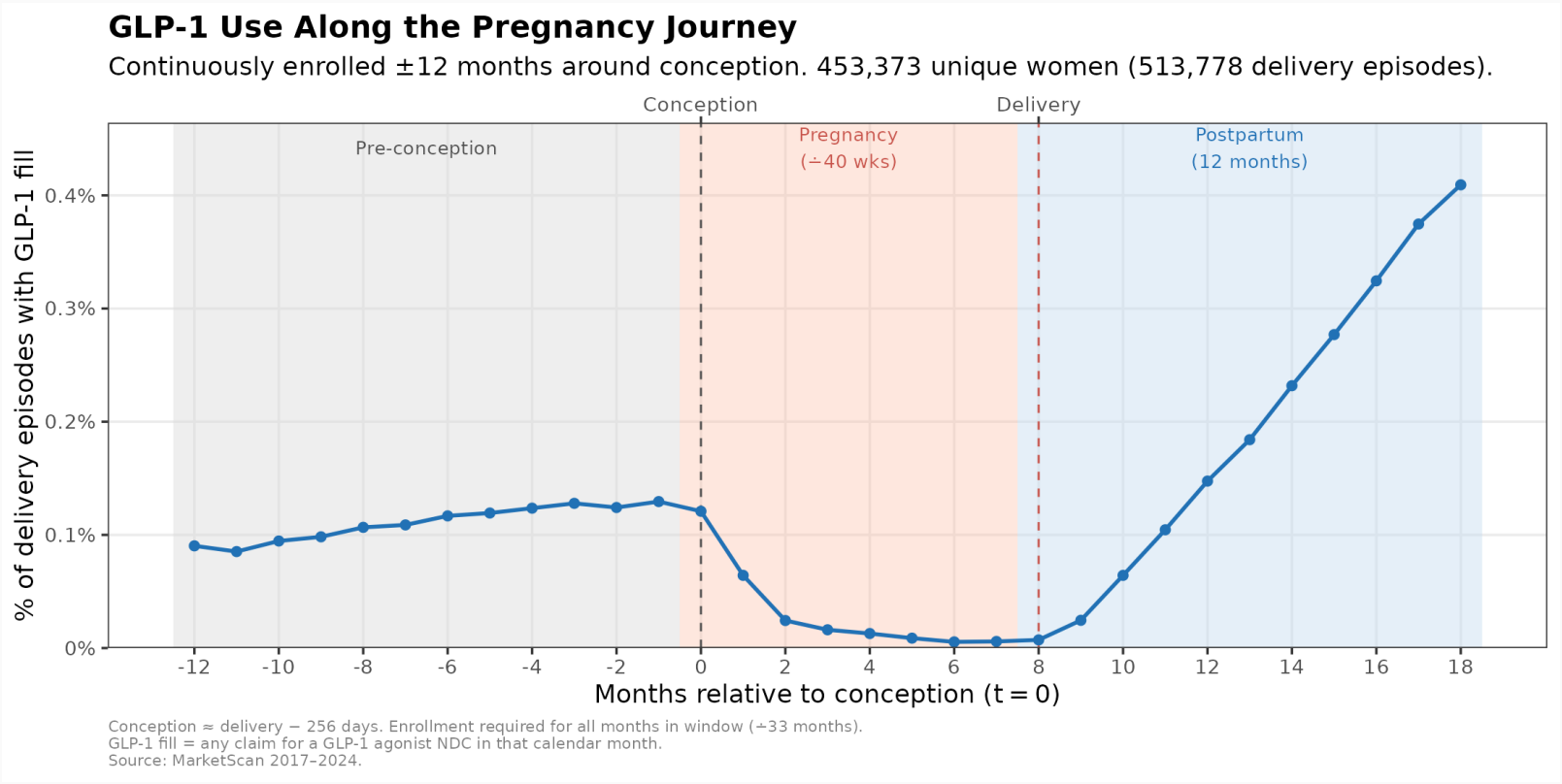
Add flags (dummy variables): PCOS, TTC signals, and monthly pregnancy or fertility outcomes do not further restrict the treated sample.

