

DEMOGRAPHIC AND NUTRITIONAL CHARACTERISTICS OF INFANTS WHO ARE  
MEDICAID BIRTHS COMPARED TO NON-MEDICAID BIRTHS IN A KANSAS WIC  
POPULATION

by

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## **Abstract**

Nutritionally vulnerable women are more apt to give birth to low birth weight, small for gestational babies who have increased medical complications and higher risk of mortality. Participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) prenatally has been found to enhance positive pregnancy outcomes for women; reduced risk of low birth weights and nutrient deficiencies thus reducing the costs associated with medical care for infants covered by Medicaid, the joint federal and state insurance program for low income women, which covers 40% of infants in the United States. Pregnant women covered by Medicaid insurance are normally at the most risk but are adjunct eligible for the WIC program.

This descriptive cross-sectional research study determined the demographic and nutritional characteristics of Medicaid births in the WIC program compared to non-Medicaid births for the 2009 WIC program year, using the Kansas birth certificate, WIC program data linked to the birth certificate by unique identifying code.

Results from the study show that the Kansas WIC and Medicaid programs are serving the target population for the objectives of the programs. Mothers of Medicaid births who received WIC food during pregnancy and those in the WIC program are of low socioeconomic status and they are more likely to be younger in age, of minority racial group, less educated, never married and less likely to breastfeed infants at discharge and high likelihood of smoking. Compared to Medicaid births that did not participate in the WIC program, women at the lower margins of low socioeconomic status participated in WIC, signaling that the most vulnerable were getting the needed services.

Distinct findings from the Kansas WIC program reveal that Medicaid births in the WIC program were more likely to be breastfed at discharge, compared to Medicaid births not in the WIC program, even though WIC recipients had demographic characteristics associated with low breastfeeding patterns. A study investigating the reasons for not enrolling in WIC by Kansas Department of Health would be beneficial to the WIC program's goal to provide nutrition support to low income eligible women, infants and children in Kansas.

## Table of Contents

List of Tables .....	v
Acknowledgements .....	vi
Chapter 1 - Introduction .....	1
Health Significance .....	2
Problem statement .....	8
Chapter 2 - Methods.....	9
Description of Datasets .....	9
Preparation of the Datasets .....	10
Study Population .....	10
Data Collection and Analysis.....	11
Chapter 3 - Results.....	12
Chapter 4 - Discussion .....	40
Value of the research .....	51
Limitations of the study .....	53
Conclusion .....	53
References .....	54

## List of Tables

Table 2-1: Variables to be measured in this study .....	11
Table 3-1: Method of payment for deliveries in Kansas, 2009 .....	13
Table 3-2: Demographic characteristics of children born in Kansas in 2009 (N=41,388) by type of payment for delivery <sup>1</sup> .....	14
Table 3-3: Nutrition characteristics of children born in Kansas in 2009 (N=41,388) by type of payment for delivery <sup>1</sup> .....	17
Table 3-4: Prenatal characteristics and breastfeeding status of mothers with infants born in Kansas in 2009 (N=41,388) by type of payment for delivery <sup>1</sup> .....	19
Table 3-5: Demographic characteristics of Medicaid births in Kansas in 2009 (N=11,225) by mother's receipt of WIC food during pregnancy .....	21
Table 3-6: Nutrition characteristics of Medicaid births in Kansas in 2009 (N=11,225) by mother's receipt of WIC food during pregnancy .....	23
Table 3-7: Prenatal service, maternal risk factors, and breastfeeding status of Medicaid births in Kansas in 2009 (N=11,225) by mother's receipt of WIC food during pregnancy.....	25
Table 3-8: Demographic characteristics of Medicaid births in Kansas in 2009 (N=11,225) by enrollment in the WIC Program.....	27
Table 3-9: Nutrition characteristics of Medicaid births in Kansas in 2009 (N=11,225) by enrollment in the WIC Program.....	29
Table 3-10: Maternal characteristics and prenatal benefits of Medicaid births in Kansas in 2009 (N=11,225) by enrollment in the WIC Program.....	30
Table 3-11: Demographic characteristics of Medicaid births in the WIC program (N=19,002) in Kansas in 2009 compared to non-Medicaid births.....	32
Table 3-12: Nutrition characteristics of Medicaid births in the WIC program in Kansas in 2009 (N=19,002) compared to non-Medicaid births <sup>1</sup> .....	35
Table 3-13: Maternal characteristics of Medicaid births in the WIC program in Kansas in 2009 (N=19,002) compared to non-Medicaid births <sup>1</sup> .....	37
Table 3-14: Program participation of Medicaid births in the WIC program in Kansas in 2009 (N=19,002) compared to non-Medicaid births <sup>1</sup> .....	39

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## Chapter 1 - Introduction

The first two years of life are the most important in the growth, development and health of a child<sup>1</sup>. The health and nutritional status of mothers and children are intimately linked; therefore, there is need that any improvements in infant and young child feeding begin with ensuring the health and nutritional status of women, in their own right, throughout all stages of life<sup>2</sup>. Maternal nutritional factors before and during pregnancy affect a woman's risk of poor pregnancy outcomes, from spontaneous abortion, congenital malformations and birth defects to intrauterine growth retardation (IUGR), preterm delivery and reduced likelihood of her baby's survival during infancy<sup>3</sup>. Maternal health risk behaviors like smoking during pregnancy, alcohol and drug use also contribute significantly to the health of newborn babies. Women who smoke during pregnancy are more likely to have negative birth outcomes and their pregnancies more likely to present in miscarriages, IUGR, preterm births and low birth weight<sup>4</sup>.

Food insecurity and poverty are factors that contribute to poor nutritional status of pregnant women and their infants. The interaction of both food insecurity and poverty compound the negative consequences for children and women, making nutrition safety net programs such as the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) a priority in the United States<sup>5</sup>.

Poor nutritional status and health of pregnant women is related to increased morbidity and mortality of their infants, due to low birth weight, inadequate nutritional intake and disease. The CDC<sup>6</sup> defines low birth weight as a new born infant who weighs less than 2500 grams. The cut-off for very low birth weight (<1500 g) and extremely low birth weight at <1000g. Infants born with low birth weights have increased chance of infections and complications compared to infants with normal birth weights<sup>7</sup>. Recent studies reflect a decline in the birth weight/gestational age-specific neonatal mortality, however, there are also observed racial and ethnic differences<sup>8</sup>. In addition to the observed decline in neonatal mortality, infants born with very low gestational ages and birth weights account for the majority of United States infant mortality<sup>9</sup>.

Household low incomes reduce likelihood of adequate and nutritious food intake of family members<sup>10</sup>. Cook et al,<sup>11</sup> in a study determining the health effects of food insecurity using the U.S Household Food Security Scale, found that any level of food insecurity in a

household increases the risks of infants and children to develop severe illnesses to the extent of requiring hospitalization. Kennedy and Cooney<sup>5</sup> suggest that evidence from the implementation of the nutrition safety nets for children, namely WIC, School Breakfast Program, Summer Food Service Program, Child and Adult Care Food Program and SNAP – the Supplemental Nutrition Assistance Program, formerly known as the food stamps program, reflect that the nutrition safety nets’ effectiveness is closely linked to the overall social safety net influences of the broader economy.

### ***Health Significance***

Maternal and infant mortality indicators are used to measure the competency of a nation’s health care system<sup>12</sup>. The area of maternal, infant and child health is at the center of the objectives of the Healthy People 2020 as the wellbeing of mothers, infants and children determines the health of the next generation and can predict future health challenges for families, communities and the health care system<sup>13</sup>. The WIC program was initially established in 1972 with the mission to safeguard the health of low-income women, infants and children up to age five who are at nutritional risk by providing nutritious foods to supplement diets, nutrition education and referrals to health care and other social services<sup>14</sup>.

Within the United States, half of the participants in the WIC program are children between ages one and five years; one fourth are infants and the remaining fourth consist of, in descending order, non-breastfeeding postpartum and breastfeeding women<sup>15</sup>. The program serves a large number of children who are at risk of health and nutrition deficiencies, as well as pregnant and postpartum women, thus the program is considered a gateway into United States’ health care system<sup>16</sup>. There is insurmountable evidence that the WIC program is effective in the improvement of health and nutrition outcomes of women, infants and children<sup>17</sup>.

Infants born to women who participate in WIC during pregnancy tend to have a slightly higher mean birth weight than those born to women who were eligible but did not participate in WIC<sup>18</sup>. A study conducted by Kotelchuck et al<sup>19</sup> used births, and deaths registry in Massachusetts for the year 1978 and WIC bank vouchers to determine the association between maternal participation in the WIC program and outcomes of pregnancies. A total of 4126 pregnant women who participated in prenatal WIC program were matched by age, race, parity, education and marital status to 4126 non WIC prenatal participants. The study revealed that



women who participated in WIC program were younger in age, less educated, more likely to be unmarried and of minority race than women who did not participate in WIC during the prenatal period; which puts them at a greater health risk of having poor pregnancy outcomes thus delivering low birth weight babies. However, when compared to women not participating in WIC, participants had higher mean birth weights, gestational age and significantly reduced incidence of low birth weights and premature deliveries (i.e., at 36weeks), with the strongest improvements observed for black women, unmarried women and women with a less than high school education <sup>19</sup>. The authors proposed that though participation in the WIC program has beneficial effects for pregnancy outcomes, women at greater risk for health and nutrition vulnerability tend to benefit most from the WIC program <sup>19</sup>.

Increased prenatal participation in WIC for about seven to nine months was also associated with increases in birth weight, gestational age and decline in low birth weight, prematurity and small for gestational age and neonatal deaths <sup>19</sup>. These findings concurred with a later study conducted by Lazariu-Bauer et al<sup>20</sup> that utilized New York vital statistics data linked with WIC certifications, administrative and voucher redemption records, and federal census for the New York City period of 1995. Researchers examined the effect of longer duration prenatal participation in the WIC program compared to shorter duration prenatal participation in WIC on the birth weight of participants. The study findings showed that infants born to mothers who participated longer in prenatal WIC program had higher birth weights than infants with shorter prenatal participation, suggesting that early enrollment in WIC beneficially affects birth weight of new born infants.

An earlier national study to determine the benefits of WIC on nutrient intake, child growth and access to health care services for 2111 preschool children found that the WIC program increased nutrient intake for the specified target nutrients for the WIC program, iron (Fe), vitamin A, and vitamin C; however, there were no increases in energy intake. Children born of low socio economic status, black, unmarried mothers, into larger household size were found to benefit the most from the WIC program<sup>21</sup>.

Edozien et al<sup>22</sup> conducted a medical evaluation of WIC participants to determine the nutritional risks and further assess if WIC program food packages had any contribution to alleviating nutrition deficiencies WIC participants initially presented with. They found that WIC participants had increased nutrient intake, with infants who had healthy growth patterns, reduced

anemia prevalence, increased weight gain for pregnant women, and increased birth weights. This finding was further confirmed in a later study by Miller et al<sup>23</sup> noting that infants enrolled in the WIC program since birth, when compared to infants of same characteristics without enrollment in WIC, had lower chances of developing iron deficiency anemia (IDA), which is common and yet has negative consequences on the growth and development of infants. Black et al<sup>24</sup> found that infants eligible for WIC who did not receive WIC were more likely to be underweight, short, and perceived as having health problems, compared with WIC assistance recipients.

