The Gendered Health Benefits of WIC Participation

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ABSTRACT. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a food assistance program designed to help pregnant or postpartum women, infants, and young children consume a nutritious diet. Food, however, is often a communal commodity shared by all household members and the benefits received by a participant child are often shared with WIC-ineligible family members. In some, but not all instances this sharing is found to impose a cost on the enrolled child. This paper uses data from the 2013 wave of the National Health Interview Survey to identify how the health benefits of WIC participation depend on the gender of the participant child. Results indicate that WIC participation improves a male child's overall health but does not do the same for female children, suggesting that gender is an important determinant in the realization of health benefits associated with WIC. (I10, I30, I38)

I. Introduction

The health and wellness of low-income children has prompted a great deal of social, political, and academic interest within the United States. These concerns are well justified as children from poor and near poor families have been shown to have higher rates of obesity, malnutrition, and asthma. At the same time these children have been shown to suffer developmental delays, have a higher incidence of learning disabilities, and to have poorer academic outcomes (Magnuson and Votruba-Drzal 2009; Seith and Isakson 2011; Joyce et al. 2012). These health and learning issues often persist throughout adulthood and for many children represent the beginning of the poverty cycle (Duncan et al. 2012). To help combat these tendencies and to help children avoid the cycle there has been a substantial expansion of the social safety net; which includes programs designed to provide nutritional support, health care services, and educational opportunities.[1]

At the same time, however, program costs have risen (in both real and nominal terms) and public debate over the efficacy, efficiency, and

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equity of social welfare programs has grown in both fervor and frequency. Thus, the importance of understanding the benefits conveyed by such programs cannot be overstated. One program that has received considerable attention is the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), which has seen a 20% increase in both enrollment and real program cost since the turn of the 21st century.

The program is designed to safeguard the health and nutritional outcomes of pregnant or postpartum women, infants, and children under the age of 5 who live in households with a combined family income below 185% of the federal poverty level, and who are believed to be nutritionally at risk. To this end, the program provides participants with access to foods rich in the vitamins and minerals that are essential for their healthy growth and development, recommendations for health care services, nutrition counseling, and educational programming. Nutritionally, the program has been successful in meeting it's objectives as it both reduces the consumption of high fat, high sugar foods and increases consumption of key nutrients (Rush et al. 1988; Rose, Habicht, and Devaney 1998; Wilde, McNamara, and Ranney 2000; Arsenault and Brown 2003; Siega-Riz et al. 2004; Gundersen 2005; Bhargava and Amialchuk 2007; Yen 2010; Whaley et al. 2012).

The impact of WIC participation on a child's health is less clear. The majority of studies find a positive connection between program participation and a child's general health, but there are several notable exceptions and the issue has not yet been resolved within the literature. The present paper identifies one possible explanation for the lack of consensus, by identifying a gender bias in the distribution of the health benefits derived from WIC participation. In addition to gender, there are several other factors that contribute to the ongoing debate. First and foremost, health is a composite measure determined by a variety of biological processes, socio-demographic characteristics, and genetic factors—thus, nutrient consumption plays only a small role in a child's overall health.

If nutrient consumption improves, but other components of a child's health simultaneously decline it is possible that a child's health could remain constant or deteriorate despite an improved diet. Consider, for example, a child who enrolls in WIC and later finds that their family's main breadwinner looses their job. The nutritional quality of the child's diet would have improved but the changes in their living environment and increased stress at home could exert an overriding negative influence that

could lead to a decline in their health. A child could also enroll in WIC, begin to consume a healthier diet, but suffer an unrelated illness or injury that reduces their physical activity level—this too, could ultimately lead to a decline in overall health.

Alternatively, it could be that the nutritional enhancements received by WIC children are not substantial enough to affect a child's overall health. This could occur for a few reasons. First, WIC participation could be an adaptive strategy used by low-income families (Moen and Wethington 1992). In this case a child's WIC enrollment is not a response to the needs of the child, but is rather, a method of supplementing the family's food supply. Thus, the foods purchased by WIC are shared with others in the household and the enrolled child receives a smaller share of the nutrition and health benefits than the program intends.

Second, WIC could be treated (by the family) as a form of supplemental income. The receipt of WIC food(s) relaxes a family's budget constraint and the family could, at its discretion, allocate the additional income to non-WIC family members. In this situation the participant could consume the foods provided by WIC but at the same time, receive a smaller allotment of the family's food supply. The enrolled child's consumption would remain at its pre-WIC level and changes in health would be unlikely. If the newly available income were used to provide nutritious foods or health care services for non-participants their health would likely improve as a result of living in a WIC household. In this scenario, WIC participation would not affect change for the enrolled child but would benefit others within the household.

