Family Matters: Sibling Spillovers in Program Participation*

Jason Cook† and Katherine Meckel‡

March 27, 2026

[Preliminary draft; Do not cite or circulate]

Abstract

Much remains unknown about the determinants of program participation. This paper provides new evidence on sibling spillovers, showing that benefit variation for one child affects enrollment decisions for others within the household. Using administrative microdata from Utah's WIC program, we find that older children are significantly more likely to participate when a younger sibling receives high-value infant benefits, and that their enrollment declines sharply when the younger child transitions to the lower-value package at 13 months. A difference-in-discontinuities design attributes roughly a 15 percent decline to the reduction in benefit value. Spillovers operate symmetrically: when an older child ages out of WIC at 60 months, younger sibling enrollment falls sharply despite no change in their own benefits. We interpret these patterns through a model of household participation with fixed hassle costs, in which high-value benefits for one child sustain enrollment for the entire household. Households that exit at the 13-month threshold have higher pre-cutoff income, consistent with a lower marginal utility of benefits. These findings imply that standard evaluations of benefit design may understate the effective reach of benefit changes if they do not account for spillovers within households.

JEL Codes: H53, I18, I38

Keywords: WIC, sibling spillovers, benefit take-up

*Contact e-mail: kmeckel@ucsd.edu. We gratefully acknowledge the Utah Department of Health and Human Services for providing administrative data access and for answering our questions. We have no financial relationships or potential conflicts of interest to disclose. We are grateful to Anna Aizer for helpful comments.

†University of Utah, Division of Quantitative Analysis of Markets and Organizations, and CESifo

‡University of California, San Diego, Department of Economics, CESifo and NBER

1 Introduction

A large literature documents barriers to take-up of means-tested programs, emphasizing frictions such as stigma, information gaps, and administrative burden (Currie 2006; Bhargava and Manoli 2015). We document a different force shaping program participation: spillovers within the household.

Using detailed administrative data from Utah's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), we show that a child's enrollment responds to the benefit incentives facing their sibling. Older children are substantially more likely to be enrolled when a younger sibling receives the high-value infant food package, which includes infant formula and is worth approximately $100–$200 per month. When the younger sibling transitions out of this package at 13 months, older sibling enrollment falls sharply. Although the 13-month threshold coincides with a recertification requirement, the decline in enrollment is substantially larger than at later recertification thresholds (e.g., 24 and 36 months), suggesting that the drop in benefit value is a key driver.

To isolate the role of benefit value from recertification-related costs, we implement a difference-in-discontinuities design that compares enrollment changes at the 13-month threshold to those at the 24-month recertification threshold, where no comparable benefit change occurs. This approach attributes roughly 15 percent of the older sibling enrollment decline at 13 months to the reduction in benefit value itself. We provide additional evidence using the age-5 eligibility cutoff: when an older child ages out of WIC, younger sibling enrollment declines sharply despite no change in the younger child's own benefit schedule.

We interpret these patterns through the lens of household participation decisions. Although participants are certified individually, many participation costs——such as travel, documentation, and time spent at appointments——are largely fixed at the household level. When these fixed costs are important, high-value benefits for one child can sustain participation for the entire household, including siblings whose own benefits would not independently justify enrollment. Our evidence, based on households with an older child who is already eligible, is more consistent with this fixed-cost channel than with information spillovers.

These findings have implications for how we evaluate benefit design in programs with individual-level certification. Standard analyses focus on the value of benefits accruing to the individual recipient. Our results suggest that this understates the effective reach of high-value benefits—and symmetrically, overstates the cost of reducing them. In the context of WIC, the infant formula package sustains enrollment not only for the infant receiving it but also for siblings. Reductions in benefit generosity, or disruptions to formula supply such as the 2022 Abbott recall, may therefore generate additional enrollment losses through

within-household spillovers that are not typically accounted for in program evaluation. More broadly, our results suggest that participation in individually targeted programs may be better understood as a household-level decision.

2 Policy Background

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federal assistance program administered by the United States Department of Agriculture (USDA) that aims to improve the nutritional well-being of low-income women and young children. Eligible individuals include pregnant and postpartum women, as well as infants and children up to age five. To qualify, individuals must reside in households with income below 185 percent of the federal poverty line (currently $51,338 for a family of four) or participate in Medicaid or SNAP.[1] Participants must also be deemed "at nutritional risk," though this requirement rarely binds (IOM 2000).

WIC provides a bundle of benefits that includes specific food packages, nutrition education, health screenings, and referrals to other social services. In 2023, the program served approximately 6.6 million participants with total expenditures of $6.7 billion.[2] A large literature documents that WIC participation improves infant and maternal health, increases breastfeeding, and facilitates access to other safety net programs (Bitler and Currie 2005; Currie and Rajani 2015; Hoynes, Page, and Stevens 2011; Rossin-Slater 2013).

Food benefits take the form of monthly quantities of specific nutritious foods. For example, a pregnant enrollee receives a monthly package that includes 4 gallons of milk, 36 ounces of breakfast cereal, 48 ounces of whole wheat bread, one dozen eggs, 10 ounces of canned fish, 64 ounces of juice, and either 64 ounces of canned or dried beans or 18 ounces of peanut butter. Tables A.1 and A.2 describe the full food packages for women, children, and infants.

In Figure 1a, we plot the monthly value of WIC food benefits as a function of child age (in months), from −9 (in-utero) to 60 (age-eligibility cutoff), for a benefit case consisting of a mother and one child. When packages vary by breastfeeding status, values are averaged using national feeding shares. The maternal package is shown by the dashed green line, the infant/child package by the solid red line, and total package value by the blue line. The monthly value during pregnancy is approximately $45. At birth, total package value increases sharply due to the inclusion of infant formula in the infant package. Averaged across feeding types, the combined mother–infant package ranges from approximately $185 to $230 per month during the first year of life, compared to about $41 per month for children ages one to four, generating a sharp drop in benefits at 13 months.[3]

[1] Source for income cut-off: https://liheapch.acf.hhs.gov/profiles/povertytables/FY2023/popstate.htm.

[2] Program participation and funding statistics are available at https://www.fns.usda.gov/pd/wic-program.

[3] Values are based on USDA estimates of average monthly *pre-rebate* WIC food package costs from the

WIC serves a substantial share of the target population: in 2021, 39% of infants, 23% of children ages one to four, and 20% of pregnant and postpartum women participated in the program. However, take-up among eligible individuals remains incomplete, with only 51.2% of eligible participants enrolled (Gray et al. 2021). Prior research attributes this gap to a range of participation costs, including travel to clinics, documentation requirements, and frictions associated with redeeming benefits at authorized retailers (Bitler, Currie, and Scholz 2003; Swann 2007; Rossin-Slater 2013; Barnes et al. 2023; Meckel 2020).

2.1 WIC in Utah and Enrollment Procedures

Utah WIC is a federally-funded, state-administered, and locally-operated program. The Utah Department of Health and Human Services allocates federal WIC funds to local health departments, which operate 42 clinic locations statewide. These clinics are organized across 13 local health departments, covering both the urban Wasatch Front (Salt Lake, Utah, Davis, and Weber counties) and more rural areas. In FY 2023, Utah WIC served roughly 47,000 participants per month.

Initial WIC certification requires an in-person clinic visit during which applicants provide documentation of income, residency, and identity, and a WIC health professional conducts a participant-specific health assessment.[4] After certification, participants return to the clinic every three months to receive nutrition education and have benefits loaded onto the household's electronic WIC (eWIC) card, with health assessments conducted periodically as required. Certification periods vary by participant type: infants are typically certified from birth through 12 months of age, while children ages one to four are certified for up to 12 months, after which a recertification visit is required to continue receiving benefits.

The time and travel costs associated with WIC participation can increase when enrolling an additional child. When certification timelines are aligned across siblings, enrolling an additional child lengthens the clinic visit, as each participant requires separate assessments and benefit issuance. When timelines are misaligned, families must make separate visits, increasing travel costs. In our main sample of two-sibling benefit cases, siblings share certification appointments approximately 70% of the time (Figure A.1).

2018 WIC Participant and Program Characteristics report, which convert prescribed food quantities into dollar values using retail prices. Infant and postpartum maternal packages are averaged using national feeding shares (approximately 70% fully formula-fed, 17% partially breastfed, and 14% fully breastfed), and all values are inflated to 2023 dollars using the CPI-U.

[4]During the COVID-19 pandemic, USDA granted a physical presence waiver under the Families First Coronavirus Response Act (effective March 2020), permitting certification by telephone or video. Remote certification remained available through the end of our study period under extensions authorized by the American Rescue Plan Act.

3 Data

Our primary data come from statewide administrative records from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Utah. The raw files consist of status records that capture a participant's information at discrete points during a certification period. These records are generated whenever an administrative encounter occurs——such as application, recertification, required clinic visits, benefit issuance——or when participation ends before the scheduled certification end date. We are also able to observe termination reasons individually for each person on the case.