In a study by Owen &Owen, the prevalence of IDA among toddlers and preschool children was found to be lower for those participating in WIC<sup>25</sup>. In addition, the Supplemental Nutrition Assistance Program (SNAP, formerly the food stamp program) and WIC contribute to an increase in important nutrient intake for preschool children. However, intake of iron and zinc was found to be greater for children in the WIC program compared to children in the SNAP Program<sup>26</sup>. While Batten et al<sup>27</sup> also observed increases in nutrient intake in WIC infant participants compared to non WIC infant participants; the low IDA in WIC participants were attributed to the consumption of iron-fortified milk formula, which was very common in the WIC program.

Medicaid, the state and federal partnership that provides health insurance coverage for people with lower incomes, older people, people with disabilities and some families and children, finances 40% of all births in the United States. It provides coverage for pregnant women for prenatal care services throughout pregnancy, labor and delivery, including care for any complications that may occur thereafter, for 60 days post-partum. The coverage further extends automatically to infants born to pregnant women, and eligibility continues until the child's first birthday<sup>28</sup>. Medicaid is important in promoting the use of medical services, including prenatal services among low income women<sup>29</sup>.

A national survey of characteristics of WIC participants with a sample size of 2538 participants revealed that nearly two-thirds (63.6%) of children in WIC families are covered by Medicaid<sup>30</sup>. Rosenberg et al<sup>31</sup> suggests pre-pregnancy Medicaid coverage of pregnant woman may be associated with early initiation of prenatal care, which may in turn contribute to reduced low birth weights, even though prenatal care is only a part of the comprehensive care for mothers and newborns. Nevertheless, research suggests that there are benefits of prenatal care in improving birth weights of Medicaid births. A study on women receiving Medicaid at time of

birth and receiving prenatal care coordination (PNCC), a service targeted at enhancing accessing health services for women who are at high risk of poor birth outcomes in Wisconsin, found that women receiving prenatal care coordination had a lower risk of adverse birth outcomes – specifically, fewer low-birth weight infants, preterm infants and infants transferred to neonatal intensive units<sup>32</sup>.

Kahler et al<sup>33</sup> studied factors associated with prenatal WIC participation and determined that pregnant women who attended more prenatal visits had increased chances of participating in the WIC program. Furthermore, low-income pregnant women who received prenatal health care at health departments and community-sponsored clinics were more likely to be enrolled in the WIC program than women who receive prenatal care in other health care services<sup>33</sup>.

The Kaiser Family Foundation, in an issue brief on Medicaid's role for women across the lifespan, reported that nationwide, a majority of adult Medicaid participants are women above 19 years of age, of childbearing age (19-44 years), and of low socio economic status; some as far as 50% below the federal poverty level (FPL)<sup>34</sup>. Nevertheless, in comparison to uninsured women, Medicaid participants have access to a wide range of reproductive health care services, inclusive of prenatal, delivery and postpartum care. They also have higher insurance utilization rates for health care services compared to private insurance<sup>34</sup>, likely a result of the reality that pregnant women get full coverage for prenatal, delivery and postpartum without copayments.

On another note, marital status is found to be a determinant for health insurance coverage in that compared to married women, unmarried women are more likely to be uninsured and eligible for Medicaid insurance or other federal or state funded health insurance, while married women are more likely to have private health insurance with low possibilities of being uninsured<sup>35</sup>, revealing another dynamic in the care of poor women. Married women who are equally poor as unmarried counterparts are less likely to be eligible for Medicaid, thus leading to poor married women more likely to be uninsured than poor unmarried women<sup>34</sup>.

A study by Glied et al<sup>36</sup> used the Census Bureau March population survey for 1980-2005 to determine how marriage, labor participation, and public policy have affected women's health coverage for the period 1980-2005 at six-year intervals. This research further detailed that employment serves as an important source of insurance for women, with employed women likely to purchase employer-based insurance. However, as more women are unmarried and further more likely to have children as dependents, the absence of pooled income from spouses, income

from mostly part time employment, increased contribution to employment offered insurance for family coverage may render working women eligible for public health insurance since it is based on income and categorical eligibility<sup>36</sup>.

The WIC and Medicaid programs make positive contributions to the health and nutritional wellbeing of infants and children at different levels, with early enrollment in either program yielding overall positive outcomes. Bitler and Currie<sup>37</sup> studied the effects of the WIC program on the birth outcomes using the Pregnancy Risk Assessment Monitoring System (PRAMS). When comparing women whose deliveries were paid for by Medicaid and were in the WIC program compared to women whose deliveries were paid by Medicaid not in the WIC program, they determined that WIC prenatal participation brought about more pronounced, positive birth outcomes for poor, unmarried, lower educated and teenage mothers also participating in other public assistance programs.

Infants in WIC are either born into the program by women participating during pregnancy, or they may enter the program any time after birth before reaching five years of age, as long as eligibility criteria are met. Since one of the objectives of the WIC program is to refer participants to other services, there is evidence that infant and child enrollment in the WIC program increases participation in Early Periodic Screening, Diagnosis and Treatment (EPSDT), a complete well-child visit paid through Medicaid, emergency care and other services, thereby linking children to preventive and curative services in the health care system<sup>38</sup>. The EPSDT service also bridges the gap for children on public insurance and private insurance. However, even though Medicaid provides health coverage for low income children, the services they receive may be lower than those received by children covered by private health insurance due to access, utilization restrictions that may apply due to the management of the Medicaid program at state levels including the recipient taking responsibility to seek out for medical providers who accept Medicaid<sup>39</sup>.

To increase food security as well as maternal/infant health, WIC supports the American Academy of Pediatrics recommendation that mothers exclusively breastfeed their newborn infants for 6 months, then follow with a combination of the introduction of complementary foods

in addition to breastfeeding until at least 12 months of age, continuing breastfeeding for as long as mutually desired by mother and baby<sup>40</sup>. Breast milk fulfills all nutritional requirements for the growth and development of an infant, provides protection from acute illness during childhood and may provide protection from chronic diseases<sup>41</sup>. Breastfeeding has been associated with higher cognitive development of the child; similarly, breastfeeding mothers benefit by having decreased postpartum bleeding, an earlier return to their pre-pregnancy weight and a decreased risk of breast and ovarian cancer<sup>42</sup>.

The WIC program provides nutrition education and breastfeeding promotion; however, despite these benefits, breastfeeding duration is low in the WIC infant population<sup>43</sup>. The Ross Laboratories Mothers' Survey of infant feeding conducted between 1978 and 2003 found that mothers in the WIC program were not likely to breastfeed, while breastfeeding was more likely for women with college education, those living in the Western region of the US, not on WIC, infants with normal birth weight and women not working outside the home<sup>44</sup>. Great strides have been made in the WIC program to promote breastfeeding. All WIC participants receive a supplemental food package; however, beginning in 1992, an enhanced food package that provides additional food items (carrots and canned tuna) and additional juice, cheese, beans/peanut butter was provided to exclusively breastfeeding women, to better support their nutritional needs. In addition, the USDA initiated a national breastfeeding promotion campaign to encourage WIC participants to breastfeed.

Mothers who do not breastfeed are provided with iron-fortified infant formula for one year for their infants; however, their participation in the WIC program is limited to six months postpartum, compared to one year postpartum for breastfeeding women. All infant participants from six months of age receive the WIC package which includes foods rich in targeted nutrients: protein, iron, vitamin C, vitamin A, and calcium. In a national random sample of 3022 children ages 4 to 24 months who participated in the 2002 Feeding Infants and Toddlers study, nutrient intakes for iron, zinc, vitamin C, thiamin, niacin and vitamin C were found to be higher in WIC infants compared to non-WIC infants<sup>45</sup> thereby meeting the program goals.

***Problem statement***

In Kansas, and nationally, several studies have been conducted on WIC program effects on prenatal participation and Medicaid cost savings. However, there are few studies that focus on the impact of WIC participation during infancy and childhood as compared to the more frequently studied prenatal component of the WIC program<sup>46</sup>. Likewise, few studies have been conducted on the health outcomes of recipients of Medicaid, as more have emphasized on “process measures not health outcomes”<sup>39</sup>. The objective of this research project is to determine the nutritional and health characteristics of the 2009 Kansas Medicaid births in the WIC program compared to Medicaid births in the same time period not in the WIC program.

In the examination of the 2009 Kansas Medicaid births, the research questions to be answered are:

1. What are the demographic characteristics of infants born in Kansas for the year 2009 categorized by the method of delivery payment?
2. What are the characteristics of Medicaid infants whose mothers received WIC food during pregnancy?
3. What are the characteristics of Medicaid births co-participating in the WIC program in comparison to Medicaid births not in the WIC program?
4. What are the characteristics of Medicaid births also participating in the WIC program compared to non-Medicaid births in the WIC program?

## Chapter 2 - Methods

This descriptive cross-sectional research study is aimed at determining the nutritional and health characteristics of Kansas Medicaid births who are also participants in the WIC program, compared to Medicaid births not in the WIC program for year 2009. Approval was received from the Kansas Department of Health and Environment, Bureau of Epidemiology and Public Health Informatics to examine the data on the infants in Kansas WIC 2009 population. In addition, approval was granted by the Kansas State University Institutional Review Board for Research Involving Human Subjects - IRB proposal #6482.

To answer the questions for the study, secondary data from the linked Kansas data between WIC (PedNSS and PNSS), and births data files for the year 2009 were used.

### *Description of Datasets*

Datasets containing birth records, Medicaid claims data and the WIC program data that were linked to birth certificates for all singleton births born alive in the year 2009 were requested and received from the Kansas State Department of Health and Environment, Bureau of Epidemiology and Public Health Informatics. The WIC program, and the Bureau of Epidemiology and Public Health Informatics also provided the data dictionaries for the birth certificate, the Medicaid claims data, and WIC program data.

The basis for the births data is the birth certificate, which is required by each state. It is further mandated by federal law that a birth certificate is collected and published together with other vital statistics. The information published by the National Vital Statistics system at the federal level is derived from birth certificate data received from the National Center for Health Statistics (NCHS) and the states<sup>47</sup>.

In 2009, there were 41,388 records from the Kansas births data set containing 311 variables. The births data set was used in this study to identify the demographic characteristics of Kansas infants born in 2009, including method of payment used for the delivery. In this way, Medicaid births were identified, as well as whether the mother received WIC food or not during pregnancy, her prenatal care participation and behavioral risk factors such as smoking and alcohol use.

The Kansas WIC program provides data collected from the Pediatric Nutrition Surveillance System (PedNSS) and the Pregnancy Nutrition Surveillance System (PNSS), which

are national program-based surveillance systems that monitor the nutritional status of low-income infants, children and women in federally funded maternal and child health programs. These surveillance systems provide data that describe prevalence and trends of nutrition, health and behavioral indicators for mother and children.

The linked birth certificate and WIC datasets contained 41,388 records with a total of 728 variables (417 variables from the WIC dataset were added onto the birth certificate dataset that contained 311 variables) which were used to determine nutrition and health characteristics of Medicaid births and non-Medicaid births that were in the WIC program in the year 2009. In addition, socioeconomic, nutrition and health characteristics for both the infant and mother were determined from this dataset.

### *Preparation of the Datasets*

In order to prepare the use of the data sets, the protocol for entering the data was read, then each of the data sets was studied carefully to determine the names assigned for each variable and to match the values assigned for each response by comparing the values from the data dictionary. Descriptive statistics were run to determine the completeness of the data and decisions were made to use alternate variables for variables with missing data. Further, a number of variables (e.g. race, education and birth weight) were recoded into groups to prepare for better analysis.

### *Study Population*

In this study, data from all infants born in the year 2009 were used to determine Medicaid births in Kansas. From the Medicaid births, all infants who had been linked to their mothers by child ID and were singletons born alive in the year 2009 characterized infants in the WIC program. In addition, from the same set of Medicaid births, infants whose unique child ID was not in the WIC program were identified as part of the study population. The two groups from the Medicaid births were used to answer the research questions. From this study population, the demographic and nutritional characteristic descriptions of differences in nutritional and health outcomes of Medicaid births in the WIC program in comparison to Medicaid births not in the WIC program will be documented.