Although the motives behind the spreading of WIC benefits have not yet been identified, several studies have confirmed that benefit spreading is a common practice within WIC households (Basiotis, Kramer-LeBlanc, and Kennedy 1998; Oliveira and Gundersen 2000; Ver Ploeg 2009; Woodward and Ribar 2012; Robinson 2013). Given that the WIC program is targeted in nature and benefits are intended for the enrolled family member, enhancing our understanding of benefit spillovers is essential from a policy and outreach perspective. Currently, there are (at least) three gaps in our understanding of spillovers. First, it is unclear which participants are affected, as it is possible that some participants do not experience a spillover. Second, the motivation behind the spillover is unclear. If the factors leading to the spillover can be identified, policy

directives to minimize their impact can be more targeted in nature. Third, the impact of the spillovers on participants is ambiguous—it could be detrimental to the participant or an additional benefit received by non-enrolled family members.

This paper addresses the first and third knowledge gaps by examining the potential for gender discrimination in the distribution of health benefits received from the WIC program. The findings of this research will improve our understanding of benefit spillovers by indicating whether spillovers are gender neutral or the result of gender biases held by parents. Although not specific to WIC family's, research has shown that U.S. parents have gender preferences that are similar to those from developing nations, where male children are preferred to female children (Steinbacher and Gilroy 1990; Bachrach, Stolley, and London 1992; Thomas 1994; Unger and Molina 1997; Swetkis, Gilroy, and Steinbacher 2002; Dahl and Moretti 2008; Bogan 2013). If this is the case in WIC households, parents are likely to make resource distribution decisions in a way that protects and promotes the wellbeing of males. In turn, male children enrolled in WIC would likely receive a larger share of WIC approved foods than otherwise similar female children; thereby, increasing the program's ability to exert a positive impact on the health of male children.

On the other hand, it is possible that parents in WIC households view female children as needing more protection. In this case female children would receive a larger share of WIC provided food than male children. In turn, female children would be more likely (than males) to experience health benefits from their WIC participation. Finally, it is possible that parents provide the same standard of care for children regardless of their gender, in which case benefit distribution should be similar and the receipt of health benefits by enrolled children should not be gender dependent.

Identifying which of these scenarios best reflects the reality of WIC families will further our understanding of benefit spillovers by highlighting which groups are most likely to be affected. A deeper understanding of the role gender plays in the distribution of benefits received from WIC could provide valuable insight for policy makers and program administrators as they plan future educational programming and fine-tune benefit packages. The findings from this study could also provide researchers and family scientists with additional insight into the unique bargaining systems and social dynamics that take place within

families that are, by definition, experiencing a period of economic hardship.

Given the complexities that may exist due to food and nutrient sharing amongst siblings, and the confirmation from Martin-Anderson (2014) that spillovers are not limited to multi-child households, this paper focuses exclusively on only child households. This eliminates the potential for parents to use WIC as an adaptive strategy to support a child who is nutritionally in-need but ineligible for the program, but does not eliminate the possibility of a benefit spillover to other family members. Thus, this paper provides an important first step toward understanding how a child's gender influences the health benefits they receive from WIC participation.[2]

Results indicate that male children receive health benefits from participating in the program, but that female children do not. One possibility is that male children receive a larger portion of the nutrients provided by WIC than similar female children, which suggests that a preference for males exists in WIC families. This finding is consistent with the research that has been done on gender preference within the United States as well as previous research examining the impact of WIC on a participant child's health.

The remainder of this paper is organized as follows: the next section provides a brief outline of related literature. The third section describes the data used in the empirical analysis while the fourth section presents the empirical methods employed by the present study. The fifth section presents the results of empirical estimation and discusses their implications for WIC policy. The final section offers concluding observations about the role gender plays in the realization of health benefits received from the WIC program.

II. Literature Review

The primary objective of this research is to expand our understanding of the health benefits children receive from participation in the WIC program. More specifically, this paper aims to identify how a child's gender influences the health benefits they receive from participating in WIC. Although this issue has not been directly addressed by previous research, there are important insights to be gained from the research that focuses on the nutrition and health benefits of WIC participation as well as that which focuses on the gender preferences of United States' parents.