The data include all such status records for all active WIC participants from January 2018 through December 2023. Each record contains a unique individual identifier, a family (benefit-unit) identifier, basic demographics (sex, age, and a Hispanic indicator), and dates describing the associated certification period, including the start date, scheduled end date, and (when applicable) termination date. Records also include the date on which the status information was entered or updated. We use these records to construct monthly participation histories, yielding a person–month panel in which participation is measured as an indicator for whether the individual is enrolled at any point during the calendar month, for all months from January 2018 through December 2023.

A key administrative field reports age in months as of a fixed reference date (September 15, 2023). Using this information, we impute each child's birth month and construct age in months for every calendar month in which the child appears in the data. Because the administrative files do not explicitly categorize participants as infants, children, or mothers, we classify individuals using age, defining a participant as a child if they are ever observed at age 60 months or younger.

Sibling sample construction. Our analysis focuses on families with exactly two child WIC participants. Because household composition is not directly observed, we identify such families as benefit units in which exactly two children ever appear as active WIC participants during the study period (2018–2023). We therefore do not observe children in these families who enrolled only outside the study window or who never enrolled in WIC. We retain the two observed children in each family and exclude multiple births.

Sample sizes and missingness. Across 2018–2023, the raw annual extracts contain 727,585 status records, corresponding to 60,015 distinct families and 155,802 unique participants. Observations with missing age in months are extremely rare (178 records, or 0.02 percent of the raw extract) and are dropped because age is required to impute birth month and construct monthly age. We also drop records that lack either a certification start date or a certification end or termination date, which prevents us from reliably determining the tim-

ing of enrollment. After these exclusions, the analytic sample consists of 49,961 families and 106,070 participants. Restricting to families with exactly two child participants yields a final sibling sample of 10,897 families (21,794 children), corresponding to 432,880 child–month observations with active WIC enrollment.

Demographic covariates. We observe both sibling- and family-level covariates. At the sibling level, we observe age, Hispanic ethnicity, and sex. At the family level, we link administrative records on income and county of residence. Because income may be recorded multiple times for a household, we define income using the earliest observation in our data. We similarly assign each family its first-observed county of residence and construct an indicator for residence in a large (urban) county.[5]

Summary Statistics. Table 1 compares our Utah sibling sample to a national WIC sample constructed from the 2020 WIC Participant and Program Characteristics file, restricted to households that likely include two children and one parent.[6] In the national data, younger siblings correspond to WIC-certified infants (under 12 months) and older siblings to WIC-certified children (ages 1–4); geographic variables are not available in the public-use file.

The two samples are similar along observed demographics. In both, 51–52% of younger and older siblings are male. Hispanic ethnicity is reported for 38 percent of younger siblings and 37 percent of older siblings in our sample, compared to 34 percent for both groups in the national data. The average age gap is 28.8 months in our sample and 30.4 months in the national data. Mean annual income is $25,122 in our sample compared to $23,448 nationally. In our sample, 79 percent of households reside in urban counties.

4 WIC Enrollment Patterns by Age

We begin by examining how WIC participation varies with child age. Figure 1b plots the number of active child participants by age in months, from the prenatal period (months -9 to -1, measured through maternal enrollment) through age five.[7] Participation increases approximately linearly during pregnancy, potentially reflecting both learning about the pregnancy and exposure to the program (e.g., through referrals from prenatal care providers).[8]

Participation continues to rise after birth and then levels off between months 6 and 12 at approximately 42,400 participants per month. At month 13, participation drops sharply–by 46 percent–coinciding with the transition from the infant to the child package, which sub-

[5] We classify a family as residing in an urban county if the first-observed county of residence is Salt Lake, Utah, Davis, Weber, or Cache County; all other counties are classified as rural.

[6] See the notes to Table 1 for full sample details.

[7] Because we do not observe the identity of a child's mother directly, we proxy for maternal enrollment by requiring that an adult woman on the case transitions to postpartum status in the child's birth month.

[8] The upward trend may also reflect anticipation of the high-value infant formula package.

stantially reduces benefit value.[9] This age also corresponds to a recertification point, which may contribute to the decline through either failing eligibility or administrative frictions. Participation then remains relatively stable over subsequent 12-month intervals, with smaller declines at later recertification thresholds (24 percent, 3 percent, and 10 percent at 25, 38, and 49 months, respectively). The much larger drop at 13 months suggests that the drop in benefit value is likely an important driver of the decline.[10] By age 60 months, participation has fallen to 17 percent of its peak level.

We next examine how these patterns differ by family structure. Figure 2a restricts the sample to cases with at most one child observed during our sample period (our proxy for only-child households). The pattern is similar to that in the full sample: participation peaks at about 23,400 participants at age 6 months, declines by 50 percent at 13 months, and then decreases gradually through age five.

We compare this with patterns for older and younger siblings in two-child households (Figures 2b and 2c). For younger children, the pattern closely resembles the full sample: participation rises through infancy, peaks at roughly 8,300 participants per month, and then declines sharply at 13 months (by about 51 percent), followed by additional declines at subsequent recertification thresholds.

In contrast, participation among older siblings follows a different pattern. Enrollment declines modestly at 13 months (by about 24 percent from roughly 4,600 participants), but then rises, such that average participation between ages 24 and 36 months (about 4,800 participants per month) exceeds enrollment during the infant period. This increase runs counter to the lower, constant benefit level from 13 months onward and suggests within-household spillovers. The high-value infant package received by the younger child may offset participation costs, sustaining enrollment of the older sibling despite the lower value of the child package.

5 Formalizing Incentives

Motivated by these patterns, we develop a simple model of welfare participation decisions to formalize how variation in benefits for one child can affect sibling enrollment.

We suppose a household faces two types of participation costs. A fixed cost C is incurred whenever any child is enrolled in the program. Enrolling each child additionally requires a per-child cost c. A household chooses which children to enroll, and participates if the utility gains from enrolled children exceed these costs. The incremental benefit of enrolling child i

[9] This is also the month that the mother loses her postpartum benefits.

[10] In the next section, we consider the possibility that additional changes at 13 months, such as a reduction in household expenditures, drives some of this decline.

is:

$$V(y + b_i) - V(y), \tag{1}$$

where $b_i \in \{b_h, b_l\}$ is the benefit level for child i, with $b_l < b_h$ ("low" vs. "high" benefits), y is income from other sources, and $V(\cdot)$ is increasing and concave.

First consider a household with a single eligible child. The child is enrolled when:

$$V(y + b_i) - V(y) \geq c + C. \tag{2}$$

One-child households for whom this condition holds at the higher benefit amount but not the lower benefit amount b_h but not b_l–satisfy:

$$V(y + b_h) - V(y) \geq c + C \tag{3}$$

and

$$V(y + b_l) - V(y) < c_l + C. \tag{4}$$

Now consider a household with two eligible children, one receiving benefit b_h and one receiving b_l. Suppose the high-benefit child's package satisfies $V(y + b_h) - V(y) \geq C + c_h$, so the household participates in the program. The participation decision for the low-benefit child is then whether the associated utility gain clears only the per-child cost:

$$V(y + b_h + b_l) - V(y + b_h) \geq c_l. \tag{5}$$

Even if the low-benefit child would not have justified program entry on her own,

$$V(y + b_l) - V(y) < c_l + C, \tag{6}$$

she may still be enrolled once the fixed cost is already covered by her sibling. This is the sibling spillover.

5.1 Application to the Age-1 Benefit Cliff in WIC

We next discuss the model's key parameters in the context of the 13-month benefit cliff in WIC.

First, consider participation costs. As discussed in Section 2, many components of WIC participation operate at the household level. Income verification, travel, and much of the time spent at clinic visits are shared across children, especially when recertification timing is aligned, while child-specific costs include parts of the documentation process and individual

assessments. This suggests that C is likely large relative to c. When fixed costs are important, participation decisions are effectively joint across siblings (i.e., operate at the household level), so enrollment of a low-benefit child should track that of a high-benefit sibling.

Second, consider the value of benefit packages b_h and b_l. Household valuation of these packages, which are provided as food products, may differ from their retail value. Infant formula constitutes a large share of infant consumption and cannot easily be replaced with other foods, whereas foods in the child package are more easily substitutable with household meals. In addition, older children may be selective ("picky eaters"), reducing the value of some provided foods. Consistent with this, prior work documents substantially higher redemption rates for infant packages than for child packages (Bitler et al. 2024). Together, these factors suggest that the difference between b_h and b_l likely exceeds the difference in their dollar values.

Third, consider non-program income y. The age-1 transition may coincide with changes in effective resources. When formula is removed from the package, households will likely substitute toward lower-cost foods such as milk or shared meals, effectively increasing available resources. Under concavity of $V(\cdot)$, this reduces the marginal utility of income and further lowers the value of benefits.[11] Importantly, no other major eligibility or benefit-generosity changes occur exactly at 13 months.