### ***Data Collection and Analysis***

Secondary data collected routinely for the Kansas WIC program that have been specifically linked to births and Medicaid records were analyzed using SPSS version 20<sup>48</sup>. The chi square test for independence was employed for the nominal variables to test the independence of the variables. Analysis of variance (ANOVA) was utilized to compare means for the variables in between the independent variables. Alpha was set at 0.05 for both chi square and ANOVA analysis.

**Table 2-1: Variables to be measured in this study**

<b>Maternal</b>	<b>Infant</b>
Demographic (Age, Education, Marital Status, Race/ethnicity)	Birth weight
Prenatal Care	Birth payment method
Source of payment for delivery	Medicaid enrollment
Pre- pregnancy weight	
Prenatal WIC service utilization	
Diabetes: pre-pregnancy/gestational	
Cigarette smoking	
Alcohol use	

Independent variables: Medicaid birth, Prenatal WIC enrollment, WIC enrollment, Source of payment for birth

## Chapter 3 - Results

The objective of this research project was to determine the demographic, nutritional and health characteristics of Kansas Medicaid births in the WIC program compared to non-Medicaid births in the WIC program. This chapter will reveal the results of the data analysis on Kansas linked birth certificate and the WIC program datasets for the year 2009.

The WIC program data comprises data collected from the PedNSS and the PNSS, which collect nutrition and health indicators for low-income women, infants and children in all federally funded programs. In Kansas, the nutrition and health indicators for low income women, infants and children are obtained from the Kansas population.<sup>49</sup>

The findings will be presented according to the research questions outlined as follows:

1. What are the demographic characteristics of infants born in Kansas for the year 2009 categorized by the method of delivery payment?
2. What are the characteristics of Medicaid infants whose mothers received WIC food during pregnancy?
3. What are the characteristics of Medicaid births co-participating in the WIC program in comparison to Medicaid births not in the WIC program?
4. What are the characteristics of Medicaid births also participating in the WIC program compared to non-Medicaid births in the WIC program?

Three sources of payment for delivery were used for analysis and will be compared namely: Medicaid, Private/employer insurance and other government throughout the study. For the year 2009, a total of 41,388 infants were born in Kansas. Of these births, 98.3% had the source of payment for their deliveries recorded on the birth certificates. As seen in Table 3-1 below, nearly half (49.6%) of Kansas deliveries in the year 2009 were paid for by private/employer insurance. Medicaid was the second largest payer for deliveries in the state, with 27.1% deliveries paid through the joint federal and state funded insurance. Other government insurance (5.2%) paid for the remaining deliveries for the infants in the year 2009. In descending order, private insurance, Medicaid, self-pay and other government insurance were the majority payers of deliveries in Kansas. Indian Health Service covers the least number of deliveries.

**Table 3-1: Method of payment for deliveries in Kansas, 2009**

<b>Method of payment for delivery</b>	<b>Number</b>	<b>% of Total</b>
Medicaid	11225	27.1
Private/Employer insurance	20528	49.6
Self-Pay	3442	8.3
Indian Health Service	38	.1
CHAMPUS/TRICARE	1869	4.5
Other government	2138	5.2
Other	682	1.6
Unknown	773	1.9
Total	40695	98.3

To conduct further analysis of the research questions, nutrition, socioeconomic and health characteristics of Medicaid births were compared to the characteristics of other two sources of payment; private/employer insurance and other government sources of payment.

**Question 1: What are the demographic characteristics of infants born in Kansas for the year 2009 categorized by the method of delivery payment?**

**Table 3-2: Demographic characteristics of children born in Kansas in 2009 (N=41,388) by type of payment for delivery<sup>1</sup>**

Selected characteristic	Medicaid (N= 11,225)		Private insurance (N=20,528)		Other government (N=2138)		$\chi^2$	p value
	N	%	N	%	N	%		
<b>Gender</b>								
Male	5671	50.5	10516	51.2	1104	51.6	1.80	0.407
Female	5554	49.5	10012	48.8	1034	48.4		
<b>Mother's race</b>								
White	8583	76.5	18375	89.5	1732	81.0	1667.06	0.000
Black	1703	15.2	713	3.5	317	14.8		
American Indian	276	2.5	186	0.9	28	1.3		
Other <sup>2</sup>	663	5.8	1254	6.1	61	2.9		
<b>Mother's education level</b>								
Less than high school, no diploma	3333	29.8	1164	5.7	664	31.2	10187.09	0.000
High school diploma or GED	4260	38.1	3089	15.1	778	36.5		
Some college, no degree	2749	24.6	4487	21.9	518	24.3		
Associate degree or higher	842	7.5	11747	57.3	170	8.0		
<b>Father's education level</b>								
Less than high school, no diploma	2442	28.9	1231	6.2	434	27.6	7079.62	0.000
High school diploma or GED	3628	42.9	3936	19.9	671	42.6		
Some college, no degree	1687	19.9	4358	22.1	329	20.8		
Associate degree or higher	704	8.3	10242	51.8	141	9.0		
<b>Mother's marital status</b>								
Ever married	3736	33.3	17528	85.4	826	38.7	9382.13	0.000
Never married	7472	66.7	2990	14.6	1309	61.3		
	<b>Medicaid</b>		<b>Private Insurance</b>		<b>Other government</b>		<b>F</b>	<b>p value</b>
<b>Mean age of mother (years)</b>	23.72		28.79		24.34		3694.93	0.000

<sup>1</sup> Methods of payment excluded are self-pay, Indian Health Service, and CHAMPUS/TRICARE.

<sup>2</sup> Includes: Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Native Hawaiian, Guamanian, Samoan, and Other Pacific Islander, as well as non-specified other races

As shown in Table 3-2, for the year 2009 there were 11,225 births paid for by Medicaid, 20,528 births paid for by private/employer insurance and 2138 births paid for by other government sources of payment. Among the three categories of sources of payment, the gender breakdown among births paid for by the three sources of payment is similar. For Medicaid deliveries, 50.5% were male and 49.5% females while 51.2% were male and 48.8% were females in the private/employer insurance deliveries. There was a similar breakdown in gender for the other government insurance group which had 51.6% males and 48.4% females.

Table 3-2 shows significant differences ( $p < 0.001$ ) in the maternal race of the three categories. The highest percentage of white mothers (89.5%) is in the Private /Employer insurance, 81.0% in other government insurance and 76.5% of Medicaid. The highest percentage of black mothers (15.2%) delivered through Medicaid or through other government insurance (14.8%), with 3.5% delivering through private/employer insurance. Other races had a majority of deliveries paid for by private/ employer insurance (6.1%), 5.8% by Medicaid and 2.9% by other government insurance.

There were significant differences of the “Mother’s education level” among the different types of payments for delivery ( $p < 0.001$ ). Compared to mothers of private insurance births and other government births, more mothers of Medicaid born infants (38.1%) had a high school diploma or GED, 29.8% had less than high school education with no diploma, 24.6% had some college education with no degree and 7.5% had an associate degree or higher. Mothers of private/employer born infant mostly had associate degrees or higher (57.3%), 21.9% some college but no degree, 15.1% high school diploma and 5.7% with less than high school education. The “mother’s education level” for the other government category was comparable to the Medicaid “mother’s education level.

The education characteristics of the fathers of the children of the three categories also followed a pattern similar to that of the mothers. For the Medicaid births, 28.9% had less than high school education with no diploma, the majority of fathers had a high school diploma or GED (42.9%), 19.9% had some college with no diploma and 8.9% had an associate degree or higher. A 51.8% proportion of fathers of births from private/employer insurance had associate or higher education, 22.1% had some college education with no diploma, 19.9% had high school diploma or GED and 6.2% had less than high school with no diploma.

Marital status was statistically significant among the three types of payment ( $p < 0.001$ ). A majority of mothers of Medicaid births had never been married (66.7%) while only (33.3%) had ever been married. Mothers of private /employer insurance had high proportion that had ever been married (85.4%) while 14.6% had never been married before. Mothers in the other government insurance type of payment had a higher proportion that had never been married (61.3%) while 38.9% had ever been married.

“Maternal age” among the types of payments was statistically significant ( $p < 0.001$ ). Medicaid mothers had a mean age of 23.72 while private insurance mothers had mean age of 28.79 and other government insurance had mean age of 24.34.

**Table 3-3: Nutrition characteristics of children born in Kansas in 2009 (N=41,388) by type of payment for delivery<sup>1</sup>**

<b>Selected characteristic</b>	<b>Medicaid (N= 11,225)</b>		<b>Private insurance (N=20,528)</b>		<b>Other government (N=2138)</b>		<b>F</b>	<b>p value</b>
<b>Mean birth weight (gm)</b>								
Total	3205.95		3347.28		3169.10		267.16	0.000
Male	3262.46		3405.01		3224.45			
Female	3148.26		3286.64		3110.00			
<b>Mean prepregnancy weight of mother (lb)</b>	166.57		161.71		170.94			
<b>Selected characteristic</b>	<b>Medicaid (N= 11,225)</b>		<b>Private insurance (N=20,528)</b>		<b>Other government (N=2138)</b>			
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>χ<sup>2</sup></b>	<b>p value</b>
<b>Birth weight groups</b>								
High	653	5.8	1916	9.3	139	6.5	248.38	0.000
Normal	9609	85.6	17328	84.4	1737	81.2		
Low	963	8.6	1284	6.3	262	12.3		
<b>Low birth weight subgroups</b>								
Very low birth weight	883	91.7	1163	90.6	238	90.8	0.58	0.653
Extremely low birth weight	80	8.3	121	9.4	24	9.2		
<b>Mother's smoking status 3 months before pregnancy &amp; during pregnancy</b>								
Yes	3949	35.3	1877	8.4	620	29.1	3378.35	0.000
No	7226	64.7	18617	91.6	1513	70.9		
<b>Mother's alcohol use</b>								
Yes	41	0.4	11	0.1	4	0.2	44.82	0.000
No	11183	99.6	20517	99.9	2134	99.9		

<sup>1</sup> Methods of payment excluded are self-pay, Indian Health Service, and CHAMPUS/TRICARE.

As shown in Table 3-3, of the total births for the year of 2009 (n= 41,388), total mean birth weight was statistically significant among the three types of payment ( $p < 0.001$ ). Mothers with private/employer insurance delivered infants with the highest mean birth weight (3347.28 g); Medicaid infants had mean birth weight of 3205.95g while other government insurance infants had the lowest mean birth weight of 3169.10g.

“Mean pre-pregnancy weight” of mothers in pounds was significantly different among the three types of payments. Mothers of other government insurance infants had the highest mean pre-pregnancy weight (170.94 lb.); mothers of Medicaid infants had a mean weight of 166.57 lb. while private insurance mothers had the lowest pre pregnancy weight (161.71 lb.).

Among the three types of payments, birth weight groupings according to “high birth weight”, “normal birth weight” and “low birth weight” were significantly different ( $p < 0.001$ ). The cut-off points for high birth weight were birth weight  $> 4000g$ , normal birth weight  $\geq 2501g \leq 3999g$  and low birth weight  $\leq 2500g$ . Private insurance births had the highest high birth weights (9.3%) followed by other government insurance births (6.5%) and lastly Medicaid births (5.8%). Medicaid infants had the highest normal birth weights (85.6%), private insurance had (84.4%) and other government insurance had (81.2%). Other government insurance births had the highest low birth weights (12.3%) followed by Medicaid infants (8.6%) while private insurance had the least low birth weights (6.3%).