Within the realm of WIC research, the most developed body of work focuses on the nutritional outcomes of children who are enrolled in the program. This strand of literature has found that WIC participation improves the nutritional quality of a child's diet in two ways. First, WIC participation increases consumption of important vitamins and minerals and decreases consumption of high fat, high sugar foods (Rush et al. 1988; Rose, Habicht, and Devaney 1998; Oliveira and Gundersen 2000; Wilde, McNamara, and Ranney 2000; Arsenault and Brown 2003; Siega-Riz et al. 2004; Bhargava and Amialchuk 2007; Yen 2010). Following the 2009 program revision, WIC has also been shown to increase consumption of fresh produce (fruits and vegetables), whole grain foods, and (for women and children over two years of age) low-fat dairy (Whaley et al. 2012; Odoms-Young et al. 2013).

The impact of WIC participation on a child's health has also been examined, but research in this area has failed to reach a consensus. The majority of studies, however, have indicated that the benefits provided by WIC are associated with improvements in child health and wellbeing. Carlson and Senauer (2003), for example, found that participant children were in better overall health than children who were eligible for, but not participating in the program. Black et al. (2004) confirmed this finding for children less than 12 months of age. Later, WIC participation was shown to reduce the incidence of child abuse, neglect, failure to thrive, and anemia (Lee and Mackey-Bilaver 2007). Along similar lines, Black et al. (2012) found that program participation successfully reduced (but did not eliminate) the health risks faced by children who lived in food insecure households and/or with a parent who suffered from depression (Black et al. 2012). For comprehensive reviews of the literature focusing on the health of WIC participants see Fox, Hamilton, and Lin (2004) and Colman et al. (2012).

Other studies, however, have found a more tenuous connection between WIC participation and the realization of health benefits. Studies by Sparks (2010) and Foster, Jiang, and Gibson-Davis (2010) failed to find a significant connection (either positive or negative) between WIC and a child's health. Robinson (2014) found that WIC improved the health outcomes of only children but did not, necessarily do the same, for children with siblings. For children who shared their home with at least one sibling, the age, gender, and number of siblings present had a meaningful impact on the health benefits derived from the program.

Although the WIC program is intended to provide nutritious foods to it's participants, existing research has indicated that there is a

discrepancy between the program's intent and implementation. Seminal research in this area by Basiotis, Kramer-LeBlanc, and Kennedy (1998) found that family level Healthy Eating Index (HEI) scores were higher in WIC households than in similar non-WIC households; however, it was unclear whether the result was driven solely by an improvement in the participant's score or if the HEI score(s) of the non-participant(s) had also increased. Later research supported the notion of a benefit spillover, as participant and non-participant children (living in the same household) were not found to have significantly different nutrient consumption (Oliveira and Gundersen 2000).

More recent research in this vein has also supported the existence of WIC benefit spillovers. Ver Ploeg (2009), Woodward and Ribar (2012), and Robinson (2013) each examined the impact a household's WIC status had on age-ineligible children and found that older children in a WIC household derived benefit from the program. More specifically, Ver Ploeg (2009) found that the HEI scores of older children in WIC households were higher than the HEI scores of children in non-WIC families. Woodward and Ribar (2012) also focused on the dietary behavior of older children in WIC households and found that their consumption of some WIC approved foods was higher than that of similar children in non-WIC households. Extending this line of inquiry, Robinson (2013) identified a health spillover for male children over the age of 12, who had an increased likelihood of being in excellent health.

Martin-Anderson (2014) examined the potential for benefit spillovers to extend beyond children, and considered the possibility that WIC influenced the nutrient consumption patterns of adult men. Results supported the notion of a benefit spillover as grown men in WIC households were found to consume more WIC-approved foods than those in non-WIC households. The study did not, however, account for characteristics of the enrolled child(ren) and focused exclusively on the behaviors and outcomes of adult family members.

Considering the role a child's gender plays in the realization of health benefits derived from WIC is a critical piece of the puzzle, as a preference for sons has been shown to exist in the United States. If a preference for sons does exist in WIC families, spillovers may occur in ways that systematically favor males over female. One of the first studies focusing on gender preferences amongst United States parents by Dahl and Moretti (2008), found that families with first-born daughters were less likely to remain in tact than families with first-born sons. Moreover, they found that families with first-born daughters were often larger than

families with first-born sons, as parents who remained together following the birth of a daughter continued to "try" for a son. Bogan (2013) also offered evidence of a preference for sons with research that indicated that parents of sons are more risk averse than parents of daughters. A related study focusing on resource distribution decisions within households found that fathers tend to channel a family's resources to male children over female children, indicating that fathers (at a minimum) exhibit a preference for sons over daughters (Thomas 1994).