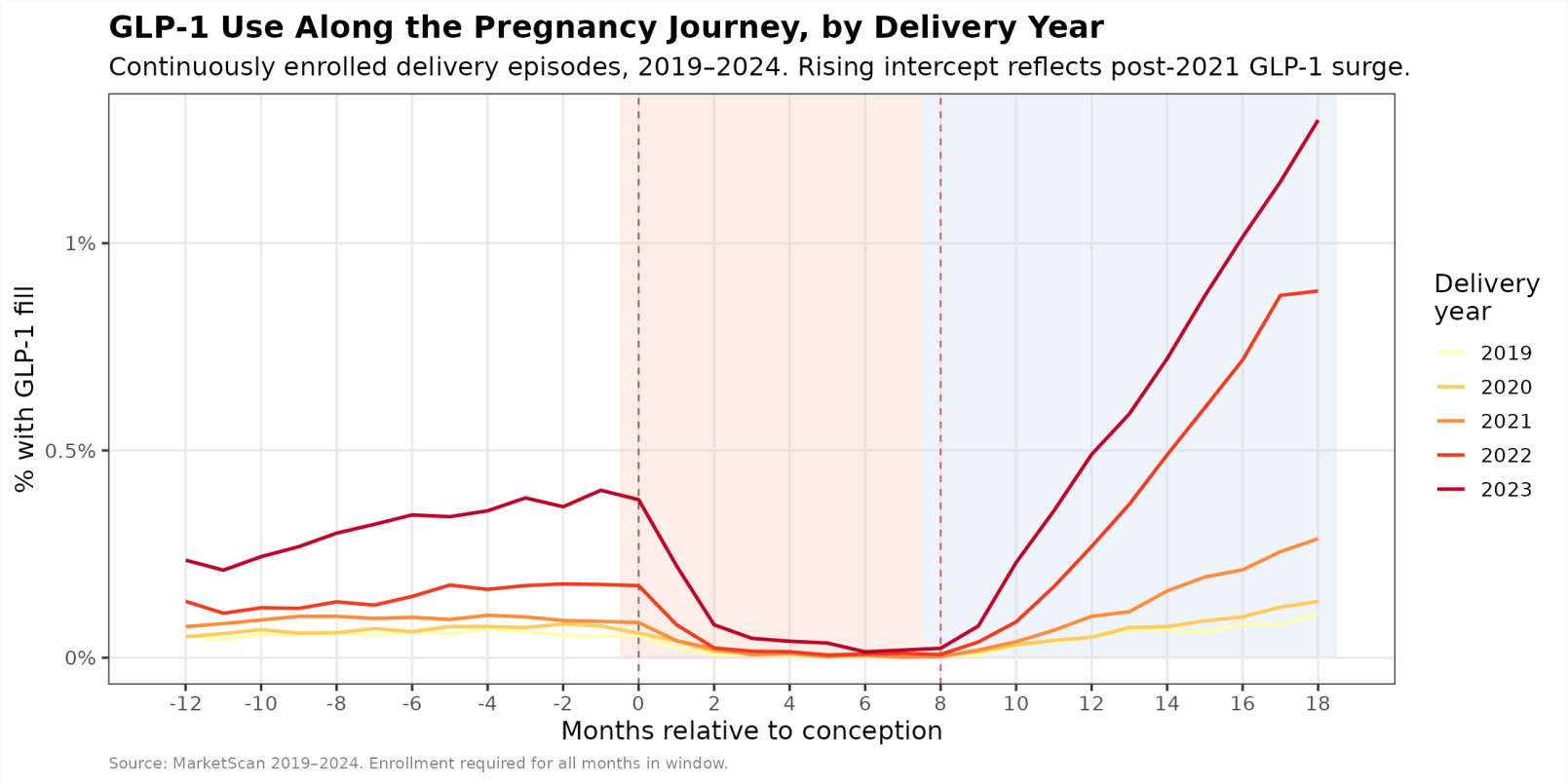
Sample Construction: Treated and Control