Among the low birth weights, two categories were formulated; very low birth weight (VLBW, at 1001g-2500g) and extremely low birth weight (ELBW at  $\leq 1000g$ ). Differences in low birth weight incidence among the three forms of payment were not statistically significant  $X^2 = 0.58$  ( $p = 0.653$ ). In the Medicaid births, 91.7 % of low birth weights were VLBW while 8.3% were ELBW. For the private insurance 90.6% of low birth weight were VLBW, while 9.4% were ELBW. Other government insurance-covered births had 90.8% of the low birth weights qualifying as VLBW and 9.2% ELBW.

Among the three methods of payment, Medicaid births had the highest percentage of very low birth weights (91.7%) followed by private insurance births (90.6%) while other government insurance had (90.8%) very low birth weights. Extremely low birth weight infants were most in private insurance births (9.4%), (9.2%) in other government insurance births and 8.3% in Medicaid births.



Mothers smoking status three months before pregnancy and during pregnancy was statistically significant ( $p<0.001$ ) among the three forms of payment. Smoking was highest for mothers of Medicaid births 35.3%, women covered by other government insurance 29.1% while lowest for those with private insurance 8.4%.

Mother’s alcohol use was statistically significantly ( $p<0.001$ ) associated with the form of payment. Alcohol use was (0.4%) among mothers of Medicaid births, (0.2%) among mothers of other government insurance births and (0.1%) among private insurance births.

<b>Table 3-4: Prenatal characteristics and breastfeeding status of mothers with infants born in Kansas in 2009 (N=41,388) by type of payment for delivery<sup>1</sup></b>								
<b>Selected characteristic</b>	<b>Medicaid (N= 11,225)</b>		<b>Private insurance (N=20,528)</b>		<b>Other government (N=2138)</b>		<b>F</b>	<b>p value</b>
<b>Mean number of prenatal visits</b>	12.43		12.94		14.33		24.49	0.000
<b>Selected characteristic</b>	<b>Medicaid (N= 11,225)</b>		<b>Private insurance (N=20,528)</b>		<b>Other government (N=2138)</b>			
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>χ<sup>2</sup></b>	<b>p value</b>
<b>Prenatal care</b>								
Yes	11063	98.6	20482	98.8	2125	99.4	166.55	0.000
No	162	1.4	46	0.2	13	0.6		
<b>Prenatal WIC participation</b>								
Yes	8267	75.2	2670	13.2	1393	69.1	12732.62	0.000
No	2732	24.8	17495	86.8	623	30.9		
<b>Infant breastfed at discharge</b>								
Yes	6865	63.1	17042	85.5	608	28.9	2075.36	0.000
No	4006	36.9	2882	14.5	1493	71.1		

<sup>1</sup> Methods of payment excluded are self-pay, Indian Health Service, and CHAMPUS/TRICARE.

Table 3-4 shows that the “mean number of prenatal visits” among the three types of payment for delivery were statistically significant ( $F=24.49$ ,  $p<0.001$ ). Mothers of births paid for by other government insurance had the highest mean number of prenatal visits (14.33) while private insurance mothers had 12.94 visits and Medicaid mothers the lowest mean number of prenatal visits (12.43).

Prenatal care differed significantly among the three groups of payments ( $p < 0.001$ ). Prenatal care was attended by 99.4% of mothers of other government insurance births, 98.8% of mothers of private insurance births and (98.6%) of mothers of Medicaid births.

Prenatal WIC participation, defined here as mothers who received WIC food for themselves during pregnancy, was statistically significant ( $p < 0.001$ ) among the different forms of payment. Mothers of Medicaid births had the highest participation percentage (75.2%), those with other government insurance participation in WIC was (69.1%) and lowest among private insurance births (13.2%).

Breastfeeding status of infants at discharge varied significantly among the three groups and reflected that breastfeeding at discharge was highest in private insurance mothers (85.5%), (63.1%) among Medicaid mothers and lowest among other government insurance mothers (28.9%).

**Question 2: What are the characteristics of Medicaid infants whose mothers received WIC food during pregnancy?**

**Table 3-5: Demographic characteristics of Medicaid births in Kansas in 2009 (N=11,225) by mother's receipt of WIC food during pregnancy**

Selected characteristic	Received WIC Food (N=8267)		Did not receive WIC food (N=2732)		$\chi^2$	p value
	N	%	N	%		
<b>Gender</b>						
Male	4215	51.0	1339	49.0	3.35	0.188
Female	4052	49.0	1393	51.0		
<b>Mother's race</b>						
White	6304	76.3	2101	76.9	1.24	1.000
Black	1275	15.4	398	14.6		
American Indian	199	2.4	69	2.5		
Other <sup>1</sup>	489	5.9	164	6.0		
<b>Mother's education level</b>						
Less than high school, no diploma	2599	31.5	676	24.8	174.06	0.000
High school diploma or GED	3244	39.4	937	34.4		
Some college, no degree	1905	23.1	782	28.7		
Associate degree or higher	495	6.0	330	12.1		
<b>Mother's marital status</b>						
Ever married	2659	32.2	995	36.5	19.06	0.001
Never married	5596	67.8	1733	63.5		

<sup>1</sup>Includes: Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Native Hawaiian, Guamanian, Samoan, and Other Pacific Islander, as well as non-specified other races

Table 3-5 shows that of the 11,225 Medicaid births in Kansas in the year 2009, mothers who received WIC food for themselves during pregnancy were 8267, while mothers who did not receive WIC food were 2732. The infants' gender distribution between Medicaid birth mothers

who received WIC food and Medicaid mothers who did not receive WIC food was not statistically significant ( $p=.188$ ). The gender distribution of infants was 51% males and 49% females from mothers who received WIC food during pregnancy whereas there were 49% males and 51% females from mothers who did not receive WIC food during pregnancy.

Mother's education for mothers who "received WIC food" and those that "did not receive WIC food" was statistically significant ( $p<0.001$ ). Education level for mothers who received WIC food had 31.5% less than high school with no diploma, 39.4% had a high school diploma or GED, 23.1 % had some college with no degree and 6% had an associate degree or higher whereas mothers who did not receive WIC food had 24.8% less than high school education with no diploma, 34.4% had a high school diploma or GED, 28.7% had some college with no degree and 12.1% had associate degree or higher.

Mother's marital status for mothers who received WIC food mothers who did not receive WIC food was statistically significant. A major proportion of the mothers in both groups were never married -- 67.8% of mothers who received WIC food and 63.5% of mothers who did not receive WIC food.

<b>Table 3-6: Nutrition characteristics of Medicaid births in Kansas in 2009 (N=11,225) by mother's receipt of WIC food during pregnancy</b>						
<b>Selected characteristic</b>	<b>Received WIC Food (N= 8267)</b>		<b>Did not receive WIC food (N=2732)</b>			
					<b>F</b>	<b>p value</b>
<b>Mean birth weight (gm)</b>	3204.10		3212.96		0.347	0.707
<b>Selected characteristic</b>	<b>Received WIC Food (N= 8267)</b>		<b>Did not receive WIC food (N=2732)</b>		<b><math>\chi^2</math></b>	<b>p value</b>
<b>Birth weight groups</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>		
High	483	5.8	155	5.7	0.86	0.930
Normal	7079	85.7	2341	85.7		
Low	705	8.5	236	8.6		
<b>Low birth weight subgroups</b>						
Very low birth weight	653	92.6	212	89.8	4.69	0.096
Extremely low birth weight	52	7.4	24	10.2		
<b>Breastfed at discharge</b>						
Yes	4996	62.5	1732	64.8	4.67	0.031
No	2999	37.5	939	35.2		

Mothers who received WIC food totaled 8267 compared to 2732 that did not receive WIC food during pregnancy. Table 3-6 shows that the mean birth weight for infants born of mothers who received WIC food and infants whose mothers did not receive WIC food, analyzed by ANOVA, was not significantly different ( $p=.707$ ). The mean birth weight of infants whose mothers received WIC food was lower (3204.10 grams) compared to birth weight of 3212.96 grams for infants whose mothers did not receive WIC food.

Comparing the birth weight groups of high birth weight, normal birth weight and low birth weight, there was no significant difference between mothers who received WIC food and those who did not receive WIC food ( $p=.930$ ). High birth weight was higher in mothers who received WIC food (5.8%) whereas there was 5.7% high birth weight infant from mothers who did not receive WIC food. Normal birth weight infants from mothers who received WIC food

were 85.7% and also 85.7% for mothers who did not receive WIC food. Low birth weight was 8.5% for mothers who received WIC food and 8.6% mothers who did not receive WIC food.

For low birth weight infants, incidences of VLBW infants and ELBW infants were not statistically significant ( $p=.096$ ) for infants whose mothers received WIC food and those mothers who did not receive WIC food. Breastfeeding at discharge was statistically significant ( $p=.031$ ) between infants whose mothers received WIC food during pregnancy and those that did not receive WIC food during pregnancy. Breastfeeding at discharge was higher (64.8%) for mothers who did not receive WIC food compared to 62.5% infants whose mothers received WIC food. There were 37.5% infants not breastfed at discharge whose mothers who received WIC food compared to 35.2% infants that were not breastfed at discharge by mothers who did not receive WIC food.

<b>Table 3-7: Prenatal service, maternal risk factors, and breastfeeding status of Medicaid births in Kansas in 2009 (N=11,225) by mother's receipt of WIC food during pregnancy</b>						
<b>Selected characteristic</b>	<b>Received WIC Food (N= 8267)</b>		<b>Did not receive WIC food (N=2732)</b>		<b><math>\chi^2</math></b>	<b>p value</b>
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>		
<b>Prenatal care</b>						
Yes	8169	98.8	2671	97.8	15.08	0.000
No	98	1.2	61	2.2		
<b>Alcohol use</b>						
Yes	32	0.4	8	0.3	0.28	0.599
No	8235	99.6	2724	99.7		
<b>Smoking 3 months before and during pregnancy</b>						
Yes	2996	36.4	882	32.4	14.20	0.000
No	5241	63.6	1843	67.6		
					<b>F</b>	<b>p value</b>
<b>Mean number of prenatal visits</b>	12.42		12.39		0.190	0.827
<b>Mean pre-pregnancy weight (lb.)</b>	168.12		160.83		7.833	0.000

Table 3-7 shows that receiving prenatal care of mothers of Medicaid births was significantly different ( $p < 0.001$ ) between mothers who received WIC food and mothers who did not receive WIC food. Mothers who received WIC food had a higher percentage (98.8%) receiving prenatal care while 97.8% of mothers who did not receive WIC food during pregnancy received prenatal care. The mean number of prenatal visits was not significantly different ( $p = .827$ ) between mothers who received WIC food and those that did not receive WIC food.

The mean pre pregnancy weight in pounds was statistically significant ( $p < 0.001$ ) for mothers who received WIC food and mothers who did not receive WIC food during pregnancy. Mothers who received WIC food had a significantly higher mean prepregnancy weight (168.12 pounds) when compared to the mean pre pregnancy weight of mothers that did not receive WIC food (160.83 pounds)

Alcohol use was not significantly different ( $p = .599$ ) for mothers of Medicaid births that received WIC food versus mothers who did not receive WIC food during pregnancy. Alcohol use was higher in mothers who received WIC food (0.4%), compared to mothers who did not receive WIC food (0.3%).

Smoking three months before and during pregnancy was significantly different ( $p < 0.001$ ) between mothers who received WIC food and mothers who did not receive WIC food. Smoking was higher in mothers who received WIC food during pregnancy (36.4%) while only 32.4% of mothers who did not receive WIC food smoked three months before and during pregnancy.