Finally, heterogeneity in these parameters across households yields additional predictions. Because the value of benefits is decreasing in income, higher-income households should be less likely to remain enrolled when benefits decline. As a result, average income among participating households may increase following the 13-month transition. Similarly, variation in participation costs across households may generate heterogeneity in participation decisions. For example, households facing higher participation costs——such as longer travel distances to clinics——should be more likely to exit when benefits decline.

6 WIC Enrollment by Sibling Age

With these predictions in mind, we examine sibling enrollment spillovers. We begin by analyzing older sibling participation as a function of the *younger* sibling's age. Figure 3a plots the number of actively enrolled older siblings by the younger sibling's age (in months), including the prenatal period (months -9 to -1, measured through maternal enrollment).

Two discrete changes stand out. First, at the birth of the younger sibling, older sibling enrollment increases by roughly 10 percent, from 5,225 to 5,767. Second, when the younger

[11] To isolate the effects of the benefit cliff on sibling participation absent a coincident income shock, we also examine spillovers that occur when households experience the end of eligibility at 60 months. In this case, two children receiving low-value benefit packages may justify the fixed participation costs, but one child alone may not.

sibling reaches 13 months–corresponding to the transition from the infant to the child benefit package–older sibling enrollment declines by 16 percent, from 6,396 to 5,370.

Outside of these discontinuities, older sibling enrollment rises gradually before and after the younger sibling's birth, which may reflect variation in the timing of initial maternal or infant enrollment. Figure 3b examines this more directly by re-centering on the younger sibling's first WIC enrollment (including prenatal enrollment). The pattern is striking: older sibling enrollment doubles at the time of younger sibling entry, increasing from 5,182 to 10,359. This is consistent with a strong entry spillover, whereby the younger child's enrollment brings the older sibling onto the program.

We next turn to the 13-month threshold, the central focus of the paper. In panel (a), the gradual decline around month 12 suggests that some exits occur just before or after the threshold, potentially reflecting variation in recertification timing. If households make participation decisions at the household level, older siblings whose certification periods end near this threshold may exit in advance of, or shortly after, the younger child's benefit reduction. As a result, the discrete drop at month 13 may understate the true spillover effect.

Panel (c) addresses this by restricting the sample to families in which both siblings share the same recertification cycle. In this sample, the pre-13-month trend is unambiguously increasing, with no evidence of anticipatory exit: older sibling enrollment rises from 990 at birth to 2,126 at month 12. The discrete drop at month 13 is substantially larger, with enrollment falling by 53 percent (from 2,126 to 1,009). A second, smaller decline of 37 percent occurs at month 25, corresponding to the younger child's 24-month recertification threshold. Because benefit levels do not change at 24 months, we interpret this drop as reflecting recertification costs rather than changes in benefit value.[12] Together, these patterns suggest that both benefit reductions and recertification costs generate spillovers in participation.[13]

While these results are consistent with sibling spillovers, the 13-month threshold may also coincide with changes in household consumption needs. When formula is removed from the package, households that were formula-feeding may experience a reduction in out-of-pocket food expenditures, as milk is substantially cheaper and infants increasingly consume shared household foods. If this reduces the marginal value of WIC benefits, it could contribute to the observed decline in enrollment independent of the spillover channel.

To address this concern, we examine a second threshold at which a sibling's benefits

[12] As shown in Figure A.2a, termination due to income ineligibility is very rare, suggesting this is not a prominent reason for exit.

[13] Figure A.3 explores heterogeneity by whether the older child was already enrolled prior to the birth of the youngest child (at least 6 months prior). This reveals that the 13-month cut-off induces a comparably large exit among both enrollees who have been on the program at baseline as well as new recipients.

change discretely but no analogous change in household consumption occurs. When the older child reaches 60 months, they age out of WIC eligibility, removing their benefit package (approximately $33 per month) from the household. Unlike the 13-month transition, this threshold does not coincide with a change in feeding costs for the younger sibling. For households with two children participating, this decline in benefits will make it more likely that the total benefit package outweighs the costs of staying enrolled.

Figure 4 plots younger sibling enrollment by the *older* sibling's age in months, restricting to families with aligned recertification timing. Prior to the threshold, younger sibling enrollment is stable at approximately 360 participants per month. Enrollment declines modestly as the older child approaches age 60, reaching 340 at month 59. At month 60, enrollment falls to 281, and then declines sharply to 110 at month 61—a 68 percent drop relative to month 59. Enrollment remains roughly constant thereafter. The sharp decline in younger sibling enrollment when the older child loses eligibility provides further evidence that benefit size affects sibling participation decision.

6.1 Changes in Demographic Composition

The preceding results suggest that participation decisions are largely made at the household level, with older sibling enrollment tracking that of a younger, higher-benefit sibling. We next examine how the composition of participating households changes around the 13-month threshold.

Figure 5 plots average household characteristics by the younger sibling's age, restricting to sibling pairs with aligned certification timing. We show the number of active older siblings alongside baseline measures of mean household income, urban share, Hispanic share, and sex composition.[14]

At the 13-month threshold, we observe a shift in the composition of participating households. Average household income among active older siblings declines by nearly $2,000, and the Hispanic share increases by nearly 5 percentage points. There are also small upward shifts in urban share and male share (around 1 percentage point). These patterns suggest that higher-income households are more likely to exit at this threshold, consistent with the idea that the value of participation falls when benefits decline. However, only the shifts in household income and Hispanic shares are marginally statistically significant at conventional levels.

Extending the analysis beyond 13 months provides a useful comparison to other recertification thresholds. Figure A.4 extends the analysis through 36 months of the younger child's

[14]We require that household income is measured prior to the 13-month benefit reduction to avoid endogeneity. This further restricts the sample to cases where the older sibling was enrolled during the younger sibling's in-utero period.

age. While enrollment declines at the 24-month recertification threshold, we do not observe comparable shifts in observable characteristics, although estimates are noisy. This contrast suggests that the compositional changes at 13 months are more closely tied to the decline in benefit value than to recertification costs.

7 Regression Analysis

Thus far, we have relied on comparing means. In this section, we estimate a differences-in-regression-discontinuity model to quantify the share of older siblings that drop out because of the benefit reduction for their younger sibling when they reach 13 months. Because, the 13-month benefit reduction coincides with a recertification appointment that may generate its own disenrollment effect, we difference the 12-month drop with the drop at 24 months. Our model intuitively compares enrollment changes at 12 months to those at the 24-month recertification threshold—where no comparable benefit change occurs—under the assumption that the latter captures routine recertification-related churn.

Our analysis uses person-month data for siblings in two-child households. For each recertification threshold $c \in \{12, 24\}$, we construct a local RD sample using observations within a symmetric six-month bandwidth:

$$r_{it} = \text{AgeMonths}_{it} - c, \qquad r_{it} \in [-6, 6].$$

We restrict the RD samples (for both 12- and 24-month thresholds) to children who are observed as active in at least one month within the corresponding 12-month window. This restriction allows the estimated discontinuities to be interpreted directly as percentage changes in participation.

7.1 Younger-child difference-in-discontinuities design

Let Y_{it} denote an indicator for whether child i is actively enrolled in WIC in month t. For each cutoff month, c, define

$$\text{Post}_{it} = \mathbb{1}\{r_{it} \geq 0\}.$$

Within a six-month bandwidth around each cutoff, we estimate local linear RD specifications of the form:

$$Y_{it} = \alpha + \tau_c \cdot \text{Post}_{it} + \beta_{1c} r_{it} + \beta_{2c}(r_{it} \times \text{Post}_{it}) + \varepsilon_{it}, \tag{7}$$

with standard errors clustered at the household level.

To estimate the effect of the benefit reduction, we stack the 12- and 24-month RD samples

and estimate:

$$Y_{it} = \alpha + \gamma D_{24} + \tau \text{Post}_{it} + \delta(D_{24} \times \text{Post}_{it}) + f(r_{it}) + D_{24} \times f(r_{it}) + \varepsilon_{it}, \tag{8}$$

where D_{24} indicates the 24-month cutoff and $f(r)$ is a local linear function with side-specific slopes.

In this specification: τ captures the participation drop at 12 months, $\tau + \delta$ captures the participation drop at 24 months, and $-\delta$ measures the excess decline at 12 months relative to routine recertification-related churn.

Interpreting $-\delta$ as the causal effect of the benefit reduction requires the assumption that, absent the benefit cliff, recertification-related participation responses at 12 months would resemble those observed at 24 months. While we cannot directly verify this assumption, it is worth noting that both thresholds involve the same recertification requirements. Moreover, later annual recertification thresholds (e.g., 36 and 48 months) exhibit similar percent-decline discontinuities to that observed at 24 months (Figure 1b).

