Critique of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) Program **Introduction**: The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) began in the United States in 1974 after a successful 2-year pilot program. It is administered by the US Department of Agriculture (USDA) nationally and its local implementation is delegated through the states to the local areas. In many cases, the local health departments run the WIC programs, but this is not mandated, and WIC clinics can also be found at some hospitals, schools, community health centers, or other approved sites. WIC provides food and formula vouchers for financially and nutritionally at risk women, infants, and children under 5 years of age combined with nutrition education and referrals to health and social service agencies as needed for the family.<sup>1</sup> This critique will focus on the prenatal aspect of the program only, in terms of effectiveness of the WIC program during pregnancy in preventing low birth weight (LBW) and very low birth weight (VLBW).

**Goals of WIC**: The major goal of the WIC program is to improve maternal and infant health and to reduce negative birth outcomes such as prematurity, LBW, and infant mortality, by improving nutrition. Maternal health can be measured by absence or improvement in maternal anemia, and by adequate but not excessive weight gain during pregnancy. Infant health can be measured by adequate gestational age at birth and normal size for gestational age, adequate birth weight, absence of anemia, and normal growth in weight and in length/height. <sup>1,2,3</sup>. WIC's public web site succinctly states that its mission, is "*To safeguard the health of low-income women, infants, and children up to age 5 who are at nutritional risk by providing nutritious foods to supplement diets, information on healthy eating, and referrals to health care.*"<sup>4</sup>

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**Methods/Design/Target Group of WIC**: Poverty predisposes at-risk women, infants, and children to inadequate food and problems with access to health care, thus engendering insufficient nutrition and poor health outcomes. According to the US Bureau of the Census, 15% of the US population and nearly 23% of children under 18 were living below the federal poverty level in 1993<sup>1</sup>. Therefore, it would follow that providing adequate nutrition to pregnant women, infants and children would result in an improvement in health indicators. WIC's fundamental design was based on this assumption.

Eligibility to participate in the WIC program hinges on meeting two criteria. First, the potential participant must meet an income eligibility of living at or below 185% of the US Poverty Income Guidelines. When it is determined that the applicant meets income eligibility, she or he is screened using nutritional risk criteria WIC are shown in Table 1, below:<sup>1</sup>

| Table 1: Nutrition Risk Criteria for WIC |   |
|--|---|
| As determined by:                        | Risk factor:  |
| Lab tests                                | Anemia, lead poisoning, HIV infection                             |
| Anthropometry                            | Underweight, obesity, abnormal weight gain patterns in            |
|  | pregnancy, failure to thrive, stunting, underweight and obesity   |
|  | during infancy and early childhood                                |
| Nutrition-related                        | Clinical signs of nutritional disorders, metabolic disorders,     |
| medical conditions                       | preeclampsia/eclampsia  |
| High-risk pregnancies                    | Adolescence, substance abuse including smoking, history of        |
|  | neonatal loss, prematurity, low birth weight, congenital          |
|  | malformations   |
| Dietary deficiencies/                    | Gastrointestinal disorders, chronic or recurrent infection, renal |
| inadequate nutrition                     | disease, cardiorespiratory disorders, severe burns/trauma,        |
|  | inadequate dietary patterns <sup>*</sup>                          |

. \*Realistically speaking, if the applicant is financially eligible, he or she can qualify for

acceptance into the WIC program, as few people living in poverty have adequate dietary

patterns.

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However, WIC is a federal grant and not an entitlement program. The grant funding is not sufficient to serve all eligible people, and if the particular agency's allotted caseload (as mandated by the state) is full, the applicant is placed on a priority waiting list. Vacancies are filled according to a system of priorities set by the USDA. Pregnant and breastfeeding women, and infants determined to be at nutritional risk because of serious medical problems are given the highest priority.<sup>5</sup>

**Results and conclusions**: A literature review reveals that there have been many studies of the WIC program to ascertain whether or not there have been significant positive gains in term of birth outcomes. This has been of great concern especially to government which has invested substantial dollars into this program. Expenditures have grown from \$83 million nationally in FY 1975 to \$3.2 billion in FY 1995.<sup>1</sup> If studies can show that spending money on WIC saves costs in Medicaid (MA) expenditures because of better birth outcomes, then WIC will likely continue to be funded, and funded at higher levels. Consequently, many studies are found addressing whether or not the program is cost effective, particularly in regard to MA expenditures.

