

## Extended Abstract

**Title:** WIC Participation, Prenatal Feeding Intentions and Breastfeeding Duration—Evidence for Heterogeneous Effects

**Author:** Sarah Martin-Anderson, MPP MPH

**Affiliation:** PhD Candidate, The Goldman School of Public Policy at the University of California, Berkeley

**Background:** For fiscal year 2011, the United States Department of Agriculture (USDA) requested a 100% increase in research funding for the Supplemental Nutrition Program for Women, Infants and Children (WIC)<sup>1</sup>. One of the five research priorities in this request is investigation of the “reach of WIC” — specifically, how to expand the take-up of the WIC program<sup>2</sup>. Currently, the WIC program is extremely widespread, with a higher take up rate (~70-80%) than similar programs. The USDA estimates that 50% of infants in the United States participate in the WIC Program<sup>3</sup> with some states, such as California, experiencing 60% participation rates.

WIC provides supplemental food for pregnant women and their children age 0-5. WIC will provide vouchers for free infant formula if a mother is partially breastfeeding or chooses not to breastfeed at all. WIC also provides lactation support, breast pumps and extra food vouchers if a woman is fully breastfeeding. The market value of the food package is four times greater for women who choose not to breastfeed<sup>4</sup>.

This paper is motivated by past research showing a negative effect of WIC on breastfeeding duration<sup>5,6,7</sup>. The main criticism of research on the WIC program is the inability to control for unobserved maternal characteristics that might confound the relationship between WIC and breastfeeding. Women who are the least likely to breastfeed may also be the most likely to enroll in the WIC program. For this reason, increasing funding for expanded WIC access might be ill-advised, as women who are eligible but choose not to enroll are acting rationally—the benefit of the low-value food package (without the formula vouchers) may not be enough to induce women to bear the costs of participating.

**Research Question:** (1) Do prenatal intentions to breastfeed predict take-up of the WIC program? I hypothesize that women who are firmly committed to breastfeeding are the least likely to enroll in the program, holding all else equal.

(2) Does WIC have a negative association with breastfeeding duration, and is there an interaction effect between propensity to breastfeed and WIC participation? I hypothesize that women who are prenatally undecided or uncommitted to a feeding method will be the most affected by WIC participation.

**Data:** I use the Infant Feeding Practices Survey II (IFPS2), a panel study of approximately 4,000 women whom were pregnant in late 2005. Participants were sent paper surveys through the mail at approximately 7-8 months pregnant, shortly after birth and every month thereafter for a total of 12 surveys. Surveys collected feeding, infant health and maternal opinion data. For more information on the IFPS2, see (Fein, et al) in references<sup>8</sup>.

**Methods:** The first step of this analysis is an estimation of the following linear model, where the outcome  $Y'$  is a continuous measure of expected duration and the right hand side variables are various factors that contribute to an optimal breastfeeding environment including stated intentions to feed, plans after returning to work, confidence in breastfeeding, comfort in public nursing and paternal/familial support for breastfeeding.

$$Y_i' = \alpha + \beta X_i + \epsilon_i$$

The fitted values from equation (1) are split into 5 equal quantiles, with each quantile containing roughly 250 observations. Women in quantile #5 are the most likely to desire to breastfeed, while women quantile 1 are the least likely. These quantiles form our subgroups for the propensity score analysis. A propensity score can be theoretically illustrated by:

$$P(x) = \Pr(T=1 | X=x) \text{ for all Eligible Women}$$

The Propensity Score method matches on observable demographic characteristics (income, education, race, ethnicity, parity, and maternal age) as well as interactions of these variables and 4th order terms of age. I employ a nearest neighbor matching technique and restrict treatment effect estimation to observations on common support. This matching estimator is run within the 5 subgroups to explore potentially heterogeneous treatment effects.

**Results and Discussion:** Table 1 presents selected characteristics of the five proclivity groups. Prenatal attitudes towards breastfeeding significantly predict take-up of the WIC program, suggesting that women are indeed rationalizing the costs and benefits of participating in the program, conditional on the expected need for infant formula. Paternal and Familial support for breastfeeding, as well as comfort in public nursing most significantly predicted breastfeeding duration. Though not presented here, subgroup analysis by parity results in differential effects of prenatal attitudes on breastfeeding behavior—second time mothers are more accurate predictors of their actual breastfeeding duration and less sensitive to decreased paternal and familial support.

The primary focus of this poster is the estimate of WIC treatment effects conditional on prenatal proclivity to breastfeed. Figure 2 presents the estimates from five separate propensity score matching models. Asterisks represent statistical significance in the separate models. The treatment effects are all negative and range from a decrease of approximately 2 weeks to over 14 weeks.