Treated		Control	
Definition	Obese GLP-1 new initiators	Definition	Obese never-GLP-1 women
Age	15–49 at initiation	Age	15–49 at first E66.* claim
Enrollment	12-month continuous pre-initiation lookback	Enrollment	Enrolled months only
Women	188,679	Women	3,426,283
Person-months	13.1M	Person-months	54.6M
PCOS	∼10%	PCOS	8.9%
TTC signal	2.24% (lower bound)	TTC signal	1.84% (lower bound)

Both groups defined by obesity (E66.*) in the pre-initiation lookback; GLP-1 initiation is the only difference. T2D status is unconstrained in both groups.


GLP-1 drug supply overlapping pregnancy among new initiators who delivered
N = 4670 delivery episodes | 4483 unique women
Share with GLP-1 supply overlap (%)
0
20
40
60
2018 (N= 111)
2019 (N= 205)
2020 (N= 300)
2021 (N= 372)
2022 (N= 576)
2023 (N=1,046)
2024 (N=2,053)
Delivery year
Any
T1 (days 0–84)
T2 (days 85–189)
T3 (day 190+)
Conception date from Z3A gestational age code when available (guard: gw > 0); fallback: delivery – 231 days (preterm) or – 256 days (term).
Supply interval: SVCDATE to SVCDATE + DAYSUPP – 1. T1/T2/T3 = days 0–84 / 85–189 / 190+ post-conception. Plausibility filter: gestation 154–310 days. 95% Wilson CIs.


GLP-1 Use Along the Pregnancy Journey
Continuously enrolled ±12 months around conception. 453,373 unique women (513,778 delivery episodes).
Conception
Delivery
Pre-conception
Pregnancy
(÷40 wks)
Postpartum
(12 months)
% of delivery episodes with GLP-1 fill
0.4%
0.3%
0.2%
0.1%
0%
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
16
18
Months relative to conception (t = 0)
Conception ≈ delivery − 256 days. Enrollment required for all months in window (÷33 months).
GLP-1 fill = any claim for a GLP-1 agonist NDC in that calendar month.
Source: MarketScan 2017–2024.