In 1985 and 1986, Schramm, from the Missouri Department of Health, published 2 articles which examined prenatal participation in WIC in the state of Missouri. In these studies, he examined birth outcomes from 1980 and 1982 as measured by mean birth weight and neonatal mortality. In order to do this he linked data files from MA, birth certificates, WIC records, newborn intensive care unit (NICU) admissions and death certificates and did separate retrospective cohort studies for each year. He then did costbenefit analyses (CBAs). His findings were, in both studies, that WIC participation

during pregnancy was associated with higher mean birth weights, lower rates of LBW, and lower neonatal mortality. In terms of CBA, the first study from 1980 birth records showed that for every WIC dollar spent, 83 cents was saved in MA costs. In the study of 1982 birth records, 49 cents was saved for every dollar of WIC expenditures. He explained that the apparent drop in cost-savings was an anomaly caused by higher 1980 NICU costs. He stated that when there was insufficient information in regard to WIC participation, or a mismatch of names (ie. Mother/baby had different names), there could have been WIC participants that were misclassified as non-WIC, causing a misclassification bias. This, however, would have reduced rather than have increased the apparent effectiveness of WIC to improve birth outcomes, so if anything, the association of WIC with better outcomes would have been even stronger. The author, however mentioned that the studies should be repeated in other states because of possible inconsistencies in the data.<sup>6,7</sup>

In 1986, again in Missouri, Stockbauer who incidentally worked in the same area as Schramm at the Health department, performed a study of pregnant women enrolled in WIC who delivered in1980. His study showed that the total WIC participants had a lower percentage of LBW infants than the non-WIC group, a lower percentage of smallfor-gestational age (SGA) infants, and a lower percentage of pre-term births. However, this difference did not stand up to stratification. When the sample was stratified for race (either white or non-white), it became apparent that only the non-white population showed any improvement in birth outcomes. High risk groups in terms of age were an exception, and improvements in white as well as non-white were evidenced. ("High risk" was defined as younger than 18, and older than 34 years of age). Matching was done in

92.9% of the cases. It might be that the non-white population was more disadvantaged and at much greater risk than the white population, and thus the improved nutrition from the WIC program had a much greater impact.<sup>8</sup>

Peck et al did an interesting study of birth weight and subsequent growth in Navajo children less than 2 years of age enrolled in WIC. The Navajo Nation is the largest American Indian population in the country. Information was examined that had been collected routinely between 1975 and 1980 through attendance at WIC. Although this study did not directly associate WIC enrollment with higher birth weights, it lends support to the concept of starting women on WIC in pregnancy. The study indicated that Navajo children having low birth weights are more likely to have suboptimal growth status as children; they are thinner, shorter, and lighter. Consequently, the authors argue that, since LBW can be prevented by good nutrition, getting mothers on WIC during pregnancy can positively impact growth throughout life.<sup>9</sup>

Samuels, Director of Community Health Services in Texas Department of Health, did a study on the effects of trimester of entry into WIC and how it affected birth outcomes in 1988. Her study showed that although babies born in WIC programs have lower overall birth weights than the rest of the population because of multiple risks, babies of women who enroll in WIC in the first trimester of pregnancy have higher birth weights than those who enroll in the second trimester. Accordingly, those who enroll in the second trimester have better outcomes than those who enroll in the third trimester. This shows a positive dose-response relationship.<sup>10</sup> (It should be noted here that when the author refers to the "rest of the population", this includes persons from all socioeconomic groups, as opposed to most studies which compare birth weights of

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infants born to women in similar circumstances as WIC participants, but who are not enrolled in WIC.)

Devaney et al analyzed 1987 data from 4 states: Florida, Minnesota, North Carolina, and South Carolina, and Jan-Jun 1988 data from Texas to examine birth weights of infants born to mothers participating in the WIC program. Again, the authors were evaluating the cost effectiveness of WIC in terms of MA dollars. They stated:

Prenatal WIC participation by Medicaid recipients is consistently associated with increased birth weight. The average increase in birth weight ranged from 51 grams in Minnesota to ......117 grams in North Carolina.

The authors concluded that prenatal participation in WIC not only improves birth outcomes, but generates savings in MA costs for the care of mothers and newborns.<sup>2</sup>

In yet another CBA done in 1988 by North Carolina State Center for Health statisticians Buescher et al, birth certificates born to mothers on MA were examined for live births in North Carolina by WIC participation. Because only MA births were examined, both WIC and non-WIC mothers were similar in terms of income. This study was prompted by the fact that in 1988 North Carolina had received a 50<sup>th</sup> (last) place ranking for infant mortality in the US. A new capability to link birth certificate records with health program data files enabled this study. Included in the study were all women who gave birth and were on MA except women who had received no prenatal care (this would have biased the study as only women receiving prenatal care are on WIC due to WIC eligibility requirements.) Average costs for newborn medical care were compared for WIC and non-WIC births. The study was controlled for the period of time the mother was enrolled in WIC. WIC enrollment was associated with significantly (p<.001)