**Question 3: What are the characteristics of Medicaid births co-participating in the WIC program in comparison to Medicaid births not in the WIC program?**

**Table 3-8: Demographic characteristics of Medicaid births in Kansas in 2009 (N=11,225) by enrollment in the WIC Program**

Selected characteristic	WIC (N=4953)		Not in WIC (N=6272)		$\chi^2$	p value
	N	%	N	%		
<b>Gender</b>						
Male	2506	50.6	3165	50.5	0.02	0.889
Female	2447	49.4	3107	49.5		
<b>Mother's race</b>						
White	3748	75.7	4835	75.1	3.82	0.379
Black	779	15.7	924	14.7		
American Indian	131	2.6	145	2.3		
Other <sup>1</sup>	295	6.0	368	7.9		
<b>Mother's education level</b>						
Less than high school, no diploma	1547	31.3	1786	28.6	9.69	0.027
High school diploma or GED	1837	37.2	2423	38.8		
Some college, no degree	1189	24.1	1560	25.0		
Associate degree or higher	369	7.4	473	7.6		
<b>Mother's marital status</b>						
Ever married	1593	32.2	2143	34.3	5.32	0.021
Never married	3359	67.8	4113	65.7		

<sup>1</sup>Includes: Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Native Hawaiian, Guamanian, Samoan, and Other Pacific Islander, as well as non-specified other races

As seen in Table 3-8, from the Medicaid births of 2009, there were 4593 infants enrolled in the WIC program while 6272 infants were not enrolled in the WIC program. Gender distribution of the infants was not statistically significant ( $p=.889$ ). Mothers race was not statistically significant ( $p=.379$ ) for the infants in the WIC program and those not in the WIC program.

Mothers education level was statistically significant ( $p=.027$ ) for mothers of infants that were enrolled in the WIC program compared to mothers of infants that were not enrolled in the WIC program. Mothers who had less than high school education with no diploma were higher in

the for infants enrolled in the WIC program (31.3%) compared to 28.6% mothers of infants that were not enrolled in the WIC program. Mothers with a high school diploma or GED education were higher in mothers of infants that were not enrolled in the WIC program (38.8%) while there were 37.2% mothers of infants enrolled in the WIC program. Mothers of infants with some college but no degree were higher in mothers of infants not enrolled in the WIC program (25%) while there were 24.1% mothers of infants that were enrolled in the WIC program. Mothers with associate degrees or higher were higher in mothers of infants that were not enrolled in the WIC program (7.6%) while there were 7.4% mothers of infants that were enrolled in the WIC program.

Mother's marital status was statistically significant ( $p=.021$ ) for mothers of infants that were enrolled in the WIC program compared to mothers of infants that were not enrolled in the WIC program. Mothers who were ever married were higher in the group of mothers of infants not enrolled in the WIC program (34.3%) versus 32.2% mothers of infants enrolled in the WIC program who were ever married. There was a higher percentage of mothers who were never married in mothers of infants enrolled in the WIC program (67.8%) while 65.7% mothers of infants not enrolled in the WIC program were ever married.

<b>Table 3-9: Nutrition characteristics of Medicaid births in Kansas in 2009 (N=11,225) by enrollment in the WIC Program</b>						
<b>Selected characteristic</b>	<b>WIC (N=4953)</b>		<b>Not in WIC (N=6272)</b>			
					<b>F</b>	<b>p value</b>
<b>Mean birth weight</b>	3210.89		3202.05		0.659	0.417
<b>Selected characteristic</b>	<b>WIC (N=4953)</b>		<b>Not in WIC (N=6272)</b>		<b><math>\chi^2</math></b>	<b>p value</b>
<b>Birth weight groups</b>	N	%	N	%	2.19	0.335
High	303	6.2	350	5.6		
Normal	4239	85.5	5370	85.6		
Low	411	8.3	552	8.8		
<b>Low birth weight subgroups</b>						
Very low birth weight	374	91.0	509	92.2	0.31	0.578
Extremely low birth weight	37	9.0	43	7.8		
<b>Breastfed at discharge</b>						
Yes	3018	99.5	3847	98.7	11.12	0.000
No	14	0.5	49	1.3		

In table 3-9, the mean birth weight of Medicaid infants enrolled in the WIC program and those not enrolled on the WIC program did not differ significantly ( $p=0.417$ ); however, mean birth weights of infants enrolled in the WIC program were higher (3210.89 grams) than mean birth weights of infants not enrolled in the WIC program, (3202.05 grams)

Breastfeeding status at discharge was statistically significant ( $p<0.001$ ) for Medicaid infants enrolled in the WIC program and those not enrolled on the WIC program. Breastfeeding at discharge was higher for mothers of infants in the WIC program (99.5%) than mothers of infants not enrolled in the WIC program (98.7%).

<b>Table 3-10: Maternal characteristics and prenatal benefits of Medicaid births in Kansas in 2009 (N=11,225) by enrollment in the WIC Program</b>						
<b>Selected characteristic</b>	<b>WIC (N=4953)</b>		<b>Not in WIC (N=6272)</b>		<b><math>\chi^2</math></b>	<b>p value</b>
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>		
<b>Prenatal care</b>						
Yes	4884	98.6	6179	98.5	0.16	0.692
No	69	1.4	93	1.5		
<b>Alcohol use</b>						
Yes	23	0.5	18	0.3	1.93	0.165
No	4930	99.5	6253	99.7		
<b>Smoking 3 months before and during pregnancy</b>						
Yes	1718	34.8	2231	35.7	0.97	0.325
No	3215	65.2	4011	64.3		
					<b>F</b>	<b>p value</b>
<b>Mean number of prenatal visits</b>	12.44		12.42		0.01	0.933
<b>Mean pre-pregnancy weight (lb.)</b>	166.65		166.50		0.01	0.938

Table 3-10 shows that prenatal care for mothers of Medicaid births in the WIC program and those not in the WIC program was not statistically significant ( $p=.692$ ) as prenatal care was only slightly higher for mothers of infants in the WIC program (98.6%) compared to 98.5% of mothers not in the WIC program participating in prenatal care.

Mean number of prenatal visits was higher among mothers in the WIC program (12.42 visits) compared to mothers not in the WIC program (12.42 visits)/ mean pre pregnancy weight was not statistically significant ( $p= .933$ ) for mothers of Medicaid births in the WIC program and those not in the WIC program.

Mean pre pregnancy weight was only slightly higher in mothers in the WIC program (166.65 pounds) compared to the mean pre pregnancy of mothers not in the WIC program (166.50 pounds)

Alcohol use was not statistically significant ( $p=.165$ ) for mothers of Medicaid births in the WIC program compared to those not in the WIC program. Alcohol use was higher, though not significantly in mothers in the WIC program (0.5%) compared to mothers not enrolled in the WIC program (0.3%).

Smoking three months before and during pregnancy was not significantly different ( $p=.325$ ) for mothers of Medicaid births in the WIC program and those not in the WIC program. Smoking was highest for mothers of infants not in the WIC program (35.7%) while there were 34.8% of mothers of infants enrolled in the WIC program who smoked. The mean number of prenatal visits was not statistically significant ( $p=.933$ ).

**Question 4: What are the characteristics of Medicaid births also participating in the WIC program compared to non-Medicaid births in the WIC program?**

<b>Table 3-11: Demographic characteristics of Medicaid births in the WIC program (N=19,002) in Kansas in 2009 compared to non-Medicaid births</b>								
<b>Selected characteristic</b>	<b>Medicaid</b>		<b>Private insurance</b>		<b>Other government</b>		<b>X<sup>2</sup></b>	<b>p value</b>
<b>Gender</b>	N=4953	%	N=9824	%	N=873	%		
Male	2506	50.6	5058	51.5	464	53.2	2.32	0.314
Female	2447	49.4	4766	48.5	409	46.8		
<b>Mother's race</b>								
White	3748	75.7	8793	89.5	725	83.0	853.11	0.000
Black	779	15.7	343	3.5	131	15.0		
American Indian	131	2.6	90	0.9	3	0.3		
Other <sup>2</sup>	295	6.0	598	6.1	14	1.7		
<b>Mother's education level</b>	N=4942	%	N=9809	%	N=869	%		
Less than high school, no diploma	1547	31.3	535	5.5	274	31.5	4823.81	0.000
High school diploma or GED	1837	37.2	1427	14.5	308	35.5		
Some college, no degree	1189	24.1	2127	21.7	221	25.4		
Associate degree or higher	369	7.4	5720	58.3	66	7.6		
<b>Mother's marital status</b>	N=4952	%	N=9824	%	N=873	%		
Ever married	1593	32.2	8463	86.1	332	38.0	4633.36	0.000
Never married	3359	67.8	1361	13.9	541	62.0		
<b>Received WIC food during pregnancy</b>	N=4838	%	N=9617	%	N=863	%		

Yes	3608	74.6	1203	12.5	596	69.1	5885.74	0.000
No	1230	25.4	8414	87.5	267	30.9		
	<b>Medicaid</b>		<b>Private Insurance</b>		<b>Other government</b>		<b>F</b>	<b>p value</b>
<b>Mean age of mother (years)</b>	23.58		28.8		24.30		1790.10	0.000
<b>Mean household size<sup>3</sup></b>	4.39		4.43		4.44		0.13	0.483
<b>Mean monthly household income(\$)<sup>4</sup></b>	1587.34		1582.13		1632.18		0.73	0.483

<sup>1</sup> Methods of payment excluded are self-pay, Indian Health Service, and CHAMPUS/TRICARE.

<sup>2</sup> Includes: Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Native Hawaiian, Guamanian, Samoan, and Other Pacific Islander, as well as non-specified other races

<sup>3</sup> Data for household size comes from the infant (PedNSS) dataset

<sup>4</sup> Data for household monthly income comes from the maternal (PNSS) dataset

Table 3-11 shows that, from the 19,002 WIC program enrollments, there were 4953 Medicaid births, 9824 private insurance births and 873 other government insurance program births.

Gender difference between infants who are Medicaid births and other non-Medicaid births were not statistically significant ( $p=.314$ ).

Mothers race was statistically significant ( $p<0.001$ ) for Medicaid births and other non-Medicaid births. White race mothers were higher 89.5% in private insurance births and 83.0 for other government insurance births and low 75.7% in Medicaid births. Black race mothers were higher for Medicaid births (15.7%), 15.0% for other government insurance births and lowest 3.5% for private insurance mothers. American Indian mothers were higher in the category of Medicaid births (2.6%), 0.9% and lowest 0.3% for other government insurance. Mothers of other<sup>1</sup> races were highest in private insurance births (6.1%), 6.0 in Medicaid births and lowest 1.7% in other government insurance births.

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<sup>1</sup> Other race groups include Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Native Hawaiian, Guamanian, Samoan, other pacific islander as well as non-specified other races.

Responses for the “mother’s education level” were from 4942 Medicaid births, 9809 private insurance births and 869 other insurance births. “Mother’s education level” was statistically significant ( $p<0.001$ ) for the three different forms of payment for delivery. “Less than high school education” was highest (31.5%) for mothers of other government insurance births, 31.3% for Medicaid births and lowest (5.5%) for private insurance births. Maximum education at “high school diploma or GED education” was highest (37.2%) in mothers of Medicaid births, (35.5%) for mothers of other government insurance births and lowest 14.5% for mothers of private insurance infants. “Some college with no degree education” was highest (25.4%) for other government insurance, 24.1% Medicaid births and lowest (21.7%) for mothers of private insurance births. “Associate degree or higher education” was higher (58.3%) for mothers of private insurance births, 7.6% for other government insurance births and lowest (7.4%) for mothers of Medicaid births.