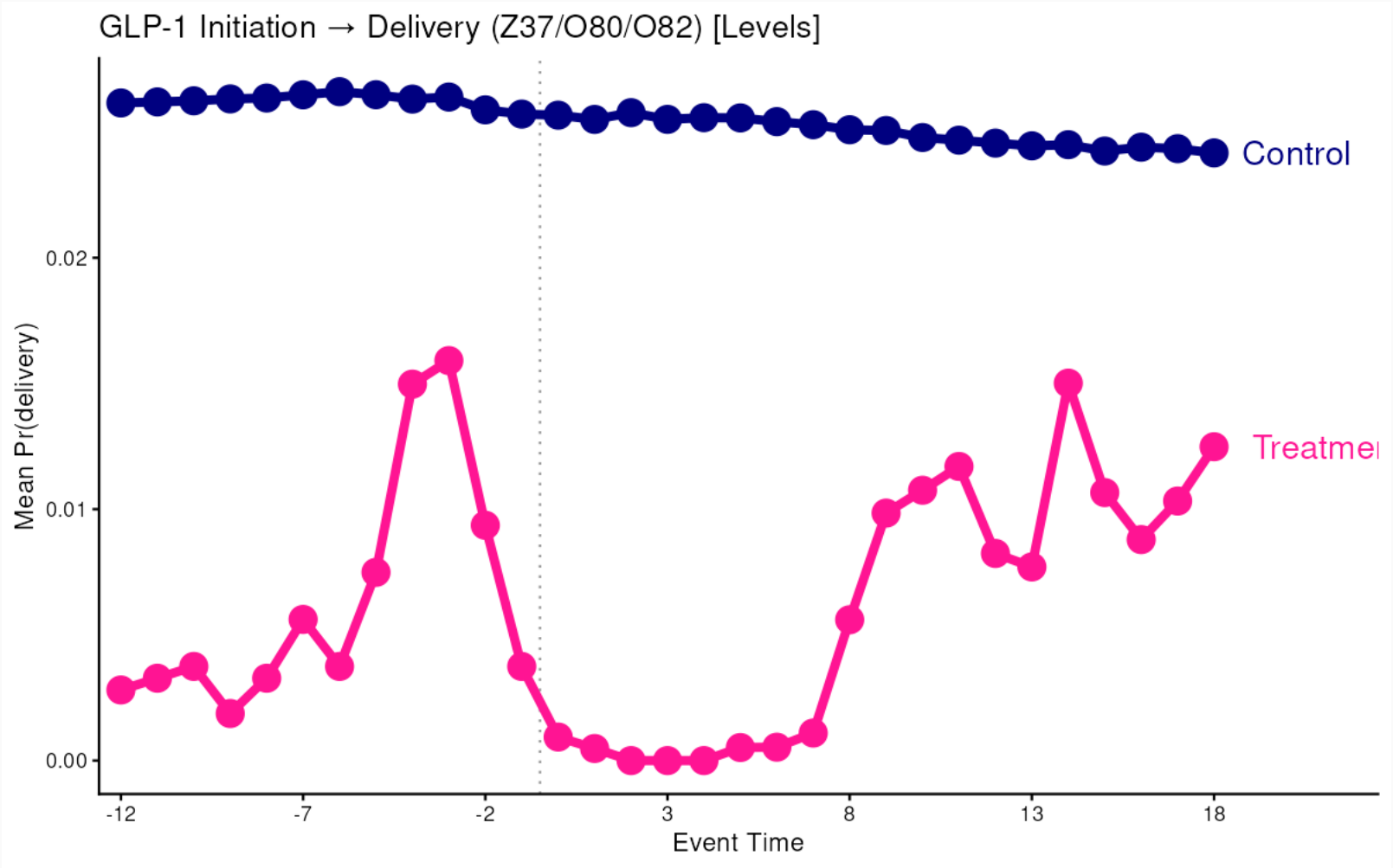

GLP-1 Use Along the Pregnancy Journey, by Delivery Year
Continuously enrolled delivery episodes, 2019–2024. Rising intercept reflects post-2021 GLP-1 surge.
% with GLP-1 fill
1%
0.5%
0%
-12
-10
-8
-6
-4
-2
0
2
4
6
8
10
12
14
16
18
Months relative to conception
Delivery year
2019
2020
2021
2022
2023
Source: MarketScan 2019–2024. Enrollment required for all months in window.