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reduced rates of LBW and VLBW. This difference was more pronounced in black recipients. The authors concluded that "the savings in Medicaid costs far outweighed the costs of WIC services." The benefits to cost ratio showed that overall, for each dollar spent on WIC, the savings to MA were \$1.92 for white births and \$3.75 for blacks, or overall, \$2.91.<sup>11</sup>

Ahluwalia et al from Centers for Disease Control and Prevention in Atlanta linked 1992 Michigan births with the mother's prenatal WIC records and compared these to birth records of women on MA but not enrolled in WIC (MA recipients were chosen because they were known to be WIC eligible and thus similar socio-economically.) To control for selection bias caused by inclusion of premature births, only full term births were included. The authors found, as did Samuels, that there existed a positive doseresponse relationship in terms of better outcomes the longer a woman was enrolled prenatally in WIC. Women enrolled longer had heavier babies. Women enrolled before 12 weeks of gestation were 45% less likely as women not enrolled to deliver a SGA infant.<sup>3</sup>

I found two meta-analyses in the literature also. The first, by Rush et al, reviewed 22 studies published from 1976 to 1987. These studies looked at possible health outcomes of WIC enrollment in five areas: birth weight, perinatal and infant survival, anemia, somatic growth in infancy and childhood, and dietary intake. In regard to birth weight, the authors concluded:

Despite many uncertainties of design and analysis in both groups of studies, the most likely range for reduction in the rate of low birth weight associated with WIC was between 1 and 2%....The results in blacks may be closer to 3%....The best estimates of the effect of prenatal WIC benefits on mean birth weight range from ~30 to 60 g. Although these effects appear to be real, the magnitude is inconsistent and may well

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depend not only on the research design and on the level of prior nutritional risk of the mother but also on the quality of the WIC program in which the mother was enrolled.

The second meta-analysis was done by an evaluator and an economist from the US General Accounting Office, Avruch and Cackley and reviewed 17 studies published between 1981 and 1991 that analyzed LBW rates among WIC recipients and non-recipients. The purpose of this paper was to examine whether or not providing WIC to pregnant women returned savings to local, state, and federal government and to private payers by reduced first year medical costs for infants. They chose studies that they found strongest in terms of controlling for variables, or in random assignments. Many states were not represented in these studies, and some states were evaluated more than once. Out of 17 studies, 16 showed an improvement in moderately LBWs. Five studies also examined VLBWs, and all 5 showed an improvement; on the average of 44%. On the average across *all* studies, women who had received WIC had 25% fewer LBW infants than demographically similar women not on WIC. <sup>13</sup>

**Generalizability of the intervention results**: Enrollment in WIC is reserved for low income participants. Therefore the results are not generalizable to the rest of the population. Many of the studies confirm that the differences in birth weight are more pronounced in babies that are born to non-WIC participants who are enrolled in MA, than in non-WIC participants that are not, compared to WIC participants. Also, studies have consistently found greater improvement in black infants' birth weights than in white. Just as a malnourished, emaciated person will show far greater weight gain when given an

adequate diet than would a normal weight person, so too does an undernourished pregnant woman improve more dramatically when given adequate food and instruction in healthy eating. In my opinion, the variations in birth weight improvement are proof that the program is valuable; it follows logic.

Also, there is variation in state to state on certain criteria to enter the program. Some states have more stringent criteria, depending on the number of eligible women. Also, there is the fact that many women that are eligible *and* motivated may be excluded because the program in a particular area is full.

**Possible sources of bias**: Self selection bias is the most likely bias. Women who enroll in WIC may be different in some fundamental aspects than non-enrolled but eligible women. For instance, they may be more motivated to care for their health and might seek out other health supportive behaviors. Also, women who enroll in WIC as a result often have increased access to prenatal care which may in itself be responsible for some of the better birth outcomes (confounder).

**Implications of the findings**: For the most part, studies show that enrollment in WIC during pregnancy leads to higher birth weight babies. The obvious implications are that more dollars should be appropriated so that all women who are financially and nutritionally eligible can be accommodated in WIC programs. Since every cost effectiveness or cost-benefit study has shown savings, this should be a no-brainer for government.

**Recommendations:** I think that it would be beneficial and enlightening to conduct studies on the nutritional patterns of others in the WIC household who are not on WIC. One thing that occurred to me in reading these studies is that in poor households where there are older children, or spouses/significant others or even seniors in the household, those foods designated only for the pregnant woman or for the children under 5 may very well be also being eaten by others in the household. How do you tell a hungry 7 year old not to eat the cereal; it is only for his little brother or his mother? Therefore, it seems that in larger households, less of the WIC foods may be eaten by the pregnant women, thus having a negative effect on birth outcomes.

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