Responses on mothers marital status was from 4952 Medicaid births, 9824 Private insurance births and 873 other government insurance births. Mother’s marital status varied significantly ( $p<0.001$ ) for the three different forms of payment for delivery. Mothers who were “ever married” were higher for mothers of private insurance births (86.1%), 38% for mothers of other government insurance births and lowest (32.2%) for mothers of Medicaid births.

“Receiving WIC food” was significantly different ( $p<0.001$ ) for the three different forms of payment for delivery. Receiving WIC food during pregnancy was highest (74.6%) for mothers of Medicaid births, 69.1% for mothers of other government insurance births and lowest (12.5%) for mothers of private insurance.

The “mean age” for mothers was statistically significant ( $p<0.001$ ) for the three different forms of payment for delivery. Mean age was highest (28.8 years) for mothers of private insurance, 24.30 years for mothers of other government insurance births and lowest (23.58 years) for mothers of Medicaid births.

The “mean household size” was not statically significant ( $p=.483$ ) for the three different forms of payment. Mean household size was highest (4.44) for other government insurance, 4.43 for private insurance and lowest 4.39 for Medicaid births.

Mean monthly household income was not statistically significant ( $p=.483$ ) for the three different forms of payments. Monthly household income was highest (\$1632.18) for other



government insurance births, \$1587.34 for Medicaid births and lowest (\$1582.13) for private insurance births.

**Table 3-12: Nutrition characteristics of Medicaid births in the WIC program in Kansas in 2009 (N=19,002) compared to non-Medicaid births<sup>1</sup>**

Selected characteristic	Medicaid		Private insurance		Other government		X <sup>2</sup>	p value
	N=4953	%	N=9824	%	N=873	%		
<b>Birth weight groups</b>								
High	303	6.1	915	9.3	50	5.7	96.48	0.000
Normal	4239	85.6	8286	84.3	717	82.1		
Low	411	8.3	623	6.4	106	12.2		
<b>Low birth weight subgroups</b>								
Very low	374	91.0	564	90.5	95	89.6	0.20	0.905
Extremely low	37	9.0	59	9.5	11	10.4		
<b>Prenatal care</b>	N=4953	%	N=9824	%	N=873	%		
Yes	4884	98.6	9804	99.8	867	99.3	77.32	0.000
No	69	1.4	20	0.2	6	0.7		
<b>Ever breastfed</b>	N=3139	%	N=6194	%	N=523	%		
Yes	1686	53.7	3328	53.7	283	54.1	0.03	0.985
No	1453	46.3	2866	46.3	240	45.9		
<b>Breastfed at discharge</b>	N=4792	%	N=9510	%	N=859	%		
Yes	3018	63.0	8125	85.4	606	70.5	946.56	0.000
No	1774	37.0	1385	14.6	253	29.5		
							<b>F</b>	<b>p value</b>
<b>Mean birth weight (gm)</b>	3210.89		3349.70		3159.55		121.33	0.000
<b>Mean prenatal visits</b>	12.44		12.85		13.21		2.98	0.051

<sup>1</sup> Methods of payment excluded are self-pay, Indian Health Service, and CHAMPUS/TRICARE.

As shown in Table 3-12, birth weight groups; high birth weight, normal birth weight and low birth weight were significantly different ( $p < 0.001$ ) between the three different forms of payment. Private insurance births had the highest (9.3%) high birth weight, (6.1%) of Medicaid births had high birth weights and 5.7% of other government insurance births had high birth weights. Medicaid births had higher (85.6%) normal birth, 84.3% normal birth weights for private insurance birth and other government insurance births has the lowest (82.1%) normal

birth weights. Low birth weight was highest (12.2%) for other government insurance births, 8.3% for Medicaid births and lowest (6.4%) for private insurance births.

Among the low birth weight infants, subgroups of low birth weight; very low birth weight and extremely low birth weight were not statistically significant ( $p=.905$ ) for the three forms of payment for delivery. Among low birth weights, very low birth weights were highest (91 %) for Medicaid births , 90.5% for private insurance births and lowest (89.6%) for other government insurance births. Extremely low birth weight was highest (10.4%) for other government insurance births, 9.5% for private insurance births and lowest (9%) for Medicaid births.

“Participating in prenatal care” was statistically significant ( $p<0.001$ ) for the three forms of payment for delivery. Prenatal care participation was highest (99.8%) for mothers of private insurance births, similar (99.3%) for mothers with other government insurance and lowest (98.6%) for Medicaid births.

The rate of infants who were ever breastfed was not statistically significant ( $p=.985$ ) between the three methods of payment for delivery. Infants that were ever breastfed were highest (54.1%) for other government insurance births, and equally lower (53.7%) for both Medicaid births and private insurance births.

Responses for breastfeeding at discharge were from 4792 Medicaid births, 9510 private insurance births and 859 other government insurance births. Breastfeeding at discharge was statistically significant ( $p<0.001$ ) for the three methods of payment for delivery. Breastfeeding at discharge was highest (85.4%) for private insurance births, 70.5% other government insurance births and lowest (63%) for Medicaid births.

Mean birth weight was statistically significant ( $p<0.001$ ) for the three methods of payment for delivery. Private insurance births (3349.70 grams) had the highest mean birth weights; Medicaid births had 3210.89 grams mean birth weight while the lowest mean birth weight (3159.55 grams) was for other government insurance births.

“Mean number of prenatal visits” did not vary significantly among the three methods of payment for delivery. Mothers of “other government insurance births” had the highest number of prenatal visits (13.21 visits), mothers of private insurance births had 12.85 visits while the lowest number of visits (12.44) was for mothers of Medicaid births.

**Table 3-13: Maternal characteristics of Medicaid births in the WIC program in Kansas in 2009 (N=19,002) compared to non-Medicaid births<sup>1</sup>**

Selected characteristic	Medicaid		Private insurance		Other government		X <sup>2</sup>	p value
	N=4593	%	N=9151	%	N=822	%		
<b>Trimester enrolled in WIC</b>								
Trimester 1	1570	34.2	3132	34.2	265	32.3	4.00	0.676
Trimester 2	1449	31.5	2923	31.9	279	33.9		
Trimester 3	817	17.8	1545	16.9	140	17.0		
Postpartum visit	757	16.5	1551	17.0	138	16.8		
<b>Gestational diabetes</b>	N=4953	%	N=9824	%	N=873	%		
Yes	160	3.2	405	4.1	34	3.9	7.13	0.028
No	4793	96.8	9419	95.9	839	96.1		
<b>Pre-pregnancy diabetes</b>	N=4953	%	N=9824	%	N=873	%		
Yes	24	0.5	57	0.6	9	1.0	3.89	0.143
No	4929	99.5	9767	99.4	864	99.0		
<b>Alcohol use</b>	N=4953	%	N=9824	%	N=873	%		
Yes	23	0.5	6	0.1	2	0.2	27.14	0.000
No	4930	99.5	9818	99.9	871	99.8		
<b>Smoking 3 months before and during pregnancy</b>	N=4933	%	N=9808	%	N=870	%		
Yes	1718	34.8	863	8.8	263	30.2	1588.64	0.00
No	3215	65.2	8945	91.2	607	69.8		
							<b>F</b>	<b>p value</b>
<b>Mean age (years)</b>	24.20		24.15		24.19		0.11	0.902
<b>Mean pre-pregnancy weight (lb)</b>	166.65		160.42		169.91		13.80	0.000
<b>Mean pre-pregnancy BMI</b>	27.40		27.22		27.28		0.78	0.460

<sup>1</sup> Methods of payment excluded are self-pay, Indian Health Service, and CHAMPUS/TRICARE.

Responses for the trimester in which mothers were enrolled in WIC as shown in Table 3-13 were from 4593 mothers of Medicaid births, 9151 mothers of private insurance birth and 822 mothers of other government insurance births. Which trimester the mother enrolled in the WIC

program was not statistically significant ( $p=.675$ ) between the three methods of payment for delivery.

Responses for the onset of gestational diabetes was from 4953 mothers of Medicaid births, 9824 mothers of private insurance births and 873 mothers of other government insurance births. The onset of gestational diabetes was statistically significant ( $p=.028$ ) for three methods of payment for delivery. Gestational diabetes was highest (4.1%) in mothers of private insurance births, was 3.9% in mothers of other government insurance births and lowest (3.2%) in mothers of Medicaid births.

Pre pregnancy diabetes was not statistically significant ( $p=.143$ ) for three methods of payment for delivery. Alcohol use was statistically significant ( $p<0.001$ ) for three methods of payment for delivery. Mothers of Medicaid births had the highest use of alcohol (0.5%), mothers of other government insurance births had 0.2% use of alcohol while mothers of private insurance had (0.1%) use of alcohol.

Responses on smoking was from 4933 mothers of Medicaid births, 9808 mothers of private insurance births and 870 mothers of other government insurance births. Smoking three months before and during pregnancy was statistically significant ( $p<0.001$ ) for three methods of payment for delivery. Smoking was highest (34.6%) for mothers of Medicaid births, was 30.2% for other government insurance births and lowest (8.8%) for private insurance births.

The mean pre pregnancy weight was statistically significant for three methods of payment for delivery. Mothers of other government insurance births had the highest mean pre-pregnancy weight (169.61 pounds), a mean weight of 166.65 pounds was identified for mothers of Medicaid births and 160.42 pounds for mothers of private insurance births. Mean pre-pregnancy BMI was not statistically significant ( $p=.460$ ) three methods of payment for delivery..

**Table 3-14: Program participation of Medicaid births in the WIC program in Kansas in 2009 (N=19,002) compared to non-Medicaid births<sup>1</sup>**

Selected characteristic	Medicaid		Private insurance		Other government		$\chi^2$	p value
	N	%	N	%	N	%		
<b>Participating in WIC</b>								
<b>Prenatal</b>	N=4953	%	N=9824	%	N=873	%		
Yes	3837	77.5	7604	77.4	684	78.4	0.41	0.813
No	1116	22.5	2220	22.6	189	21.6		
<b>Postpartum</b>	N=4953	%	N=9824	%	N=873	%		
Yes	4594	92.8	9155	93.2	822	94.2	2.58	0.275
No	359	7.2	669	6.8	51	5.8		
<b>Participating in Medicaid</b>								
<b>Prenatal</b>	N=3837	%	N=7604	%	N=684	%		
Yes	1242	32.4	2523	33.2	229	33.5	0.86	0.652
No	2595	67.6	5081	66.8	455	66.5		
<b>Postpartum</b>	N=4594	%	N=9155	%	N=822	%		
Yes	2246	48.9	4516	49.3	376	45.7	3.91	0.142
No	2348	51.1	4639	50.7	446	54.3		
<b>Participating in Food Stamps</b>								
<b>Prenatal</b>	N=3837	%	N=7604	%	N=684	%		
Yes	725	18.9	1440	18.9	139	20.3	0.82	0.663
No	3112	81.1	6164	81.1	545	79.7		
<b>Postpartum</b>	N=4594	%	N=9155	%	N=822	%		
Yes	1284	27.9	2555	27.9	219	26.6	0.64	0.728
No	3310	72.1	6600	72.1	603	73.4		

<sup>1</sup> Methods of payment excluded are self-pay, Indian Health Service, and CHAMPUS/TRICARE.

