Interim Evaluation of Project No. 11-W-00057/4
SC Family Planning Waiver: Expansion of Medicaid Benefits for
Women Below 185% FPL (SFYs 1995-2005)

Supplemental Evaluation Report

Center for Health Services & Policy Research
Arnold School of Public Health
University of South Carolina
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Study Background
This goal of this supplemental evaluation of the South Carolina Medicaid Family Planning Waiver was to provide more information on behavior and health outcomes associated with long-term waiver participation. This analysis is related to hypothesis 6 and addressed the following evaluation question:

- Do more regular participants in Medicaid family planning waiver services have more adequate pregnancy intervals, more adequate prenatal care and better infant outcomes (decreased chances of preterm birth, low and very low birth weight, and small for gestational age infants) over time as compared to women who did not use waiver services as often?

To avoid confusion, the following terms are used to reference different subsets of women for whom the waiver is intended:

Women enrolled in the waiver, or "enrollees," refers to the subset of women eligible for the waiver who have applied and been approved for Medicaid coverage of family planning services.

Women receiving services under the waiver, or "participants," refers to the subset of women enrolled in the waiver who actually received Medicaid reimbursed family planning services. Not all women who are enrolled in the waiver actually receive Medicaid reimbursed family planning services.

Methods
Research Design
This study is a retrospective cohort study, encompassing the time period from July 1994 to June 2003, the first ten years of the SC Medicaid Family Planning Waiver.

Data Sources
Medicaid claims data were used to select waiver enrollees who had given birth after at least 36 months of consecutive waiver enrollment, excluding women who gave birth within 36 months of their date of enrollment and women for whom this birth was a multiple birth (twins, etc.).   Data on the main independent variable of interest - family planning waiver participation - was collected from Medicaid claims data, counting the number of family planning annual visits received via the waiver in the years prior to birth. Data on the number of annual visits received between the first waiver birth and the subsequent waiver birth (for those women with two births while enrolled in the waiver) were also collected.

Outcomes measures on adequacy of prenatal care, birth weight, preterm birth and small for gestational age (SGA) came from the live birth certificate (1/1/1992 version). The 1992 version of the birth certificate was chosen as it was used consistently during the time period of interest (July 1994 – June 2003). The South Carolina Office of Research and Statistics (ORS) linked family planning waiver enrollees who had given birth after at least 36 months of waiver enrollment to their corresponding live birth certificate files for their first and, where applicable, second births occurring during the ten year period. ORS pulled the sample since identifying information was used to link between live births to a

given family planning waiver mother. A de-identified data set was obtained from ORS. Institutional Review Board aproval was sought from the University of South Carolina for this study, as well as from DHEC. Approval was granted from both institutions in the fall of 2006.

Measures

The main independent variable of interest in this analysis is the frequency of obtaining family planning services via the Medicaid Family Planning Waiver prior to giving birth and in the interval between two births. The frequency of obtaining family planning services via the Medicaid Family Planning Waiver prior to giving birth is a continuous variable representing the number of annual family planning visits billed to Medicaid under the waiver in the 36 month period (minimum) before the birth. This minimum interval was identified by the researcher through discussion with those familiar with women seeking services under the waiver as well as what has been identified in a prior study (Jamieson & Buescher, 1992). The number of annual family planning visits billed to Medicaid under the waiver between the index birth and a subsequent birth, for those women with two births during the study period, was also obtained. Several dependent variables of interest were evaluated against the independent variable. These consisted of both maternal and infant outcomes including the birth to conception interval between the index birth and a subsequent birth, the adequacy of prenatal care, low birth weight, preterm birth, and small for gestational age.

Since it is hypothesized that certain outcomes may be affected by the "birth to conception" interval, some analyses focused on the second birth to waiver women. For outcomes not expected to be affected by birth to conception interval, data from the first birth was used. For each dependent variable, it is noted which birth in the data set is of interest.

Birth to Conception Interval. Birth to conception interval was defined as the period of time between the index birth and the next conception (related to the second birth in these data). Birth to conception interval was calculated in months by ORS using the date of birth of the second child, minus its gestational age. This variable was provided as a continuous variable.

