



Prenatal attitudes and parity predict selection into a U.S. child health program: A short report



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ABSTRACT

Public policies are a determinant of child health disparities; sound evaluation of these programs is essential for good governance. It is impossible in most countries to randomize assignment into child health programs that directly offer benefits. In the absence of this, researchers face the threat of selection bias—the idea that there are innate, immeasurable differences between those who take-up treatment and those who don't. In the field of Program Evaluation we are most concerned with the differences between the eligible people who take-up a program and the eligible people who choose not to enroll. Using a case study of a large U.S. nutrition program, this report illustrates how the perceived benefits of participation may affect the decision to take-up a program. In turn, this highlights sources of potential selection bias. Using data from a longitudinal study of mothers and infants conducted between May and December of 2005, I show that attitudes and beliefs prenatally toward breastfeeding determine enrollment in a U.S. nutrition program that offers free Infant Formula. I also find that the significance of the selection bias differs by parity. Analysis reveals that maternal attitudinal responses are more highly predictive of future behavior, compared to standard demographic variables. In sum, this paper makes a case for rigorously understanding the factors that determine take-up of a program and how those factors can modify the results of a program evaluation.

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Introduction

Selection bias—the threat that unobserved factors predict take-up of a program and therefore bias the treatment effect estimation—is likely the most damaging critique for many public health program evaluations. The statistical weakness that selection bias presents is universal across disciplines (Hernan et al. 2007). This paper will explore the determinants of selection into a U.S. child nutrition program, the Special Supplemental Food and Nutrition Program for Women, Infants and Children (WIC). By using innovative measures of breastfeeding likelihood, I show that previous measures of a negative effect of WIC on breastfeeding are likely overstated. My analysis suggests that prenatal commitment to breastfeeding predicts later breastfeeding behavior, and that the women most likely to breastfeed are the least likely to enroll their infants in WIC, controlling for income eligibility. These results are only statistically significant for multiparous women.

For many public programs, randomization into treatment is unethical and impossible. Barring this option, researchers have a

variety of statistical techniques to employ, each with its own advantages and drawbacks. Regression adjustment is the most straightforward approach. However, even when we can control for an exhaustive list of observables, this approach can only minimize bias, not erase it (Rosenbaum & Rubin, 1983). More complex forms of statistical methods to reduce bias include Propensity Score Matching (Rosenbaum & Rubin, 1983), Instrumental Variables Analysis (Angrist & Krueger, 2001) (Imbens & Angrist, 1994), and Regression Discontinuity (Imbens & Lemieux, 2008). No matter how sophisticated these evaluation tools seem, none are sufficient to reduce all concerns about bias when selection is based on immeasurable unobservable characteristics.

Many of the above methods have been used to estimate the effect of WIC on breastfeeding and child health. The WIC program provides vouchers for free infant formula to its clients. Simultaneously, the program promotes breast milk as the healthiest feeding choice. Increasing the rate of breastfeeding among low-income, medically vulnerable populations is a goal of the US Government (Institutes of Medicine, 2011). The probability of a mother breastfeeding is not only a function of internal characteristics; it is also a function of the costs of *not* breastfeeding. Either by government action or inaction, the availability and cost of breast milk substitutes is shaped by public policy.

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The WIC Program is unique to the US experience—but the broad characteristics of the program are applicable to the evaluation of many maternal and infant nutrition programs around the world. By providing in-kind transfers to the clients, the program assumes that nutrition will improve. Exact participation and eligibility rates are unavailable, as the inclusion of undocumented immigrants in the eligible pool presents an estimation problem. Reasonable estimates (Urban Institute 2011) of participation range from 30% of all infants, young children and pregnant women to 50% for infants alone. Eligibility rates are estimated between 55% and 65% of the categorically eligible (pregnant or nursing women and children age zero to five). The coverage rate—the percent of eligible people who enroll—varies widely by state from a low of 42.9% in Nevada to a high of 70.1% in California. Compared to the other large nutritional program in the U.S.—the Supplemental Nutrition Assistance Program (SNAP)—the coverage rate differential by age is expected. Coverage rates for SNAP vary from 34% for elderly eligibles to 90% for eligible children (United States Department of Agriculture, 2011).

Previous research finds that women participating in the WIC program experience shorter average breastfeeding durations than women who do not participate in the program. Criticisms of this finding center on whether there is positive or negative selection bias into the program. If women who are more likely to breastfeed are also more likely to enter the program, then the magnitude of previous associations is understated. If women who are the least likely to breastfeed are the most likely to enter the program, then the magnitude is overstated. A claim made in many government reports is that women who are the least likely to breastfeed enroll in WIC.