Prenatal and postpartum participation in the WIC, Medicaid and Food Stamps programs as shown in Table 3-14 did not vary significantly among Medicaid births, Private insurance births and other government insurance births

## Chapter 4 - Discussion

Medicaid recipients are of low income status; however, they are automatically eligible to enroll in the WIC program. Enrolling in WIC has been found to be beneficial for birth outcomes of low income pregnant women. In addition, enrolling in WIC has been associated with cost savings for the Medicaid program, as costs of caring for preterm births and low birth weight infants are reduced. This section will discuss the demographic characteristics of Medicaid births in the state of Kansas, using the linked birth certificate and WIC program datasets.

The WIC program data linked to birth certificate for Kansas infants born in 2009 provided rich nutrition and health outcomes data for infants and their mothers. Demographic characteristics of Medicaid births who are adjunct eligible for WIC but do not participate in WIC reflects that they are less poor than the Medicaid births who actually participate in WIC, suggesting that mothers who choose to remain on WIC may have more needs to sustain their nutritional wellbeing.

### ***Question 1: What are the demographic characteristics of infants born in Kansas for the year 2009 by the method of delivery payment?***

The analysis of the birth records dataset for the state of Kansas revealed that 41,388 infants were born in the year 2009. Table 3-1 shows that close to 50% of births were paid for by private /employer insurance, while Medicaid, the federal, state funded health insurance paid for about 27% of total births, becoming the second largest source of payment for deliveries in the state of Kansas and yet other government insurance paid for all 5.2% of all births in 2009.

There were significant differences in the education level for mothers of Medicaid births, who had lower education levels and of significantly younger age than mothers of both private insurance and other government insurance births. These findings are in line with findings from the federal Medicaid enrollment data that women who receive Medicaid insurance are more likely to be of minority racial or ethnic group, have lower education levels and poor health<sup>34</sup>, hence meet the criteria for eligibility in the Medicaid insurance. On the other hand, more than 50% of mothers and fathers of infants delivered through private and employer insurance have an associate degree or higher which may suggest that, with higher education, parents might obtain employment that contributes to health insurance. In addition to findings on education levels, the

results support the concept that marital status might be a contributing factor in obtaining health insurance coverage for women; mothers of Medicaid births and other government insurance births are more likely to have never been married while mothers of private /employer insurance are more likely (85.4%) to have ever been married. Married women are more likely to have private insurance and unmarried women to have Medicaid coverage;<sup>35</sup> however, as more women are unmarried, as with 41% of mothers of infants born in the year 2009 nationwide<sup>50</sup> and further more likely to have children as dependents, the absence of pooled income from spouses, income from mostly part time employment, increased contribution to employment offered insurance for family coverage may render working women eligible for public insurance since it is based on income and categorical eligibility<sup>36</sup>, whereas low education leads to more likelihood to seek support through the federal insurance based on the lower incomes.

Furthermore, mothers of Medicaid births are much younger in age than both private insurance and other government insurance births. The education levels of Medicaid recipients and private insurance recipients may suggest that, with higher education and with being married, there is a greater likelihood of affording private health insurance.

### **Nutrition characteristics of infants born in 2009**

There were significant differences for most of the selected nutrition indicators when compared among the outcomes for private insurance, Medicaid and other government insurance. The mean birth weights were all at the normal range for healthy babies i.e. >2500g, reflecting that Kansas had above average birth weights in 2009, with Medicaid births, though born of mothers in poor conditions, had the highest normal birth weight (85%) however, overall, the mean birth weight was highest for private insurance births while it was lowest for other government insurance births.

Further analysis of the birth weight groups revealed that infants born of private insurance had the highest proportion of high birth weights i.e. >4000g when compared to the other forms of payment; while infants from other government insurance had the highest low birth weights, which also reflected in other government insurance births having the lowest mean birth weights.

Even though there were no significant differences of very low birth weight and extremely low birth weight among the three forms of payment, these babies contribute to the increase in medical costs and have increased risk of mortality due to complications and critical care needs thus contributing to the overall infant mortality of the US<sup>9</sup>.

From the low birth weights, a major proportion (>90%) across all forms of payments was very low birth weights (VLBW), however VLBW births were highest for Medicaid births, which eventually may lead to escalated costs for the Medicaid program in Kansas bringing about a need to further study the contribution of LBW care to the costs of the Medicaid program, even though ELBW infants were more common for the private insurance births.

Mother's smoking status as presented in Table 3-3 was significantly different; however, mothers of Medicaid infants had the highest percentage (35.3%) of mothers smoking cigarettes three months before pregnancy and during pregnancy compared to private insurance (8.4%). These results support the evidence by Ventura et al<sup>4</sup> who used the birth certificate for the period of 1990-2000 to study smoking in pregnancy in relation to low birth weight, and found that smoking had generally declined; however, was more common in teenage mothers and younger women, non-Hispanic white women with less than high school education and yet associated with increase in low birth weight incidence. Results of a randomized controlled trial of a nursing intervention to reduce preterm births and high low birth weight for African American women found that smoking was associated with increased risk of low birth weight and preterm births. The odds were higher for heavy smokers to give birth to low birth weight infants -- 2.60 for giving birth preterm -- compared to non-smokers<sup>51</sup>. Likewise, alcohol use, a lifestyle risk factor that has negative consequences for health was highest for mothers of Medicaid births. In this study, the causal association for smoking and low birth weight was not assessed, but the results can serve as a baseline to warrant further analysis of this risk factor on birth weight in the state of Kansas and further strengthen the programming strategies for the existing smoking cessation programs for pregnant women.

### **Prenatal characteristics of breastfeeding status of mothers with infants born in Kansas 2009**

The variables of interest were all statistically significant. Pregnant women in Kansas had more than 12 prenatal care visits, other government insurance births having the highest and mothers of Medicaid births reporting the lowest mean numbers of prenatal visits. Likewise, mothers who attended prenatal care were highest for other government insurance and lowest for Medicaid births. The Medicaid expansion occurring in the late 1980's and early 1990's was made to increase the coverage of poor uninsured women with the goal to improve maternal child



care. Even though prenatal care is not a direct solution to poor pregnancy outcomes,<sup>31</sup> Medicaid standard benefits include provision of services to pregnant women, making them a high priority. However, the results suggest that Medicaid births have low access to prenatal visits and number of visits compared to private insurance and other government insurance. The ease with which applications for the Medicaid eligibility and access to health care institutions that accept Medicaid payment may need to be reviewed as they may contribute to low prenatal visits. Anum & Strauss<sup>52</sup> found that the implementation of prenatal care programs vary by states and regions thus did not find any differences in birth outcomes between Medicaid births and private insurance births. The authors further argue the point on the eligibility criteria for Medicaid, which lies on being pregnant, which may further delay the process of finally receiving prenatal care, placing Medicaid women at a disadvantage to women who have private insurance, who are more likely to be covered before the pregnancy thus start prenatal care early, incurring more visits.

Prenatal WIC participation has been shown to improve pregnancy outcomes through the reduction of low birth weight births<sup>14,18,19,20,21,24,25,27,29,32</sup> and furthermore; serve as a reference point for access to social services including Medicaid program and health care services. In this study, mothers of Medicaid births had the highest participation in prenatal WIC, followed by other government insurance. However; the birth certificate data does not record the date of WIC enrollment to further elucidate sequence of mother's enrollment - whether they are first enrolled to Medicaid or first enrolled on Medicaid then WIC, in order to support the role of WIC on Medicaid and prenatal care, especially as the findings show that more mothers of Medicaid births participate in prenatal WIC but also have lowest percentages of prenatal care and prenatal mean number of visits. This seems to reflect that the Kansas WIC program may need to enhance referral strategy. On the other hand, an argument can be made about the sequence based on income eligibility guidelines as, pregnant women may have delayed entrance into Medicaid since they may need to be pregnant first before becoming eligible, which in turn is an eligibility criteria for WIC as participants enrolled in Medicaid are adjunct eligible for enrollment in WIC services<sup>52</sup>.

“Infants breastfed at discharge” was very low for mothers with other government insurance, but highest for private insurance mothers. Since the findings suggest that mothers of private insurance births have higher education, for both mother and father of infant, are white,

more likely to be ever married and are older in age, according to the literature, they have the social support structures to enable the decision to breastfeeding their infants compared to mothers of low socio economic status, who are more likely to be enrolled in Medicaid and other government insurance. It is thus less surprising to witness the low percentage of infants breastfeeding for these groups. The Ross Laboratories Mothers' Survey, a national survey designed to determine patterns of milk feeding during infancy, indicated that between 1978 and 2003, more mothers who do not work outside the home were likely to breastfeed<sup>44</sup> however, more mothers are now in the labor force<sup>36</sup> making it difficult to balance work outside the home and breastfeeding. Also, breastfeeding support at the workplace serves as an enabling factor for women to breastfeed<sup>53</sup>.

***Question 2: What were the characteristics of Medicaid infants whose mothers received WIC food during pregnancy?***

For the 11,225 Medicaid births in 2009, 8,267 received WIC while 2,732 did not receive WIC food during their pregnancy. The relationship between WIC prenatal participation and its role in reducing Medicaid costs, which mainly occur through the payment of costs related to intense medical care that comes with infants born with low birth weights has been studied widely. Maternal nutrition is an important component that is essential for positive outcomes of pregnancies therefore, the provision of prenatal WIC food packages has been seen to be effective in low income women as detailed earlier. This evidence, in the past positive outcomes of the WIC program, influenced the provision that Medicaid recipients be adjunct eligible for WIC therefore technically, all Medicaid recipients can enroll in WIC, and however, not all WIC recipients are eligible for enrollment in Medicaid.

Since Medicaid participants are adjunct eligible for WIC, the fact that some mothers do not enroll is an area of great concern, considering that Medicaid eligibility is based on <150% FPL, far below the income eligibility for WIC (<185% FPL). Pregnant women eligible for Medicaid are at higher risk of poor health and nutrition status.

Differences in mother's education levels' for these two groups were statistically significant with mothers receiving the WIC food during pregnancy having significantly lower education levels than Medicaid mothers. In addition, mothers of Medicaid births that received WIC food are less likely to be ever married when compared to Medicaid mothers who did not receive WIC food, suggesting that even though pregnant women can be in the same program which has same category for eligibility as in the Medicaid program, the use of social programs differs by socio economics levels, with the poor or lower socio economic group finding more benefits from the program. The literature supports the notion that from nutrition programs, the most vulnerable tend to gain most from nutrition programs that provide nutrients that would otherwise be lacking in their diets<sup>21</sup>.

Notwithstanding the even lower percentages of education and 'ever married' status of mothers who received WIC food compared to those that did not receive WIC food, this finding suggests that there may be other external factors that determine participating in WIC, better ascertained through a qualitative study. Also, the slightly elevated education and marital status may suggest that these are women who may have more social support through income and

employment of themselves or spouse, making obtaining WIC food during pregnancy an unattractive incentive to forego all processes to either collect the food package or check.

In line with the known facts about breastfeeding status of low socioeconomic mothers, breastfeeding at discharge was lower for the Medicaid program recipients who received WIC food. WIC participation has been associated with low breastfeeding rates<sup>27</sup> and the results confirmed that breastfeeding at discharge was significantly higher for Medicaid births that did not receive WIC food. The provision of free infant formula has been one factor attributed to the reduced breastfeeding for WIC participants, despite WIC's emphasis on supporting breastfeeding.

However, breastfeeding support through health workers can promote breastfeeding<sup>54</sup>. Schafers et al<sup>55</sup> provided peer counseling support for breastfeeding to low income women. The results demonstrated that women who received support through education and counseling do gain knowledge and confidence to initiate and continue to breastfeeding, signaling that the WIC breastfeeding support component is very essential in promoting breastfeeding.