Adequacy of Prenatal Care. The Kotelchuck Index was used to evaluate the adequacy of prenatal care. Adequacy of prenatal care was also used as a modifier for birth interval. Of interest was the adequacy of prenatal care for the first birth on the waiver. The Kotelchuck Index assesses adequacy by looking at when in the pregnancy prenatal care began and how many prenatal visits occurred. ORS calculated this variable using two variables obtained from birth certificate data-when prenatal care began (initiation) and the number of prenatal visits from when prenatal care began until delivery (received services). The Kotelchuck Index classifies the adequacy of initiation as follows: pregnancy months 1 and 2, months 3 and 4, months 5 and 6, and months 7 to 9, with the underlying assumption that the earlier prenatal care begins the better. To classify the adequacy of received services, the number of prenatal visits is compared to the expected number of visits for the period between when care began and the delivery date. The

expected number of visits is based on the American College of Obstetricians and Gynecologists prenatal care standards for uncomplicated pregnancies and is adjusted for the gestational age when care began and for the gestational age at delivery. A ratio of observed to expected visits is calculated and grouped into four categories-Inadequate (received less than 50% of expected visits), Intermediate (50%-79%), Adequate (80%-109%), and Adequate Plus (110% or more). The final Kotelchuck index measure combines these two dimensions (initiation and adequacy) into one of four categories defined as follows:

> Adequate Plus: Prenatal care begun by the 4th month and 110% or more of recommended visits received.
> Adequate: Prenatal care begun by the 4th month and 80%-109% of recommended visits received.
> Intermediate: Prenatal care begun by the 4th month and 50%-79% of recommended visits received.
> Indadequate: Prenatal care begun after the 4th month or less than 50% of recommended visits received (South Carolina Community Assessment Network; Kotelchuck, 1994).

Low Birth Weight/Very Low Birth Weight. Low birth weight refers to infants born weighing less than 2,500 grams. Very low birth weight refers to an infant born weighing less than 1,500 grams. Birth weight was collected as a continuous variable on the birth certificate. For analysis purposes, low and very low birth weight were treated as dichotomous variables. Birth weight from the second birth in the data was used to analyze the effect of the waiver on birth weight.

Preterm Birth. To determine whether an infant was considered preterm, the clinical estimate of weeks gestation on the birth certificate was used. Infants born at less than 37 weeks gestation were considered preterm. While weeks gestation was provided by ORS as a continuous variable, it was dichotomized for analysis purposes. Preterm birth data from the second birth in the data was used in this study.

Small for Gestational Age. Small for gestational age can be defined as a baby who is smaller than expected (in the bottom 10th percentile) for the number of weeks of pregnancy. SGA was calculated by ORS as an infant in the bottom tenth percentile for the number of weeks gestation and was provided as a dichotomous variable. The second birth in the data was used to calculate SGA for this study.

Control variables included demographic and behavioral variables that cloud the relationship between waiver participation and the outcomes under study. This means that there is some association between a certain demographic characteristic or behavior and the outcomes under study. These variables included: the mother's race/ethnicity, age, education level, marital status, urban/rural residence, parity, and tobacco and alcohol use during pregnancy.

Data Analysis
Descriptive data analyses were used to describe the population under study. To account for the covariates, multiple linear regression was used to evaluate the relationship between family planning waiver participation and birth to conception interval (the only continuous outcome of interest). Ordered logistic regression was used to evaluate the relationship between family planning waiver participation and adequacy of prenatal care (an ordinal variable). Logistic regression models were used to evaluate the relationship between family planning waiver participation and the dichotomous outcomes of interest (low and very low birth weight, preterm birth, and SGA).

Results
Description of the Samples
Tables 1 and 2 present data on the women and their infants from their first and second waiver births respectively. Approximately 10% of the total group of women gave birth a second time while on the waiver. In both the overall sample as well as the smaller subsample of women, about half were African-American and half were white. Between 77-79% of both groups were either single or married but not living with that partner. Alcohol and tobacco use was low.

Overall participation in waiver services was extremely low. Most women, though enrolled in the waiver, did not participate in obtaining family planning waiver services at all. Over the ten year time period, over 70% of women had no family planning annual visits at all. Only 20% had one annual visit in the 3 years (minimum) prior to their first birth. Just under 9% obtained 2 or more visits before their first birth – a more ideal schedule according to recommended family planning guidelines. The adequacy of prenatal care was less than the SC average, with only 57.5% of women during their first waiver pregnancy and 51.7% of women during their second waiver pregnancy obtaining "adequate plus" levels of prenatal care. Moreover, close to 11% of first waiver pregnancies and 20% of second waiver pregnancies had inadequate levels of prenatal care.

The average birth to conception interval was 14.7 months for the sample of women with two waiver births during the time period. There was wide variation in birth to conception interval, ranging from 0-55 months. The prevalence of low birth weight and preterm birth for the first infant born under the waiver was 8.5% and 12.4% respectively. These figures closely mirror national averages of 8.1% and 12.5%. However, the percent of low birth weight and preterm for the second waiver birth jumped to 9.6% and 17.0% respectively. SGA accounted for 10.1% of first births and 8.6% of second births; however, there is no national prevalence data available for comparison purposes. Fifteen percent of second births were to mothers whose first waiver birth was preterm or of low birth weight.