7.2 Older-sibling spillover design

We next examine spillover responses among older siblings in the same households. We construct analogous RD samples centered at the younger sibling's age of 12 and 24 months and estimate the same stacked difference-in-discontinuities specification using older-sibling enrollment as the outcome.

Because older siblings face no direct benefit change at either threshold, the 24-month discontinuity captures recertification-related costs, while the excess 12-month discontinuity identifies responses induced by the younger child's benefit reduction. Any discontinuity in older-sibling enrollment at that threshold must therefore reflect within-household behavioral responses to the younger child's benefit change.

7.3 Difference-in-discontinuities Estimates

Table 2 reports our main difference-in-discontinuities estimates around the 13- and 25-month thresholds. Panel A reports the scaled discontinuity at 13 months (the first month on the smaller post-infant package and following the 12-month recertification threshold), Panel B reports the scaled discontinuity at 25 months (the first month following the 24-month recertification threshold in the administrative data), and Panel C reports the difference between the two scaled discontinuities (13 minus 25).[15]

Columns (2) and (4) add a rich set of controls–sex, Hispanic ethnicity, calendar month

[15] As described in Section 4, each scaled discontinuity is the RD jump divided by mean enrollment at $r = -1$ in the corresponding cutoff sample. Standard errors are clustered at the benefit-unit (household) level.

and year fixed effects, county fixed effects, and household income with a missing-income indicator–and the resulting estimates are very similar to the baseline specifications. This helps adjust for compositional differences across the two samples, given that the "25 month" sample only includes survivors of the "13 month" drop.

For younger children, the scaled enrollment drop at 13 months is large: 0.54, indicating a roughly 50% decline in enrollment at the infant-to-child transition. Enrollment also declines sharply at 25 months, with an estimated drop of about 0.41–0.42 (Panel B). The difference-in-discontinuities estimate in Panel C implies that enrollment declines by an additional 13 percentage points at the infant-package transition relative to the recertification-only threshold. Estimates are stable whether or not controls are included (comparing columns (1) and (2)).

Older siblings exhibit a similar response. At 13 months, older-sibling enrollment falls by about 56 percent (Panel A), whereas at 25 months it falls by about 40-41 percent (Panel B). The implied excess decline at 13 months is approximately 15 percent (Panel C).

Because older siblings experience no direct change in their own benefit schedule when the younger child transitions from the infant to child package, these estimates provide evidence of large within-household spillovers in WIC participation.

What does this mean? Approximately 15% of eligible older children participate in WIC due to the fact that their sibling is at the high (compared to the low) benefit level.

8 Conclusion

This paper documents sibling spillovers in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), which provides nutritional support to a large share of low-income pregnant women, infants, and young children in the United States. Using detailed administrative data from Utah, we show that a child's enrollment responds to the benefit incentives facing their sibling.

At the 13-month transition–when a younger child moves from the high-value infant package to the lower-value child package—enrollment of the older sibling, whose own benefits are unchanged, falls by 53 percent. A difference-in-discontinuities design that nets out routine recertification-related attrition attributes roughly 9 percentage points of this decline to the reduction in benefit value. Spillovers operate in both directions: when an older child ages out of WIC at 60 months, younger sibling enrollment declines sharply despite no change in the younger child's benefit schedule. A model of household participation decisions, incorporating fixed costs of program participation, rationalizes these patterns.

These findings have implications for how we evaluate benefit design in programs with individual-level certification. Standard analyses focus on the value of benefits accruing to

the individual participant. Our results suggest that this understates the effective reach of high-value benefits: the infant formula package sustains enrollment not only for the infant receiving it, but also for siblings whose own benefits would not independently justify participation. Conversely, reductions in benefit generosity–whether through policy design or supply disruptions such as the 2022 infant formula shortage–may generate additional enrollment losses through spillovers across siblings that are not typically accounted for in program evaluation.

References

Barnes, Carolyn, Molly De Marco, Christina Chauvenet, and Alice S. Ammerman. 2023. "WIC Participants in the Retail Environment: Barriers to Access and Shopping Experiences." *Journal of the Academy of Nutrition and Dietetics* 123 (4): 678–690. https://doi.org/10.1016/j.jand.2023.01.004.

Bhargava, Saurabh, and Dayanand Manoli. 2015. "Psychological Frictions and the Incomplete Take-Up of Social Benefits: Evidence from an IRS Field Experiment." *American Economic Review* 105 (11): 3489–3529.

Bitler, Marianne, Jason Cook, Seojung Oh, and Paige Rowberry. 2024. "New Evidence on the Cycle in the Women, Infants, and Children Program: What Happens When Benefits Expire." *National tax journal* 77 (1): 175–197.

Bitler, Marianne P, and Janet Currie. 2005. "Does WIC work? The effects of WIC on pregnancy and birth outcomes." *Journal of Policy Analysis and Management: The Journal of the Association for Public Policy Analysis and Management* 24 (1): 73–91.

Bitler, Marianne P, Janet Currie, and John Karl Scholz. 2003. "WIC eligibility and participation." *Journal of Human resources,* 1139–1179.

Currie, Janet. 2006. "The take-up of social benefits." In *Public Policy and the Distribution of Income,* 80–148. Russell Sage Foundation.

Currie, Janet, and Ishita Rajani. 2015. "Within-mother estimates of the effects of WIC on birth outcomes in New York city." *Economic inquiry* 53 (4): 1691–1701.

Gray, Kelsey Farson, Kevin Meyers Mathieu, Paul Johnson, and Linda Giannarelli. 2021. "National-and state-level estimates of WIC eligibility and WIC program reach in 2018 with updated estimates for 2016 and 2017." *US Department of Agriculture, Food and Nutrition Service.*

Hoynes, Hilary, Marianne Page, and Ann Huff Stevens. 2011. "Can targeted transfers improve birth outcomes?: Evidence from the introduction of the WIC program." *Journal of Public Economics* 95 (7-8): 813–827.

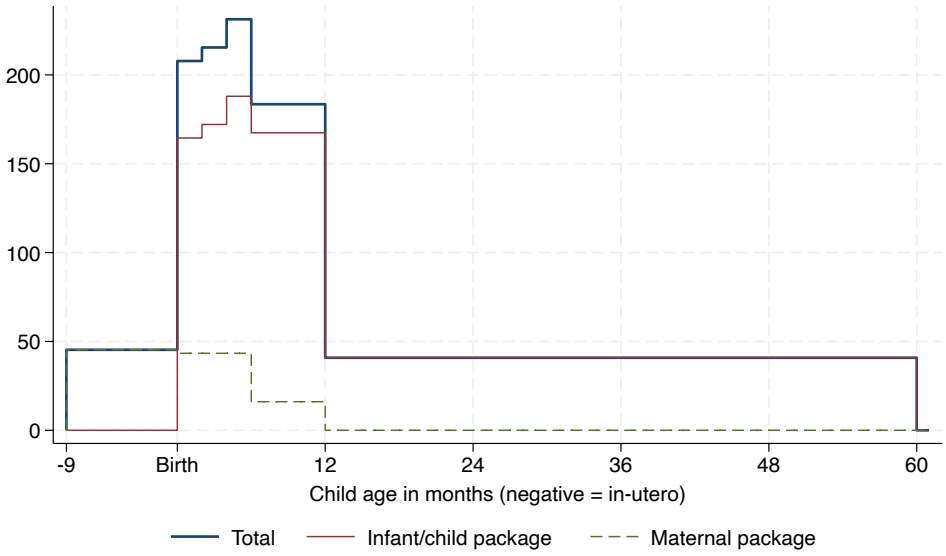
Meckel, Katherine. 2020. "Is the cure worse than the disease? Unintended effects of payment reform in a quantity-based transfer program." *American Economic Review* 110 (6): 1821–1865.

Rossin-Slater, Maya. 2013. "WIC in your neighborhood: New evidence on the impacts of geographic access to clinics." *Journal of Public Economics* 102:51–69.