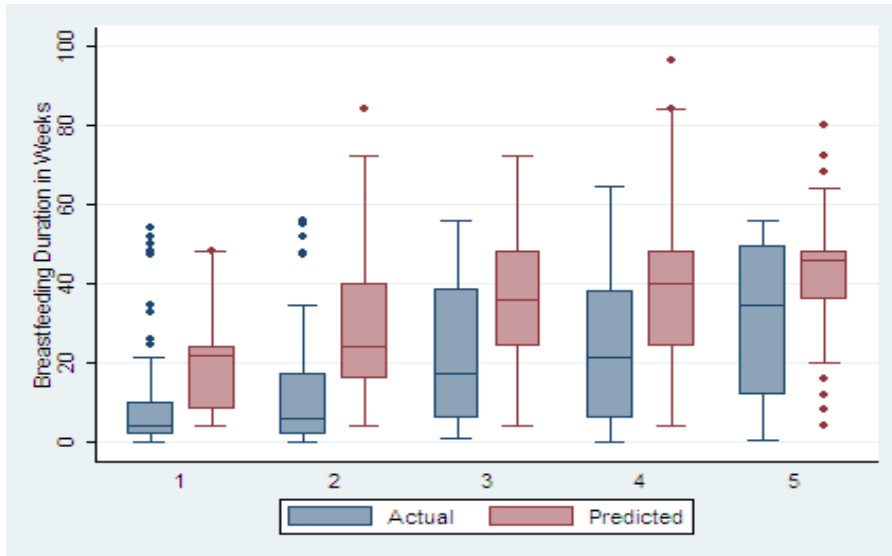
These results confirm my hypothesis: that the WIC treatment effect is strongest among women who are undecided or uncommitted to a feeding method prior to having a baby. While the Propensity Score Matching estimator does not completely erase the threat of selection bias, it is an improvement over multivariate OLS as it allows us to more flexibly model the probability of WIC take-up. This study is the first to incorporate qualitative measures of prenatal intentions in the evaluation of WIC program effects., and coupled with the matching estimator, we can conclude that WIC most likely has powerful effects on breastfeeding for women who come into the program ambivalent towards feeding methods. Future research will employ an Instrumental Variables approach to address the bias inherent in these types of studies.

WIC costs the US Government approximately 8 billion dollars a year. For FY 2011, a new Breastfeeding Performance Bonus program was added to the WIC budget<sup>1</sup>, signaling that the volumes of research suggesting a negative treatment effect of the program have informed policymakers. My study can

further inform the targeting of resources by channeling them towards the women who will potentially receive the largest benefit.

**Tables and Figures:**

**Figure 1: Predicted and Actual Breastfeeding Duration by Proclivity Group**



**Table 1: Selected Characteristics by Proclivity Group**

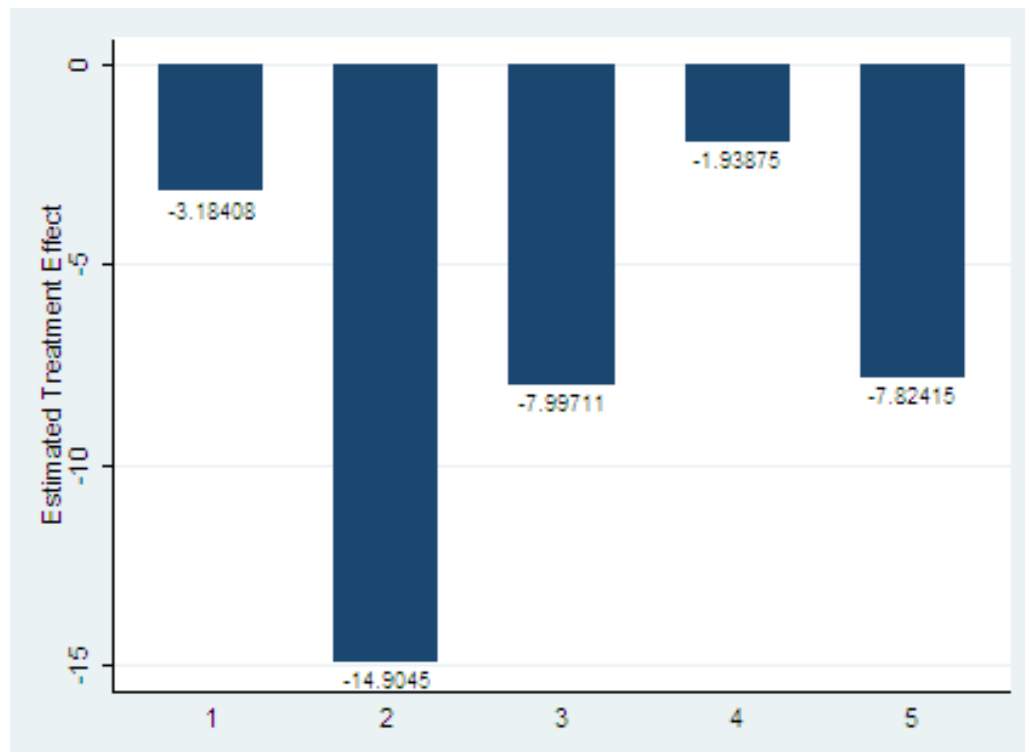
| Proclivity Group | WIC Eligibility (%) | WIC Take-Up (%) | Mean WIC Lag <sup>a</sup> | Mean Supplementation Lag <sup>b</sup> | Mean Shortfall <sup>c</sup> |
|------------------|---------------------|-----------------|---------------------------|---------------------------------------|-----------------------------|
| 1                | 48                  | 75              | 4.6                       | 8.2                                   | -5.9                        |
| 2                | 38                  | 69              | 6.6                       | 12.4                                  | -10.8                       |
| 3                | 34                  | 56              | 5.9                       | 17.7                                  | -13.3                       |
| 4                | 41                  | 62              | 4.3                       | 18.7                                  | -14.7                       |
| 5                | 40                  | 58              | 3.1                       | 24.1                                  | -16.8                       |

(a) “WIC lag” is equal to the number of weeks after birth until WIC began minus the number of weeks after birth until supplementation began. A positive number indicates that WIC began after supplementation.

(b) “Supplementation Lag” is equal to the number of weeks after birth when breastfeeding ceased completely minus the number of weeks after birth when supplementation began.

(c) “Shortfall” is equal to the number of weeks of expected breastfeeding minus the number of weeks of actual breastfeeding

**Figure 2: Estimate of the WIC Treatment Effect by Proclivity Group, in Weeks**



\* =  $p < .10$ , \*\* =  $p < .05$ , \*\*\* =  $p < .01$  (Statistical Significance of the treatment effect in the subgroup propensity score matching models)

#### References:

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