Outcomes
Results of the multivariate analyses indicate that after controlling for key demographic and behavioral variables, greater participation in family planning waiver services is associated with increased adequacy of prenatal care (see Table 3). Specifically, for each additional family planning waiver annual visit, a person has 1.172 the odds of having

adequate prenatal care, compared to a person having received fewer family planning annual visits. An increase of two additional family planning visits increases ones' odds of adequate prenatal care by 1.37. In addition to the number of family planning visits, years of education, number of prior births, alcohol use, marital status, and rural were significant predictors of prenatal care within the waiver-enrolled population.

In addition, greater participation in family planning waiver services is associated with longer birth to conception intervals (see Table 4).

In the literature a longer birth to conception interval is strongly associated with a decreased risk of low birth weight, preterm birth, and/or small for gestational age. However, in this study, there was no association between participation in family planning waiver services and the outcomes of low birth weight, preterm birth, and small for gestational age, and these results were not modified by birth to conception interval. See Tables 5-8 for the results of the final models of these analyses.

Conclusions

Greater participation in Medicaid family planning waiver services is associated with better prenatal care and longer birth to conception intervals. These findings suggest that the waiver has a long-term impact on women who consistently use such services. That the adequacy of prenatal care was improved in women with more family planning visits supports the goals of the waiver program to get more women into medical homes. A woman who feels she has a trusted provider is more likely to seek care from that provider. That provider can then provide referrals to other parts of the healthcare sector so that the individual can get the services needed.

A concern is that overall participation in waiver services was extremely low. Most women, though enrolled in the waiver, did not participate in obtaining family planning waiver services at all. This supports prior findings that outreach is needed to move more women from enrollment in services to utilizing services. More research is also needed to understand what outreach strategies are most effective for recruiting and retaining low-income women in waiver services so that the positive results found in this study may be more widespread throughout the waiver.

An additional limitation is that women who participated in more services were motivated to seek that care, thus signifying a potential selection bias. This selection bias was not measured. Therefore, the positive results of this study see with regard to prenatal care and birth to conception intervals may only be applicable to these motivated women who sought services. Finally, the sample of women who were enrolled in the waiver over a certain time period (22,317 over any consistent 36-month period within 10 years) is relatively small compared to over 60,000 participants in 2006.

Table 1. Maternal and Child Characteristics of All Study Women

Maternal and Child Characteristics	Overall Sample (N=22,317)	
	Mean*	St. Dev.*
Age (years)	26.0	4.6
Years of education	12.5	1.8
Number of prior births	1.2	0.9
	Frequency*	Valid Percent*
Race/ethnicity		
African-American	10,866	48.7
White	11,272	50.5
Other	179	0.8
Urban/rural		
Urban	13,485	60.9
Rural	8,647	39.1
Marital status		
Married and living together	4,019	20.6
Single or married and not living together	15,480	79.4
Alcohol use		
No	22,103	99.2
Yes	177	0.8
Tobacco use		
No	18,410	82.6
Yes	3,878	17.4
Number of family planning visits before first birth		
0	15,860	71.1
1	4,502	20.2
2	1,787	8.0
3	166	0.7
4	2	0.01
Adequacy of prenatal care (Kotelchuck Index)		
Adequate Plus	12,687	57.5
Adequate	5,856	26.5
Intermediate	1,111	5.0
Inadequate	2,413	10.9
Birth weight		
Normal birth weight	20,421	91.5
Low birth weight	1,550	6.9
Very low birth weight	346	1.6
Preterm birth		
No	19,555	87.6
Yes	2,762	12.4
Small for gestational age		
No	20,062	89.9
Yes	2,255	10.1

* Does not include missing responses

Table 2. Maternal and Child Characteristics of Women with a Second Birth

Maternal and Child Characteristics	Overall Sample (N=2,268)	
	Mean*	St. Dev.*
Age (years)	26.0	3.9
Years of education	12.2	1.8
Number of prior births	2.1	0.9
Birth to conception interval (months)	14.7	10.6
	Frequency*	Valid Percent*
Race/ethnicity		
African-American	1,125	49.6
White	1,132	49.9
Other	9	0.4
Urban/rural		
Urban	1,393	62.0
Rural	855	38.0
Marital status		
Married and living together	452	22.4
Single or married and not living together	1,566	77.6
Alcohol use		
No	2,241	99.0
Yes	23	1.0
Tobacco use		
No	1,834	81.0
Yes	430	19.0
Number of family planning visits before first birth and between first and second birth		
0	1,597	70.4
1	447	19.7
2	179	7.9
3	37	1.6
4	6	0.3
5	2	0.1
Adequacy of prenatal care (Kotelchuck Index)		
Adequate Plus	1,133	51.7
Adequate	504	23.0
Intermediate	123	5.6
Inadequate	430	19.6
Birth weight		
Normal birth weight	2,051	90.4
Low birth weight	166	7.3
Very low birth weight	51	2.3
Preterm birth		
No	1,883	83.0
Yes	385	17.0
Small for gestational age		
No	2,044	91.4
Yes	192	8.6
Most recent prior birth was preterm or low birth weight		
No	1,927	85.0
Yes	341	15.0