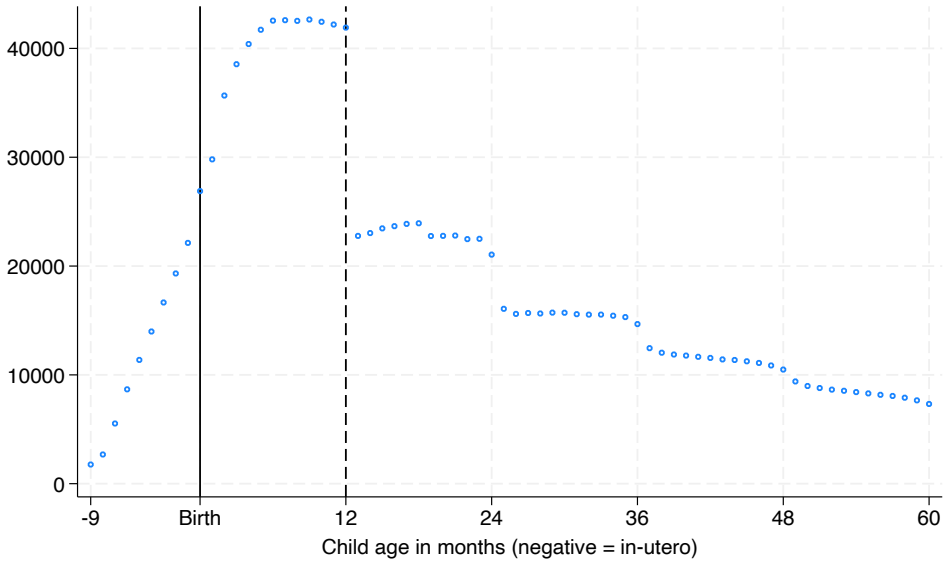
Standing Committee on the Scientific Evaluation of Dietary Reference Intakes and others. 2000. *DRI Dietary Reference Intakes: Applications in Dietary Assessment.* Technical report. Institute of Medicine.

Swann, Christopher A. 2007. "The timing of prenatal WIC participation." *The BE Journal of Economic Analysis & Policy* 7 (1).

Figure 1: WIC benefits and participation by child age in months



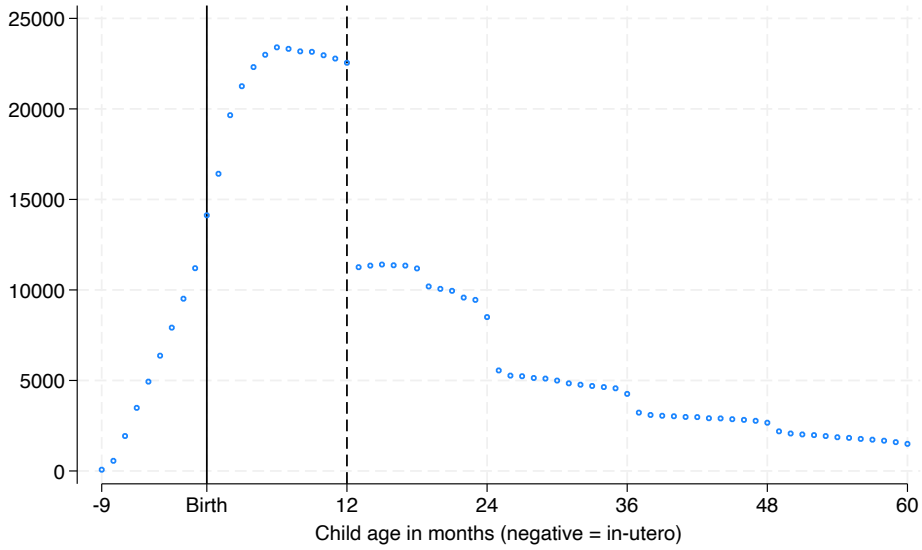
(a) Monthly benefit value for a one-child household (2023 USD)



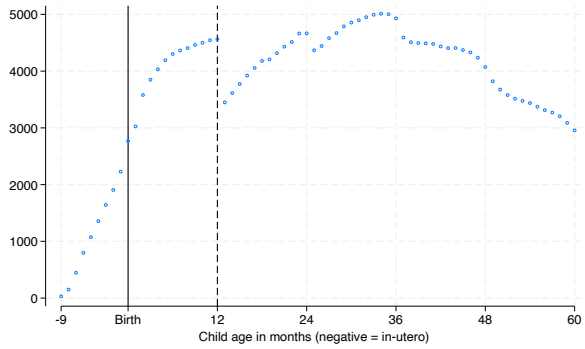
(b) WIC participation by child age

Notes: Panel (a) shows the estimated monthly value of WIC benefits for a one-child household by the child's age relative to birth. Negative months correspond to the pregnancy period, when benefits are received by the mother before the child is born (referred to here as "in-utero participation"). Panel (b) shows WIC participation by age in months using administrative data from Utah WIC (2018–2023). Each child is counted at most once per month: before birth through in-utero participation and after birth through the child's own enrollment. The dashed vertical line marks the 12-month age cutoff for infant formula eligibility.

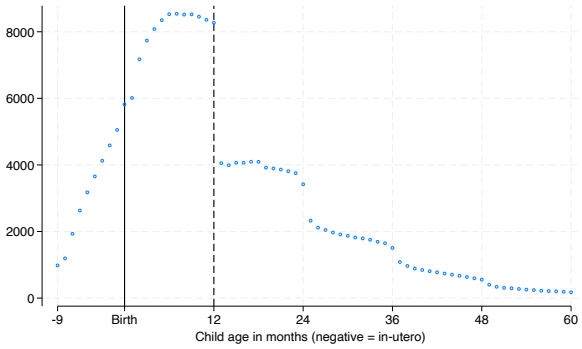
Figure 2: WIC participation patterns differ by birth order



(a) Only-child cases



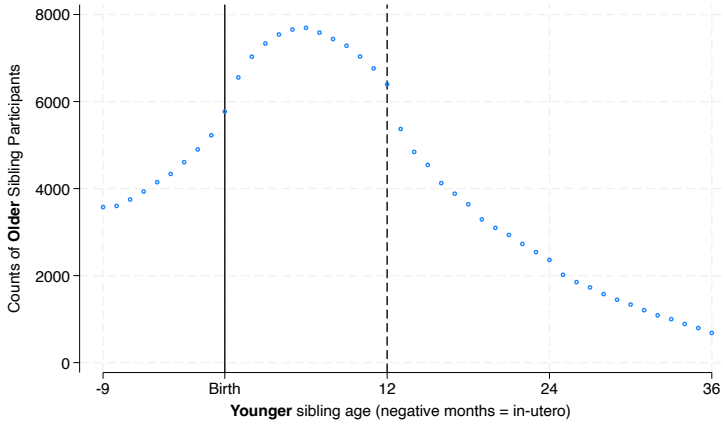
(b) Older child in 2-child cases



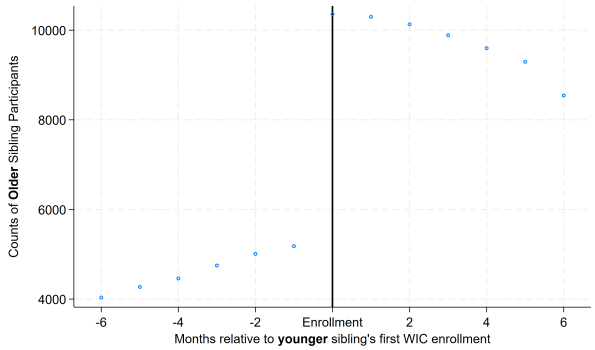
(c) Younger child in 2-child cases

Notes: This figure plots WIC participation by own age for three groups of children in the Utah administrative data: only children in panel (a), older siblings in two-child families in panel (b), and younger siblings in two-child families in panel (c). Age is measured in months relative to birth. Negative months correspond to the pregnancy period ("in-utero"). Each child is counted at most once per month: before birth through participation during the pregnancy period and after birth through the child's own enrollment. Panels (b) and (c) are restricted to two-child families with an age gap of at least nine months. The solid vertical line marks birth, and the dashed vertical line marks the 12-month age cutoff for infant formula eligibility.

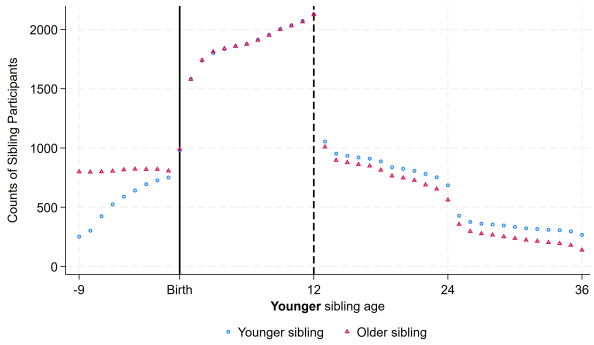
Figure 3: Younger siblings' benefits affect older sibling enrollment