“Women on WIC may have lower breastfeeding rates because breastfeeding is less common among women with lower incomes and less education, and WIC serves this population.”

(Government Accountability Office, 2006. p.15).

Few studies rigorously estimate the impact of WIC on likelihood of breastfeeding, given the methodological challenges. Using regression adjustment, previous research has mostly found decreased duration of breastfeeding (Ryan & Zhou, 2006) (Jacknowitz, Novillo, & Tiehen, 2007) (Chatterji, Bonuck, Dhawan, & Deb, 2002) among WIC mothers, compared to non-WIC mothers.

Some research on time trends in breastfeeding among the WIC population finds that WIC increased breastfeeding rates in the 1990's. However, this increase may also be explained by the changes in the demographics of the program over this time period. Hispanic women make up a larger proportion of the WIC population now than they did in 1990 (Joyce, Racine, & Yunzal-Butler, 2008). Mothers of Hispanic origin, especially recent immigrants, are more likely to breastfeed than any other racial or ethnic group (Gibson, Diaz, Mainous, & Geesey, 2005).

A more recent paper, published in 2010, is the only evaluation of the WIC program and breastfeeding to employ propensity score methods to address selection bias. In this paper, the researchers conclude that propensity score matching is preferred to Ordinary Least Squares, and that the negative relationship between breastfeeding and WIC participation is “likely spurious” (Jiang, Foster, & Gibson-Davis, 2010). The spurious association is hypothesized to be a result of the socio-economic characteristics of the population WIC serves.

Empirical analysis

The two determinants of WIC benefits for eligible women, holding all else equal, are: the number of children under age 5 in the family, and the infant feeding method. The market value of the formula feeding package is four times that of the breastfeeding

package. This suggests that the likelihood of benefits outweighing the costs of participating will be higher for women who intend to formula feed. I hypothesize that women who are firmly committed to breastfeeding are less likely to enter into the program, thereby introducing negative selection bias into studies of WIC and breastfeeding. I further hypothesize that this relationship will be modified by parity—as families grow, those who intend to breastfeed will be either less or more likely to enter the program. Mothers of multiple children may be less likely to enter the program, because of their knowledge of the benefits and what I contend could be the decreasing marginal benefit of adding another WIC child. This runs counter to standard logic; a woman with three children under five would receive three-times the benefit as a first time mother. Yet, women with two or more children also face higher time costs than first-time mothers; women on the breastfeeding food package may face more rapidly declining marginal utility of an additional unit of food benefit. The multiplying costs coupled with the low value of the package may, at some parity point, produce a negative net benefit. If this is true, previous estimates of the WIC breastfeeding effect on multiparous women will be more overstated than the estimates for primiparous women.

An alternative explanation for a decreasing likelihood of entering the program for breastfeeding multiparous mothers could be explained by the persistence of maternal behavior across births. If WIC does have a causal effect on breastfeeding duration for the first child, then any association for subsequent infants is a function of the causal relationship from birth number one. While I can not directly test these hypotheses with the data at hand—because I lack information on whether previous children participated in the WIC program—the analyses here are intended to explore heterogeneity of effect size by parity as a descriptive exercise.

The greatest methodological challenge to estimating a WIC effect is the correct specification of who is “likely” to breastfeed. Past studies have relied on observable demographic characteristics to construct a risk profile. Instead, I will exploit prenatal attitudes toward breastfeeding, as well as prenatal perceptions of support structures. By doing this, I can identify those who are more or less likely than the average woman to breastfeed. I can also compare the fit of this attitudinal model to standard models that use only the demographic characteristics and compare which approach is a better predictor of future behavior.

Description of the data

The data for this analysis comes from the Infant Feeding Practices Study II (IFPS2), a joint venture of the Centers for Disease Control and Prevention (CDC) and Food and Drug Administration (FDA). This study was conducted in the United States. Between May and December of 2005, around 4000 women began participating in the survey—by the end of 15 months, 2000 women and their babies had completed the process. Participants were asked to complete one prenatal survey and ten postnatal surveys mailed at approximately one-month intervals. Only women who gave birth after 37 weeks gestational age to infants weighing greater than 5 pounds were allowed to continue. The demographics of the sample are not entirely representative of the US population. Mothers of non-white race and Hispanic ethnicity were underrepresented, as were women with less than a High School diploma and those who worked outside the home for pay (Fein, 2007). Furthermore, those who dropped out of the study are systematically different than those who completed the study. Demographic analysis of those lost to attrition confirmed that mothers of color, those making less than 185% of the Federal Poverty Level for her particular family size, and those with less than a college education were more likely to be lost to attrition or disqualification (based on prematurity or low birth

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