Related literature from psychology, family planning, and medicine has also found evidence of a son preference within the United States. Research on reproductive technology and sex selection, for example, indicates that women hold a strong and sustaining preference for their first-born to be a male, with some willing to use sex selection technology to guarantee their desired outcome (Steinbacher and Gilroy 1990; Swetkis, Gilroy, and Steinbacher 2002). Hispanic women in Los Angeles have also shown a strong preference for sons, with a stated desire for 2.8 sons but only 0.1 daughters (Unger and Molina 1997). Additional evidence of a preference for sons within the United States, was provided by Bachrach, Stolley, and London (1992) who observed that female children were more likely to be placed for adoption than male children.

This review indicates that children who are enrolled in WIC are likely to consume a more nutritious diet than otherwise similar non-WIC children. At the same time it suggests that the health benefits derived from WIC are not uniform across all children and are influenced (in part) by household composition. An important factor that has not yet been considered is the enrolled child's gender. Given the preference for sons that has been established within the United States and the impact this preference has on intra-family resource distribution decisions in developing nations, the possibility that WIC benefit distribution occurs in a biased manner should not be overlooked.

From a policy and public health perspective resolving this ambiguity could have important implications. If a preference for males is present in WIC families it is possible that benefit sharing is more prevalent in households where female children participate than households where male children participate. This could result in female children receiving fewer health benefits from WIC. Should this prove to be the case, educational programming targeted at generating a more positive outcome for female children should be considered.

III. Data

Data for this study were obtained from the 2013 wave of the National Health Interview Survey (NHIS). The NHIS is conducted by the National Center for Health and Statistics and is one of the most comprehensive studies of the health (physical and mental) and health behaviors of the American public. The study is cross sectional in nature and has been conducted annually since it began in 1957.

The NHIS data has several features that make it ideal for a program evaluation study of this nature. First, the data contains detailed information about all individuals in a household and the family as a unit. Second, it is possible to link the records for all family members, which in turn, makes it feasible to incorporate information about a child's parents and siblings into individual level analysis. Third, the data set contains comprehensive data about each family member's participation in social welfare and food assistance programs. Moreover, the NHIS selects one child under the age of 18 to serve as the sample child for a family.

The data collected for the sample child is more detailed than the data collected for all other household children. Although the NHIS gathers information about the health status of all individuals in a household, the data for the sample child includes other desirable variables, including a measure of whether the child's health is better than, worse than, or about the same as, it was twelve months ago. This variable is, in turn, used to construct a binary variable that indicates whether the sample child's health improved over the course of a year.[3]

Given that the primary interest of this study is to determine whether WIC participation has differential effects on the health of male and female children and the complexities that may arise when studying multi-child families, the data employed by the present study need to satisfy certain criteria. First and foremost, the sample is limited to those children who lived in only child households at the time of the 2013 survey. Second, in order to measure the change in the child's health, the child must have been the sample child and must have been more than 12 months of age, thus excluding infants from the present study. Third, the child's biological gender and the composition of their family must have been observable, including the child's relationship to the adults in the family, and when more than one adult is present, the relationship between the adults. Additionally, a child must have been born to a mother who

was no more than 40 years old at the time of birth.[4] Finally, the child's participation in WIC and their eligibility for participation (measured by their age and their family's income-to-poverty ratio (PIR)) must have been identified in the NHIS data.

Unfortunately, the NHIS does not report a household's PIR as a continuous measure, which would be the ideal metric to use when determining a household's WIC eligibility. Instead the NHIS employs a system of 14 PIR brackets, that households are categorized into based on their reported income and family size. The eligibility cut-off point (1.85) lies within one of the brackets, which includes PIR's between 1.75 and 1.99; as a result, identifying WIC eligible households cannot be completed with precision. Regardless, past research has indicated that the program's conjunctive eligibility criteria often render the income eligibility threshold non-binding for a large number of WIC participants; thus, to ensure the present study is as inclusive as possible the sample includes all households with a PIR that is below 1.99.

Applying the criteria above results in a final sample of 437 only children. Given the present study's intention of identifying the role a child's gender plays in the receipt of health benefits derived from WIC there were two samples to be considered from an empirical perspective: male children without siblings and female children without siblings.[5] Of those children who were part of the sample, 232 were male and 205 were female. The names and definitions of variables used in the analysis are presented in Table 1, while Table 2 presents summary statistics for each sample. Variables chosen for inclusion as dependent variables represent the child's socio-demographic background, their family environment, their program participation status, and the time of year their family was interviewed; these variables may influence both a child's health, the probability that a child's health improved over a twelve-month period of time, and are standard within the literature.