(a) Older Sibling's Participation by Younger Sibling's Age in Months



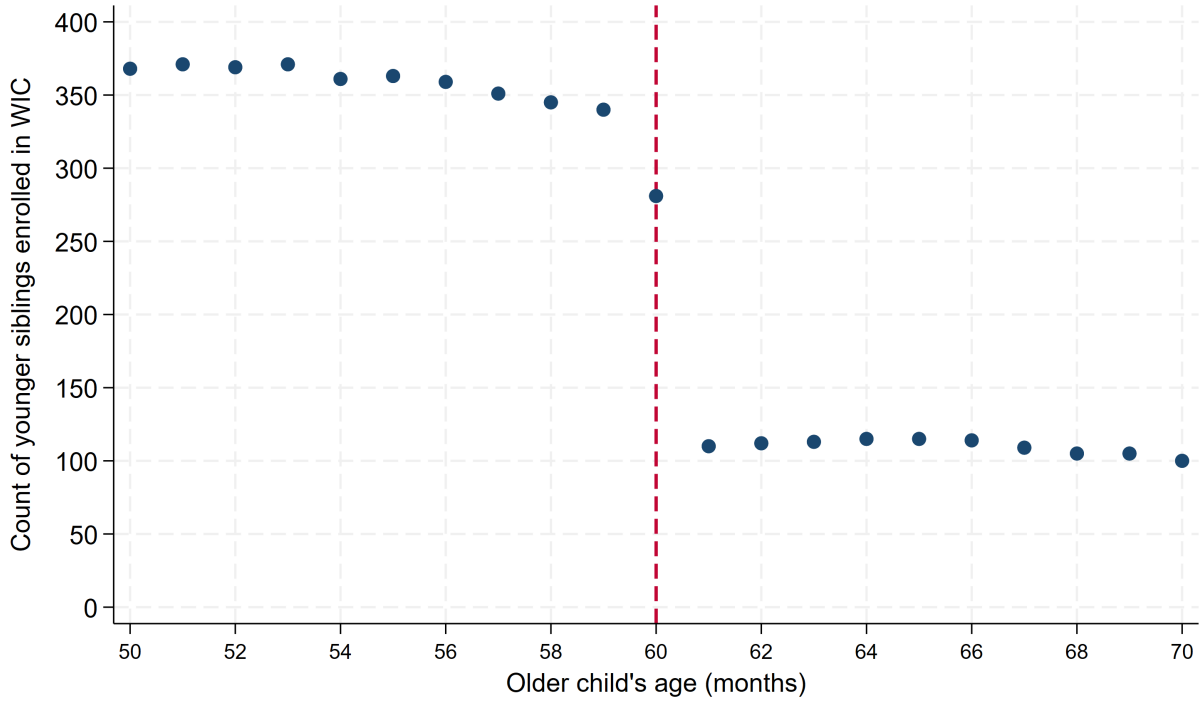
(b) Re-Centered on Younger Sibling's Enrollment Month



(c) Restricted to Siblings w/ the Same Recertification Timing

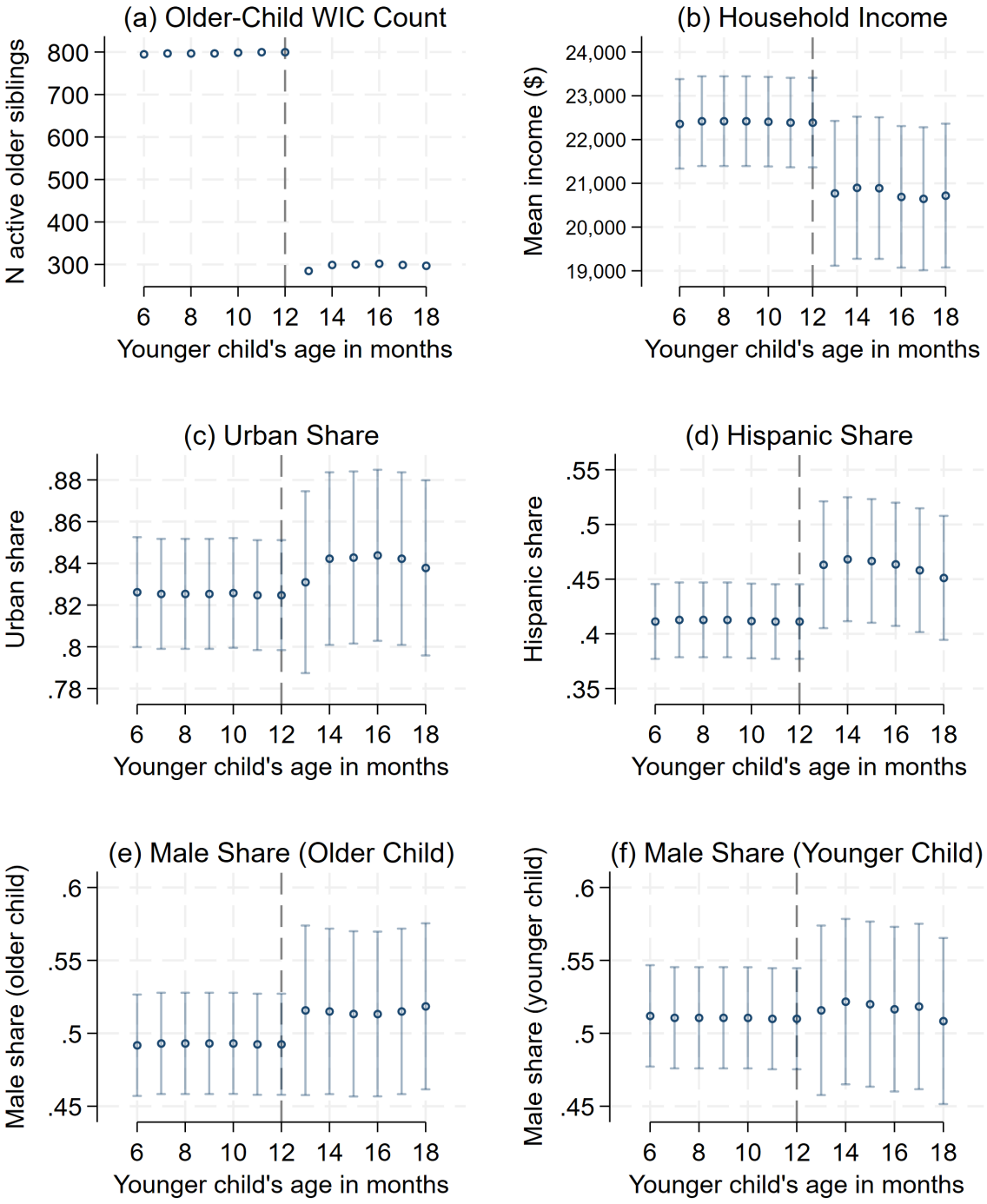
Notes: Each panel plots counts of active WIC child-month observations by child age in months (-9–60). All panels restricts to families with two child participants in the panel. Panel (a) plots older sibling enrollment counts by younger sibling's age in months, where negative values represent months in-utero. Panel (b) re-centers the x-axis on the younger sibling's first month participating in WIC. Panel (c) restricts to families where both siblings share the same recertification timing and plots counts of both siblings by the younger child's age. All panels include a vertical reference line at the relevant threshold.

Figure 4: Older Siblings' Benefits Affect Younger Sibling Enrollment



Notes: Each point represents the count of distinct younger siblings actively enrolled in WIC at a given older-sibling age in months. The sample is restricted to two-child families in which both siblings' scheduled certification end dates fall in the same calendar month, identified using the certification spell covering the older child's 60th month. The dashed vertical line marks 60 months, when the older child ages out of WIC eligibility.

Figure 5: WIC Case Composition for Siblings with Same 12-month Recertification Period



Notes: The sample consists of two-child WIC families in which (i) both siblings' certification spells end in the same calendar month, (ii) that shared certification spell ends exactly when the younger child turns 12 months old, and (iii) the older child is actively enrolled during at least one month of the younger child's in-utero period (months −9 to −1). The x-axis is the age in months of the younger child. Panel (a) shows the count of older children enrolled in WIC. The remaining panels show baseline household and individual characteristics among older siblings with active WIC enrollment at each younger-child age. Household income is measured at the family's earliest observed enrollment. The dashed vertical line marks the 12-month age cutoff for infant formula eligibility.

Table 1: Summary Statistics

	Study Sample (2018–2023)		National WIC (2020)	
	Mean	N	Mean	N
Panel A: Younger sibling				
Male	0.52	10,897	0.51	2,596
Hispanic	0.38	10,897	0.34	2,596
Panel B: Older sibling				
Male	0.52	10,536	0.52	4,107
Hispanic	0.37	10,536	0.34	4,107
Age gap (months)†	28.76	10,536	30.36	4,107
Panel C: Family covariates				
Annual income ($)	25,122	10,041	23,448	6,144
Urban county	0.79	10,533	—	

Notes: Unit of observation is the family (benefit unit). Study sample consists of two-child families enrolled in WIC in a Mountain-Plains state, 2018–2023. Annual income reflects the earliest observed annual income report for the family in the administrative records. Urban counties are Salt Lake, Utah, Davis, Weber, and Cache; all other counties are classified as rural. National WIC statistics are from the 2020 WIC Participant and Program Characteristics public use file, restricted to households with exactly three members on WIC (typically one parent and two children). Younger siblings correspond to WIC-certified infants (under 12 months) and older siblings to WIC-certified children (ages 1–4) in the national data. Hispanic share uses the five-category race/ethnicity classification. Dashes indicate variables not available in the national public use data due to suppression of geographic identifiers. †The national age gap is computed as the difference between the mean age of children (ages 1–4) and the mean age of infants (under 12 months) within three-member WIC households, as the public use file does not contain household identifiers to link siblings directly.