Contrary to the existing literature, participating in WIC prenatally did not lead to significant increases in mean birth weight. Instead, infants born to mothers who received WIC food had lower mean birth weights. Birth weights were equally normal (>2500g) for both mothers that received WIC food and mothers that did not receive, however, mothers that received WIC food had a slightly high percentage of high birth weight infants and slightly lower low birth weights compared to mothers that did not receive WIC food, who had a higher percentage of infants born with extremely low birth weights (<1000g), the most critical infants more likely to have increased medical costs and higher risks of mortality. Receiving WIC food, though no statistical differences were observed, does seem to have some positive effects for mothers in the lower margins of socio economic status.

Findings on the increase in prenatal care and the mean number of prenatal visits was in line with the literature as there were significant increases compared to Medicaid mothers who did not receive WIC program however, the link to improve pregnancy outcomes may need to be further investigated.

Smoking three months before and during pregnancy continued to be significantly higher for mothers of Medicaid births who received WIC food during their pregnancy, further

supporting evidence that the most poor as demonstrated by the demographics of mothers of Medicaid births who received WIC food are more likely to engage in risky health behaviors.

Analyses for question one and two were entirely based on variables collected by the birth certificate. Overall, the birth certificate data for Kansas 2009 reveals that WIC is targeting low income recipients as depicted by the demographic characteristics of recipients of WIC services. It is however, a concern that some mothers of Medicaid births who qualify for WIC do not enroll in WIC, implying that their nutrition and health statuses may deteriorate thus having negative birth outcomes since provision of prenatal WIC services is associated with positive birth outcomes. Studies to ascertain barriers to participating in WIC during pregnancy can be helpful in determining why Medicaid mothers opt-out of WIC and further provide suggestions for how best Medicaid and WIC services can be linked to be more accessible to poor mothers as most benefits are achieved through the combined use of both programs.

***Question 3: What are the characteristics of Medicaid births that are in the WIC program in comparison to Medicaid births not in the WIC program?***

The Kansas 2009 linked birth certificate and WIC program data includes singleton births born alive in 2009. There were 4,953 Medicaid births in the WIC program while 6,272 were not in the WIC program. There is a discrepancy between numbers of mothers of Medicaid births obtained from the birth certificate records in the WIC program as discussed in question two above and the numbers of mothers of Medicaid births in the linked birth certificate and WIC dataset.

These differences may be partly attributable to the fact that multiple births are included on the birth certificate. However, it is also worth noting that the question on the birth certificate inquires whether mothers “received WIC food” during pregnancy whereas the WIC program data linked to birth certificates provides the actual data on participation in the WIC program. Given this scenario, there may be mothers who receive WIC food during prenatal period and then discontinue enrollment in WIC after delivery and thus do not appear in the WIC records. The Medicaid coverage for women extends to 60 days after delivery, therefore mothers may either lack the knowledge that WIC services do not end 60 days postpartum but continue up to six months if they do not breastfeed and up to one year postpartum if they breastfeed their infants. It is possible that mothers may assume that all public assistance programs have the same criteria therefore, a study looking into the reason why Medicaid births do not enroll in prenatal WIC can be helpful.

Mothers of Medicaid births in the WIC program have lower education levels; less than high school education/GED, less than high school levels with no diploma and less likely to ever been married compared to Medicaid births not in the WIC program. Similarly with the birth certificate data, mean birth weight was not statistically significant between the two groups however, the mean birth weight was higher for Medicaid births in the WIC program (3210.89g) compared to Medicaid births not in the WIC program (3202.05g) signaling that, to some extent, WIC may have beneficial effects for the mothers more poor within the Medicaid population.

Contrary to the differences in breastfeeding at discharge for the birth certificate in Table 3-6, and WIC linked dataset, breastfeeding at discharge was higher for Medicaid WIC participants (99.5%), even though it continues to be much lower compared to Medicaid births not

in the WIC program; which may signify that participating in WIC provides more access and financial support to using infant formula.

Also, prenatal care, the mean number of prenatal care visits that were statistically significant in the birth certificate data in Table 3-7 was not found to be statistically significant in the WIC linked dataset however, mothers enrolled in the WIC program continue to have a higher percentage participation in prenatal care, implying that enrolling in WIC does enhance enrollment to health services.

In the WIC linked dataset, smoking was not statistically significant compared to the birth certificate data as in Table 3-7, a distinct finding that raises questions regarding the patterns of smoking behaviors of mothers in the WIC program and those not enrolled in the WIC program since the results based on the birth certificate data does not seem to show same results in the WIC program. A study by Ventura et al<sup>4</sup> reflected that smoking, at any level, increased incidence of low birth weight across all demographic characteristics.

Lastly, when looking at the profile of Medicaid recipients, the income eligibility is <150% of federal poverty levels (FPL). Therefore, Medicaid recipients are presumably much lower income than cut-off for WIC recipients who have an income eligibility of <185% FPL and may have more shortages of nutritious foods in their diets. Since the WIC program can already cover pregnant women based on their income and categorical statuses, it is possible to have overlaps between the two programs however; the discrepancy in enrollment of Medicaid participants to the WIC program is of great concern as women may benefit most from both services, implying the need for greater coordination between the two programs.

***Question 4: What are the characteristics of Medicaid births in the WIC program compared to non-Medicaid births?***

Medicaid births that are in the WIC program reflect that they are born from mothers who are more likely to be of minority race population, have high school diploma/GED or less education levels, are less likely to be ever married, much younger in age and most likely to receive WIC food during pregnancy than mothers of private insurance births and other government insurance births. This finding agrees with existing literature of the characteristics of federal government recipients <sup>37</sup>.

As seen in table 3-12, nutritional characteristics of Medicaid births in the WIC program reflect that Medicaid births are more likely to have normal birth weight, and are not likely to have the highest incidence of low birth weights when compared to births covered by other government insurance. Private insurance births have the highest mean birth weight; however, when comparing Medicaid and other government insurance, Medicaid births in the WIC program have higher mean birth weights. Table 3-9 shows that even though not statistically significant, Medicaid births whose mothers are enrolled in the WIC program have higher mean birth weights compared to Medicaid births not in the WIC program. This may suggest that mothers of Medicaid births may have benefited from WIC services when enrolled in both programs.

Almost all mothers of Medicaid births receive prenatal care, however, when compared to private insurance and other government insurance; prenatal care participation for Medicaid births in the WIC program is lowest compared to private insurance and other government insurance. Even though Medicaid offers insurance coverage, there may be limitations in the benefits offered in Medicaid insurance compared to benefits that private insurance and other government insurance which raises the question of how Medicaid benefits compare to other insurances for pregnancy - related services.

Breastfeeding at discharge is lowest for Medicaid births in overall WIC program which is a reflection that even though breastfeeding is low in WIC, social economic status may contribute to breastfeeding behaviors and decisions. Ahluwalia et al <sup>56</sup> found that women that never initiate breastfeeding were more likely to have no intention to breastfeed before becoming pregnant, be black, young, less than high school education, had unplanned pregnancies, participated in WIC



and had low birth weights babies. The reasons for breastfeeding cessation were mainly due to discomfort experienced and the lack of knowledge to solve discomforts during breastfeeding.

According to Table 3-14, Medicaid births in the WIC programs' participation in prenatal and postpartum WIC, Medicaid and food stamps programs were not significantly different. However, prenatal participation was low for all the programs, across Medicaid and non-Medicaid groups, reflecting that some mothers may not be aware that they are eligible for the social services until they have delivered. WIC prenatal participation was the highest for all Medicaid, private insurance and other government insurance births even though in Table 3-13, it is noted that only about 30% mothers from all sources of payment for delivery enroll for WIC in the first trimester.

It is however worth noting that mothers of Medicaid births have the highest enrollment (17.8%) in the third trimester, raising a question whether mothers are aware of the social services they may be eligible for or the importance of prenatal care, which also affects breastfeeding initiation and duration. Minkovitz et al,<sup>57</sup> found that the use of social services by Medicaid recipients could be determined by the type of managed care systems they use as accessing WIC and Food Stamp programs was low, yet mothers were eligible thus suggesting the coordination of managed care systems and public health agencies so that pregnant women get the most from these services. With the WIC program serving as a referral point to other services, a study determining the role that the WIC program serves in referring mothers to other services for which they are eligible may be essential.

The period at which mothers enroll for Medicaid is also an avenue that will need to be explored, since even though mothers have Medicaid pay for their deliveries, participation in prenatal Medicaid is 32.4% and increases to 48.9% for postpartum enrollment within the WIC program. This leaves a discrepancy and brings forth questions regarding why not all mothers and infants enroll in postpartum Medicaid, especially since they are adjunct eligible to participate in the WIC program.

### ***Value of the research***

This study was an initial assessment into the characteristics of Medicaid births in the 2009 pilot linked birth certificate and WIC program datasets for the Kansas Department of Health and Environment. The study will provide a baseline for more studies to be conducted on nutrition and health outcomes of Medicaid participants.

There is evidence that participation in WIC is related to reduced likelihood of low birth weight and micronutrient deficiencies, and better overall health and nutrition outcomes. Pregnant women attending prenatal care through Medicaid insurance are more likely to enroll in WIC early in their pregnancies, further increasing their chances of improved birth outcomes. In addition, Medicaid participants are adjunct-eligible for enrollment to the WIC program, facilitating the process.

The results of the study show that the Kansas WIC and Medicaid programs are serving the target population for the objectives of the programs as women who participate are of low socioeconomic status. According to literature, these are the women who get highest benefits from participating in these interventions. Since Medicaid births are adjunct eligible for the WIC program, effort needs to be made to link these programs as there were less than half (4953 of 11,225) of all Medicaid births in the WIC program in 2009, as seen in Table 3-9.

Another finding that stands out for the Kansas WIC program, distinct from other findings is that Medicaid births in the WIC program were more likely to be breastfed at discharge, compared to Medicaid births not in the WIC program. Program implementation of the breastfeeding promotion of the Kansas WIC program may need to be evaluated to determine if there are different approaches used, especially because the women more likely to breastfeed at discharge, characterized by their demographic profile as displayed in Table 3-8, mothers of Medicaid births who are WIC participants are more likely to be of minority population, have less education and more likely to be unmarried which fits the demographic characteristics associated with low breastfeeding patterns. This suggests that the WIC program may be able to reach out to mothers, health care facilities and public education on the social support of mothers.

Findings from this research project will be beneficial for the Kansas Department of Health and Environment to assess and characterize the Kansas WIC infant population and further use the results of the study to determine why “Medicaid only” infants, and/ or mothers who automatically qualify for WIC, were not enrolled on WIC and the effects WIC has on Medicaid costs as has been associated with reduced Medicaid costs in other States.

### ***Limitations of the study***

The study only provides a description of Kansas 2009 births at one point and will not allow an assessment or an extrapolation of the overall impact and the combined effects of the WIC program on Medicaid births. Further verification and information on the determining factors for the reasons why women who are eligible do not participate in WIC can be better determined through a qualitative study. Since this is the first study analyzing the characteristics of Medicaid births in WIC, after the pilot project linking birth certificates and WIC program files, results of the study will provide a baseline for further studies on the Medicaid population in WIC and assessments of the datasets used.

### ***Conclusion***

The overall analysis reflects that WIC covers low income population groups. Mothers of Medicaid births who are adjunct eligible for WIC yet do not participate in WIC have demographic characteristics that suggest that they are less poor than the mothers of Medicaid births who actually participate in WIC. This may suggest that mothers who choose to remain in WIC may have more needs to sustain their nutritional wellbeing. Since all Medicaid participants are automatically eligible for WIC, conducting a qualitative study to ascertain reasons why they do not use WIC services may be helpful in ensuring that the WIC program provides services to the population at-risk of nutritional deficiencies.

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