The first column of Table 2 displays summary statistics for males, the second displays the same information for females, while the third column displays the difference in means for males and females. Examination of Table 2 reveals that the male and female children are relatively similar, with the only significant differences relating to the probability of being in fair/poor health, family size, and time of year the survey took place. To be more precise, 46.6 percent of male children and 49.6 percent of female children who were eligible for WIC were enrolled in the program.

TABLE 1–Variable Definitions

Variable	Definition
Health Increase	1 if a child's health improved during the past 12 months; 0 otherwise
WIC child	1 if a child (who is 12 months of age or order) participates in the WIC program; 0 otherwise
Family size	The number of household members to whom the child is related (biologically or adopted)
Child's age	Age of the child (in years)
Child's age-squared	Age of the child squared (in years)
Residence in Northeast	1 if the child lives in a household in the Northeastern region of the United States; 0 otherwise
Residence in Midwest	1 if the child lives in a household in the Midwest region of the United States; 0 otherwise
Residence in South	1 if the child lives in a household in the Southern region of the United States; 0 otherwise
Residence in West	1 if the child lives in a household in the Western region of the United States; 0 otherwise
Hispanic origin	1 if the child is of Hispanic origin; 0 otherwise
Non-Hispanic White	1 if the child is of Non-Hispanic White origin; 0 otherwise
Non-Hispanic Black	1 if the child is of Non-Hispanic Black origin; 0 otherwise
Income-to-poverty ratio	The midpoint of the PIR bracket a household is reported to belong to
Mother is currently married	1 if the child's mother is currently married; 0 otherwise
Mother was previously married	1 if the child's mother has been previously (but is not currently) married; 0 otherwise
Mother has never been married	1 if the child's mother has never been married; 0 otherwise
SNAP participation	1 if the child's family participates in SNAP; 0 otherwise
Mother did not complete high school	1 if no adult in the household completed high school; 0 otherwise

TABLE 1–Variable Definitions (continued)

Variable	Definition
Mother completed high school	1 if the highest degree held by an adult in the household is a high school diploma; 0 otherwise
Mother attended college	1 if the highest degree held by an adult in the household is at least an associate degree; 0 otherwise
Mother's age	Age of the child's mother (in years)
Interviewed in first quarter of 2013	1 if the household was conducted in the first quarter of 2013; 0 otherwise
Interviewed in second quarter of 2013	1 if the household was conducted in the second quarter of 2013; 0 otherwise
Interviewed in third quarter of 2013	1 if the household was conducted in the third quarter of 2013; 0 otherwise
Interviewed in fourth quarter of 2013	1 if the household was conducted in the fourth quarter of 2013; 0 otherwise

TABLE 2–Weighted Summary Statistics

	Male Children	Female Children	Difference in Means
Percent of Children in:			
Excellent health	0.504 (0.501)	0.565 (0.497)	0.061 (0.057)
Very good health	0.248 (0.433)	0.275 (0.448)	-0.027 (0.054)
Good health	0.211 (0.409)	0.153 (0.360)	0.059 (0.040)
Fair/poor health	0.037 (0.189)	0.007 (0.083)	0.030** (0.014)
WIC child	0.466 (0.499)	0.496 (0.501)	-0.030 (0.056)
Family Size	2.922 (0.846)	2.703 (0.725)	0.220** (0.081)
Child's age	2.500 (1.334)	2.484 (1.384)	0.016 (0.154)
Child's age squared	8.022 (7.639)	8.075 (7.932)	-0.054 (0.853)
Residence in the Northeast	0.115 (0.319)	0.089 (0.286)	0.026 (0.031)
Residence in the Midwest	0.228 (0.421)	0.282 (0.451)	-0.053 (0.048)
Residence in the South	0.434 (0.497)	0.388 (0.486)	0.046 (0.054)
Residence in the West	0.222 (0.417)	0.241 (0.429)	-0.019 (0.053)
Hispanic origin	0.287 (0.453)	0.292 (0.456)	-0.005 (0.047)
Non-Hispanic white	0.453 (0.499)	0.383 (0.487)	0.071 (0.056)
Non-Hispanic black	0.219 (0.415)	0.243 (0.430)	-0.024 (0.043)
Income-to-poverty ratio	1.025 (0.542)	1.072 (0.544)	-0.048 (0.062)
Mother is currently married	0.538 (0.500)	0.497 (0.501)	0.041 (0.056)
Mother was previously married	0.146 (0.354)	0.124 (0.331)	0.022 (0.039)
Mother has never been married	0.316 (0.466)	0.379 (0.486)	-0.063 (0.052)
SNAP participant	0.506 (0.501)	0.445 (0.498)	0.061 (0.055)
Mother did not complete high school	0.154 (0.362)	0.218 (0.414)	-0.064 (0.050)
Mother completed high school	0.599 (0.491)	0.568 (0.497)	0.030 (0.057)
Mother attended college	0.247 (0.432)	0.214 (0.411)	0.037 (0.046)
Mother's age	26.607 (5.8324)	27.098 (5.695)	-0.490 (0.644)
Interviewed in first quarter of 2013	0.235 (0.427)	0.236 (0.426)	-0.002 (0.045)
Interviewed in second quarter of 2013	0.266 (0.443)	0.300 (0.459)	-0.035 (0.054)
Interviewed in third quarter of 2013	0.209 (0.408)	0.258 (0.439)	-0.049 (0.047)
Interviewed in fourth quarter of 2013	0.291 (0.455)	0.206 (0.405)	0.085* (0.046)
Number of Observations	232	205	437