Table 2: Difference-in-discontinuities around 13 and 25 months

	Younger child		Older sibling	
	(1)	(2)	(3)	(4)
Panel A: RD at 13 months				
Percent drop at 13	-0.543***	-0.544***	-0.561***	-0.561***
	(0.011)	(0.011)	(0.011)	(0.011)
Observations	27,651	27,651	27,664	27,664
Panel B: RD at 25 months				
Percent drop at 25	-0.411***	-0.417***	-0.404***	-0.409***
	(0.022)	(0.022)	(0.026)	(0.026)
Observations	11,453	11,453	10,491	10,491
Panel C: Difference-in-discontinuities				
Difference (13 – 25)	-0.132***	-0.127***	-0.157***	-0.152***
	(0.025)	(0.025)	(0.028)	(0.028)
Controls	No	Yes	No	Yes

Notes: Sample restricted to families in which both siblings share the same certification end date at the younger child's 12-month threshold. Each RD is estimated using a local linear specification with side-specific slopes in a ±6 month window around the cutoff. The dependent variable is an indicator for active enrollment. "Percent drop" coefficients are computed as the RD jump divided by mean enrollment at $r = -1$ in the corresponding cutoff sample. Panel C reports the difference between scaled effects at 13 and 25 months. Controls (Cols. 2 and 4) include sex, Hispanic ethnicity, calendar month FE, calendar year FE, county FE, and earliest income with a missing-income indicator. Standard errors are clustered at the household (benefit-unit) level.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table A.1: Maximum Monthly Allowances in the WIC Food Packages - Children and Women

Type	**Children**	**Women**		
Foods	**Food Package IV** A: 12-23 months B: 2-4 years	**Food Package V** A: Pregnant B: Partially Breastfeeding (up to 1 year postpartum)	**Food Package VI** Postpartum (up to 6 months postpartum)	**Food Package VII** Fully Breastfeeding (up to 1 year postpartum)
Juice, single strength	64 fl. oz.	64 fl. oz.	64 fl. oz.	64 fl. oz.
Milk	A: 12 qt. B: 14 qt.	16 qt.	16 qt.	16 qt.
Breakfast cereal	36 oz.	36 oz.	36 oz.	36 oz.
Eggs	1 dozen	1 dozen	1 dozen	2 dozen
Fruits and vegetables (CVB)	$26	A: $47 B: $52	$47	$52
Whole wheat bread	24 oz.	48 oz.	48 oz.	48 oz.
Fish (canned)	6 oz.	A: 10 oz. B: 15 oz.	10 oz.	20 oz.
Legumes, dry or canned and/or	1 lb. dry/64 oz. canned	1 lb. dry/64 oz. canned	1 lb. dry/64 oz. canned	1 lb. dry/64 oz. canned
Peanut butter	18 oz.	18 oz.	18 oz.	18 oz.

Notes: Table A.1 displays the WIC food packages for women and children as of September 2024.

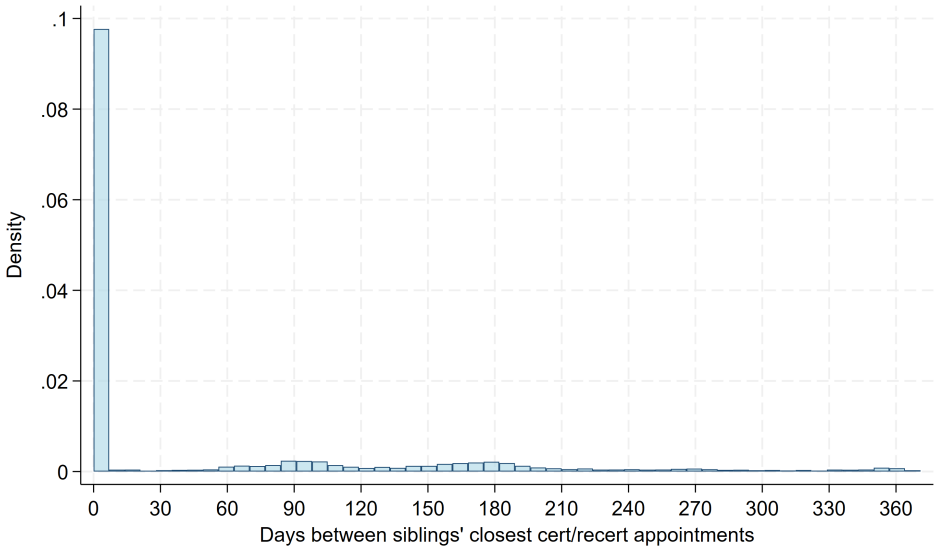
Source: https://www.fns.usda.gov/wic/food-packages/maximum-monthly-allowances.

Table A.2: Maximum Monthly Allowances in the WIC Food Packages - Infants

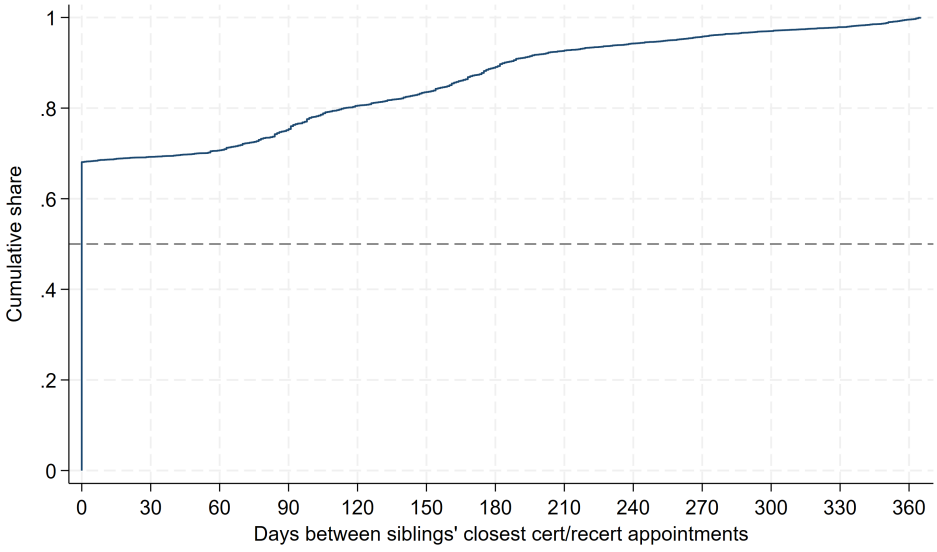
Type	**Fully Formula Fed**		**Partially Breastfed**		**Fully Breastfed**	
Food Packages	**I and III**	**II and III**	**I and III**	**II and III**	**I**	**II**
Foods	A: 0-3 months B: 4-5 months	6-11 months	A: 0-3 months B: 4-5 months	6-11 months	0-5 months	6-11 months
WIC Formula	A: Up to 806 fl. oz. B: Up to 884 fl. oz.	Up to 624 fl. oz.	A: Up to 364 fl. oz. B: Up to 442 fl. oz.	Up to 312 fl. oz.	N/A	N/A
Infant cereal	N/A	8 oz.	N/A	8 oz.	N/A	16 oz.
Baby food fruits and vegetables	N/A	128 oz.	N/A	128 oz.	N/A	128 oz.
Baby food meat	N/A	N/A	N/A	N/A	N/A	40 oz.

Notes: Table A.2 displays the WIC food packages for infants as of September 2024.
Source: https://www.fns.usda.gov/wic/food-packages/maximum-monthly-allowances.

Figure A.1: Timing of Certification Appointments Across Siblings



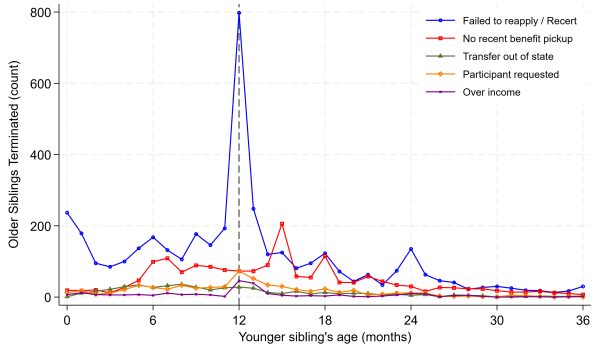
(a) Days between Sibling Certifications



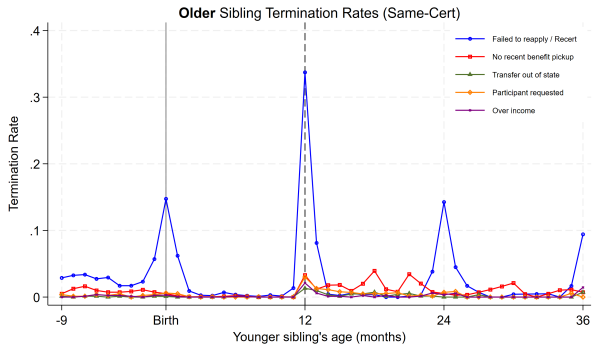
(b) CDF of Days between Sibling Certifications

Notes: This figure plots the days between the closest certification or recertification for WIC families with exactly two children.