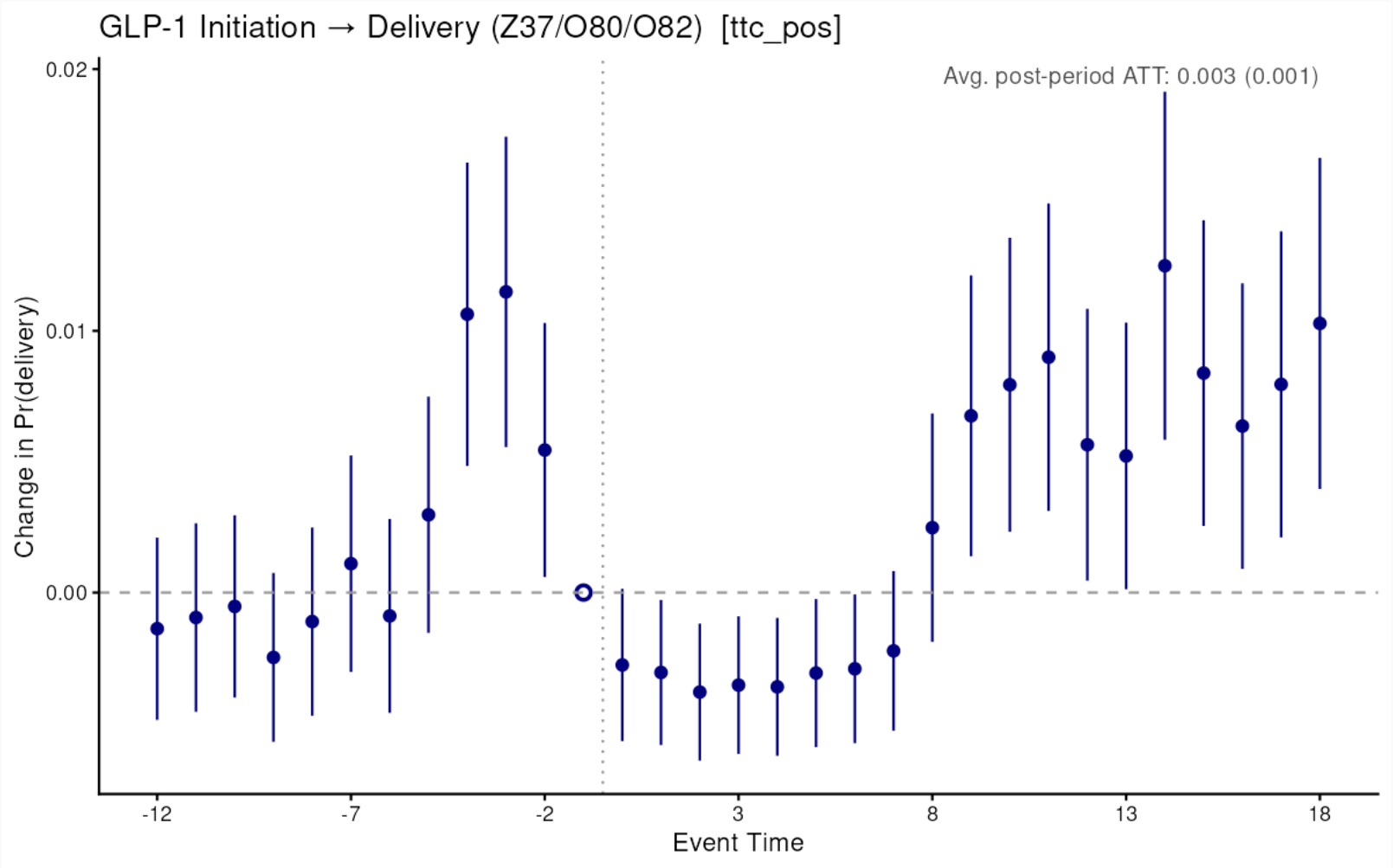
Policy Stakes

- Infertility affects roughly 12–15% of U.S. couples and carries major economic and psychological burdens (National Institute of Child Health and Human Development, 2023).
- Clinical guidance is to discontinue GLP-1 after pregnancy is confirmed, so conception risk matters directly for clinical management (Khan et al., 2025).
- If GLP-1 restores fertility among obese or PCOS women, that has implications for:
  - fertility treatment guidance
  - insurance coverage decisions
  - counseling of reproductive-age patients initiating for weight or metabolic indications

Stacked Difference-in-Differences

- Each unique GLP-1 initiation month defines one sub-experiment (cohort).
- 78 sub-experiments spanning Jan 2017 to Jun 2024.
- Each stack uses an event window from event time -12 to $+18$ months.
- Treated rows are women initiating in that calendar month.
- Control rows are never-treated obese women enrolled across the same window.
- A control woman can appear in multiple sub-experiments.
- ATT weights are assigned at stack construction.


GLP-1 Initiation → Delivery (Z37/O80/O82) [Levels]
Control
Treatme
Mean Pr(delivery)
0.02
0.01
0.00
-12
-7
-2
3
8
13
18
Event Time


GLP-1 Initiation → Delivery (Z37/O80/O82) [ttc_pos]
Avg. post-period ATT: 0.003 (0.001)
Change in Pr(delivery)
0.02
0.01
0.00
-12
-7
-2
3
8
13
18
Event Time

Thank you!