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1 in a two-tailed test for equality of means.

TABLE 3–Marginal Effects for Male and Female Children

	Male Children	Female Children
WIC child	0.138** (0.069)	0.067 (0.056)
Family size	0.058 (0.041)	-0.063 (0.046)
Child's age	-0.013 (0.119)	-0.244** (0.099)
Child's age squared	0.003 (0.020)	-0.041** (0.017)
Resides in the West	-0.250* (0.091)	-0.114 (0.085)
Resides in the Midwest	-0.146 (0.105)	-0.172** (0.083)
Resides in the South	-0.074 (0.106)	-0.231** (0.081)
Hispanic origin	0.240* (0.136)	0.082 (0.124)
Non-Hispanic white	0.025 (0.143)	0.004 (0.127)
Non-Hispanic black	0.214 (0.156)	0.214 (0.151)
Poverty-to-income ratio	-0.078 (0.066)	0.068 (0.060)
Mother is currently married	-0.030 (0.082)	0.031 (0.081)
Mother was previously married	0.039 (0.116)	-0.126 (0.087)
SNAP participant	-0.082 (0.070)	-0.002 (0.063)
Mother did not complete high school	-0.206 (0.083)	-0.184** (0.067)
Mother completed high school	-0.091 (0.081)	0.024 (0.071)
Mother's age	-0.010 (0.007)	-0.003 (0.005)
Interviewed in first quarter	0.032 (0.086)	0.198** (0.081)
Interviewed in second quarter	0.133 (0.086)	-0.044 (0.075)
Interviewed in third quarter	0.031 (0.094)	-0.080 (0.080)
Wald Chi-Squared	32.40	37.90
Pseudo-Log Likelihood	-451277.91	-328766.48
Pseudo R-squared	0.106	0.144
Observations	232	205

Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The distribution of the sample child's health across a four-tier parent-reported health scale was also similar across gender. More specifically, 50.4 percent of male and 56.5 percent of female children were in excellent health, 24.8 and 27.5 percent of male and female children were (respectively) in very good health, while 21.1 and 15.3 percent of male and female children were (respectively) in good health. Only 3.7 percent of male children and 0.7 percent of female children were reported to be in fair/poor health.[6]

The male and female children were also similar in age, family income, maternal marital status, race/ethnicity, region of residence, and participation in the Supplement Nutrition Assistance Program (SNAP). Finally, consistent with studies focusing on family composition and child gender, families with male children are significantly larger than families with female children. Given that this study focuses exclusively on only children, this provides evidence that families with a first-born son are more likely to remain intact, regardless of the parent's marital status.

IV. Empirical Methods

To measure the effect WIC participation has on a child's health probit estimation techniques are employed. More specifically, the effect WIC participation has on the likelihood that a child's health improves is described by equation (1):

$$\Pr(\textit{Health Improvement}_i) = \beta_0 + \beta_1 WIC_i + X_i' \beta_2 + \varepsilon_i \qquad (1)$$

where $\textit{Health Improvement}_i$ is a binary variable that is set equal to 1 if a child's health improved in the past year and is 0 otherwise. WIC_i, the explanatory variable of primary interest, is a binary variable that is set equal to 1 if the child received WIC benefits in the past 12 months (and is otherwise set equal to 0), X_i is a vector of other explanatory variables, and ε_i is the error term.