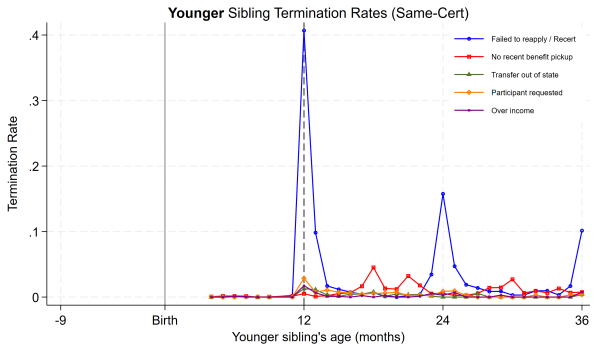
Figure A.2: Denial Reasons by Younger Sibling's Age in Months



(a) Older Sibling's Denial Reasons by Younger Sibling's Age in Months–Any Cert Timing



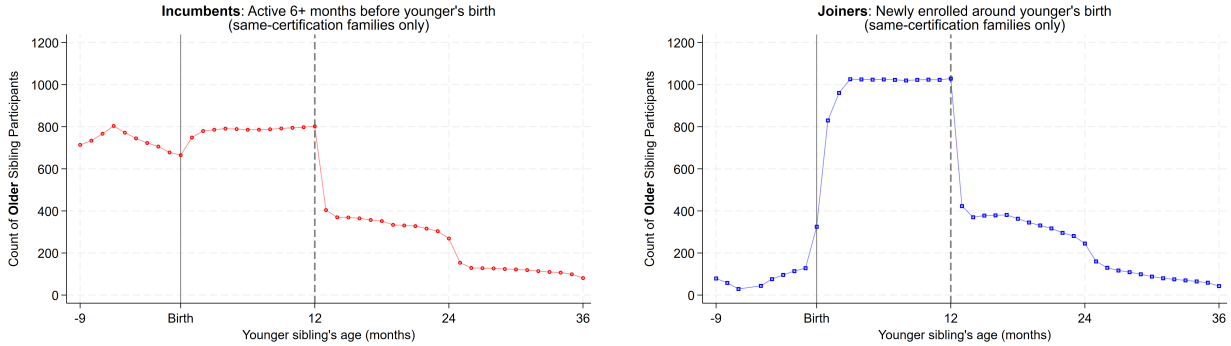
(b) Older Sibling's Denial Reasons Rates–Same Cert Sample



(c) Younger Sibling's Denial Reasons Rates–Same Cert Sample

Notes: This figure plots the share of older and younger siblings exiting WIC by termination reason, by the younger sibling's age in months. Panel (a) shows termination reasons for the older sibling across all two-child families. Panel (b) restricts to the same-certification sample and shows termination reasons for the older sibling; panel (c) shows termination reasons for the younger sibling in the same sample. The same-certification sample consists of families in which both siblings' certification spells end in the same calendar month at the younger child's 12-month threshold. The dashed vertical line marks the 12-month age cutoff for infant formula eligibility. Termination categories are as recorded in the Utah WIC administrative data.

Figure A.3: Older Sibling WIC Enrollment–Heterogeneity by Baseline Enrollment

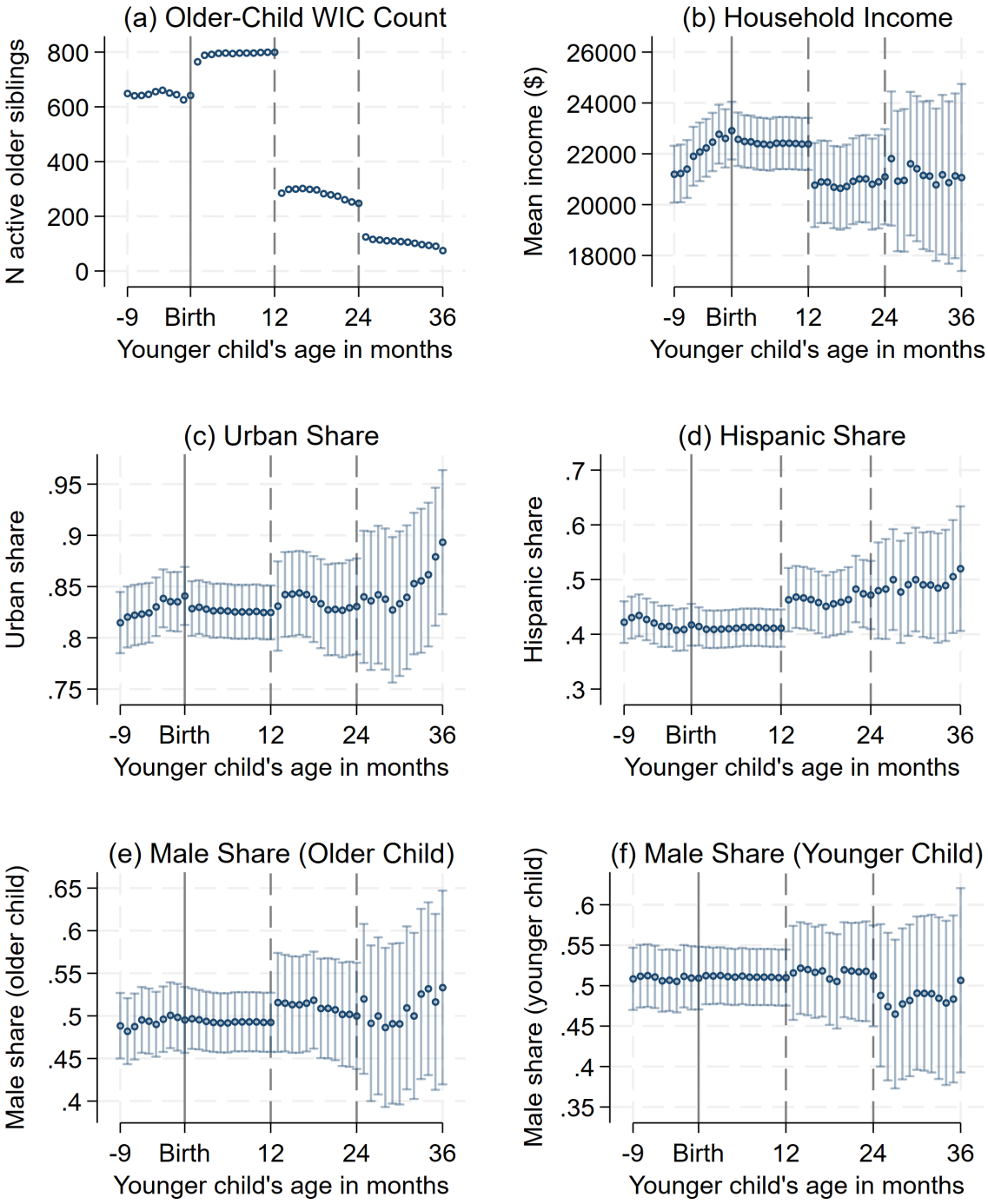


(a) Incumbents: active before younger sibling's birth

(b) Joiners: newly enrolled around younger sibling's birth

Notes: Each panel plots the count of actively enrolled older siblings by the younger sibling's age in months, restricted to same-certification families (those in which both siblings' certification spells end in the same calendar month at the younger child's 12-month threshold). Panel (a) restricts to "incumbents"–older siblings who were actively enrolled in WIC at least six months before the younger sibling's birth. Panel (b) restricts to "joiners"–older siblings who were not enrolled six months before birth but became active during months 0–3 of the younger sibling's life. The solid vertical line marks birth; the dashed vertical line marks the 12-month age cutoff for infant formula eligibility. Both panels share a common y-axis to facilitate comparison of enrollment levels across groups.

Figure A.4: WIC Case Composition for Siblings with Same 12-month Recertification Period – Full Window



Notes: The sample consists of two-child WIC families in which (i) both siblings' certification spells end in the same calendar month, (ii) that shared certification spell ends exactly when the younger child turns 12 months old, and (iii) the older child is actively enrolled during at least one month of the younger child's in-utero period (months −9 to −1). The x-axis is the age in months of the younger child. Panel (a) shows the count of older children enrolled in WIC. The remaining panels show baseline household and individual characteristics among older siblings with active WIC enrollment at each younger-child age. Household income is measured at the family's earliest observed enrollment. The dashed vertical line marks the 12-month age cutoff for infant formula eligibility.