Other explanatory variables of interest included binary measures for: living in the Northeastern, Midwestern, or Southern region of the United States (the omitted category is living in the Western region); being of Hispanic origin; being a non-Hispanic black child; being a non-Hispanic white child (self-reporting as other or two-or-more races/ethnicities serves as the omitted category); having a mother who is currently married; having a mother who has been previously married (having a

mother who has never been married is the omitted category); receiving SNAP benefits; having parents who did not complete high-school (i.e., neither parent holds a high-school diploma or GED); having at least one parent who completed high-school but did not pursue advanced education (having at least one parent who pursued higher education is the omitted category); and finally, to capture the time of year at which the interview took place, having been interviewed in the first, second, or third quarter of the year (having been interviewed in the fourth quarter is the omitted category). Each measure is set equal to 1 if the condition exists and is 0 otherwise. Continuous measures for family size, the child's age, the child's age-squared, the child's mother's age, and the household's income (proxied by their PIR) are also included in the vector X_i.[7, 8]

V. Results and Discussion

The marginal effects derived from the probit estimations are displayed in Table 3, where the first column presents the findings for males and the second column presents the findings for females. Examination of Table 3 indicates that male children enrolled in WIC are more likely to experience an improvement in their overall health than otherwise similar male children who are eligible for but not currently participating in the program. More specifically, participating in WIC increases the likelihood that a male child's health improved over the past year by 13.8 percentage points. The same cannot, however, be said for female children. For females, WIC has neither a positive nor negative effect on overall health; suggesting that WIC fails to improve the nutritional quality of their diet enough to have a positive effect on their overall health but does not impose a cost on the child.

That the positive effect was only present for males is consistent with the findings of the literature that has identified a preference for sons and that, which is focused on intra-household resource allocation. In the development literature, for example, male children have been found to receive the lion's share of their family's financial resources (see Behrman (1992), Haddad et al. (1996), and/or Lampietti and Stalker (2000) for a nice summary of development literature highlighting gender issues and intra-household resource allocation). Anthropological literature has identified a similar inequality in the distribution of food, nutrient, and educational resources (Messer 1997). Similarly, economic research has

shown that families with male children are more risk averse than families with female children and may suggest that parents are taking extra steps to ensure that boys receive as many benefits as possible (Bogan 2013).

There are a few other results (for both male and female children) that are worth mentioning. The first relates to the region of residence. For female children, geographic location has a substantial influence on the likelihood of an improvement in health. Relative to living in the Northeast region, children in the Southern and Midwestern region of the United States are less likely to see their health improve over the course of a given year. The magnitude of the impact is non-negligible, as living in the South reduces the likelihood of one's health improving by 23.1 percentage points while living in the Midwestern region reduces the probability of an improvement in health by 17.2 percentage points. Identifying the factors driving this gender specific finding is beyond the scope of the present paper, but is nonetheless important from a policy perspective. Additional research into the regional differences in the health benefits received by WIC participants should be considered.

Maternal education also plays a significant role in the health improvements of female children but does not do the same for males, which may indicate that the health behaviors of mothers and daughters are more similar than the health behaviors of mothers and sons. Relative to children whose mother completed college, female children with a mother who did not complete high school are 18.4 percentage points less likely to experience an improvement in overall health. This may indicate that mothers who completed less formal education are not as aware of the educational opportunities available through WIC or are less likely to make changes in their family's lifestyle and nutrient consumption, which could ultimately lead to improvements in a child's overall health. This is an empirical question that merits additional economic research but is beyond the scope of the present study.

As with previous program evaluation studies, there is some concern over the potential for selection bias. The WIC program is not an entitlement program and is not a program that families are automatically enrolled into. Rather, to enroll in WIC families must be aware of their eligibility and must independently apply to receive benefits. As a result it is possible that families systematically self-select into the program, which may result in either a positive or a negative bias in the empirical results described above. For a detailed discussion of such bias see Ver Ploeg (2009) and/or Robinson (2014). Unfortunately, the common

approach of addressing such concerns, two-stage instrumental variables estimation, is not possible with the data at hand as truly exogenous instruments are not available within the NHIS. Other methods, such as propensity score matching do not adequately account for selection on unobserved factors and are thus not employed by the present study.

It is also possible that there was uncontrolled endogeneity embedded in the empirical model. If this is the case, the findings may indicate the presence of a correlation (rather than a causation) between WIC participation and the probability of a male child's health improving.[9] Regardless, knowledge of a link between a child's gender and the benefits they derive from WIC participation may prove valuable when evaluating the WIC program and making resource distribution decisions.

VI. Conclusions

This paper contributes to the growing body of literature devoted to identifying the benefits children and their families receive from the WIC program. More specifically, this paper examines the roles gender and household composition play in determining whether the nutrition and education benefits provided by WIC are enough to impact the participating child's overall health. Earlier work in this area focused primarily on the non-WIC family members and, consistent with the notion of WIC as an adaptive strategy, found that benefit spillovers to non-participant children and adults were common. This research expands our knowledge of benefit spillovers by examining whether the resource spreading happens in a gender-neutral or gender-biased manner.

Using probit estimation techniques this paper considered the impact WIC participation had on the probability of an only child's health improving over the course of a year. Results indicated that WIC improved the health of male children but did not have the same effect for female children. This suggests that an only child's gender has a significant influence over the health benefits they derive from WIC participation.

That male children were found to experience improvements in health as a result of WIC participation but female children were not indicates that benefit spillovers may be more likely to exist in households where a female child participates in the program. It also suggests that intra-household resource allocation decisions are not uniform across WIC families and that these differences should be considered when benefit packages and educational programs are designed. These findings may

also indicate that the motivation behind WIC participation may not be uniform across family compositions. It is possible that WIC participation as an adaptive strategy is more likely in households with an only daughter than those with an only son—mixed methods research techniques may prove useful in further investigations into this possibility.

It should also be noted, that the preceding analysis was limited to those children who were currently living in an only child household. This limits the number of complex intra-family resource allocation decisions that must be made and provides the purest insight into the gender preferences of parents. Once multiple children are involved, especially in families where not all children are eligible for and/or enrolled in WIC, the utility maximizing distribution of resources must take each child's wants, needs, desires, and ability to contribute to the family's future success into account. An analysis of multi-child households would be an important complement to the present study, but would require data beyond the scope of that currently available.

Regardless, the findings of this study along with the existing WIC research indicate that WIC, as a policy tool, has the ability to exert a positive influence on a child's diet, wellbeing, and overall health. However, the findings of this study and previous research also indicate that the effects are not universal and that the program's influence on an enrolled child is dependent on their gender as well as the characteristics of their family. Benefit packages and educational programming specified not only by a child's age but also by their gender and other identifiable demographic characteristics may have the ability to enhance the benefits obtained from program participation and exert a greater influence on a child's overall wellbeing.

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Endnotes

1. Both the Supplemental Nutrition Assistance Program (SNAP) and the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provide low-income families with benefits that can be used to increase the food available within their household. The primary distinction between the two lies in the target audience. SNAP provides access to food for all family members, while WIC provides access to specific foods designed to meet the nutritional needs of the enrolled family member (additional details on WIC eligibility and enrollment are provided below). Medicaid and the Children's Health Insurance Program (CHIP) provide access to mental, physical, and oral health care as well as referrals and coverage for specialty care (including x-rays, laboratory testing, and surgical care). Finally, Head Start supports the perceptual, motor, and physical development of infants and young children through early learning programs, health care referrals, and parental support and education.
2. With the data at hand household decision-making and food distribution mechanisms could not be observed. Thus, the study of multi-child households is beyond the scope

of the present study. However, mixed methods research capable of incorporating the complex issues that arise in multi-child households would serve as a valuable addition to this line of inquiry.

3. It should be noted, that health is a continuous measure and that very few are likely considered to be in perfect health. As a result, even a child whose health was very good last year, has a non-zero probability of having their health improve over a twelve month time period.
4. This sample exclusion is necessary, as children born to women over the age of 40 face substantially higher risks in-utero and are more likely to be born with chromosomal abnormalities and other birth defects (which could have long lasting health impacts, regardless of household socio-demographics and program participation).
5. Stratified estimation is preferred to pooled estimation with a control for the presence of a sibling as it is more flexible and does not restrict the coefficients for non-group dummy variables in the model to be the same for all groups.
6. It should be noted that the probability a child's health improves is independent of the child's current health level. That is, children in excellent, very good, and good health have roughly the same likelihood of experiencing an improvement in their overall health. Children in fair/poor health are, however, somewhat less likely than the others to see an improvement in their health.
7. For estimation purposes only, a household's PIR is considered the midpoint of the PIR bracket the household is reported to belong to.
8. An alternative model, including a child's current health was considered. The inclusion of these additional controls did not significantly affect the findings of this study and for brevity, the following discussion focuses on the more parsimonious estimation. The findings of the expanded model are available upon request.
9. Determining causality is an important step in identifying the full benefit of WIC participation and is left for future research.