* Does not include missing responses

Table 3. Results of Ordered Logistic Regression Model for the Probability of Having More Adequate Prenatal Care

Variable	Odds Ratio	95% Confidence Interval
Total number of family planning visits before first birth on waiver	1.172	(1.122, 1.223)*
Mother's age	1.000	(0.993, 1.007)
Years of education	0.952	(0.935, 0.968)*
Number of prior births	0.871	(0.842, 0.901)*
Tobacco use	1.041	(0.960, 1.129)
Alcohol use	0.576	(0.427, 0.775)*
Black race	0.939	(0.882, 1.000)
Single/not living with married partner	0.915	(0.848, 0.986)*
Rural (Check coding direction)	1.211	(1.143, 1.284)*

*Significant, $p<0.05$

Table 4. Results of Linear Regression Model for Birth to Conception Interval

Variable	Df	F	P-value
Total number of family planning visits before first birth on waiver	1	22.46	<0.0001*
Mother's age	1	13.52	0.0002*
Years of education	1	0.52	0.4701
Number of prior births	1	6.02	0.0142*
Tobacco use	1	5.39	0.0204*
Alcohol use	1	0.14	0.7111
Race/ethnicity	1	3.67	0.0556
Marital status	1	18.41	<0.0001*
Urban/rural	1	0.01	0.9168
Adequacy of prenatal care (Kotelchuck Index)	3	0.45	0.7185

*Significant, $p<0.05$

Table 5. Results of Logistic Regression Model for the Probability of Low Birth Weight

Variable	Odds Ratio	95% Confidence Interval
Total number of family planning visits before first birth and between first and second birth	0.889	(0.692, 1.142)
Birth to conception interval	0.995	(0.978, 1.012)
Mother's age	1.010	(0.959, 1.063)
Years of education	0.932	(0.831, 1.046)
Number of prior births	1.097	(0.896, 1.342)
Tobacco use	2.924	(1.887, 4.530)*
Alcohol use	1.223	(0.322, 4.715)
Black race	1.820	(1.196, 2.770)*
Single/not living with married partner	1.044	(0.652, 1.672)
Rural	1.170	(0.820, 1.671)
Most recent prior birth was preterm or low birth weight	5.228	(3.649, 7.489)*
Adequacy of prenatal care	1.169	(1.000, 1.367)*

*Significant, $p<0.05$

Table 6. Results of Logistic Regression Model for the Probability of Very Low Birth Weight

Variable	Odds Ratio	95% Confidence Interval
Total number of family planning visits before first birth and between first and second birth	0.718	(0.393, 1.311)
Birth to conception interval	0.995	(0.960, 1.030)
Mother's age	1.076	(0.969, 1.194)
Years of education	1.002	(0.790, 1.272)
Number of prior births	0.892	(0.584, 1.364)
Tobacco use	1.968	(0.708, 5.471)
Alcohol use	1.088	(0.104, 11.428)
Black race	2.979	(1.142, 7.768)*
Single/not living with married partner	1.461	(0.471, 4.525)
Rural	1.130	(0.533, 2.396)
Most recent prior birth was preterm or low birth weight	4.966	(2.351, 10.491)*
Adequacy of prenatal care	1.752	(1.139, 2.696)*

*Significant, $p<0.05$

Table 7. Results of Logistic Regression Model for the Probability of Preterm Birth

Variable	Odds Ratio	95% Confidence Interval
Total number of family planning visits before first birth and between first and second birth	0.926	(0.773, 1.110)
Birth to conception interval	1.003	(0.990, 1.016)
Mother's age	0.995	(0.956, 1.035)
Years of education	0.932	(0.854, 1.016)
Number of prior births	1.083	(0.925, 1.269)
Tobacco use	1.808	(1.282, 2.549)*
Alcohol use	0.340	(0.071, 1.639)
Black race	1.518	(1.119, 2.060)*
Single/not living with married partner	1.214	(0.850, 1.734)
Rural	1.318	(1.012, 1.717)*
Most recent prior birth was preterm or low birth weight	3.044	(2.258, 4.104)*
Adequacy of prenatal care	0.934	(0.837, 1.041)

*Significant, $p<0.05$

Table 8. Results of Logistic Regression Model for the Probability of Small for Gestational Age

Variable	Odds Ratio	95% Confidence Interval
Total number of family planning visits before first birth and between first and second birth	0.868	(0.687, 1.097)
Birth to conception interval	0.996	(0.980, 1.012)
Mother's age	1.004	(0.958, 1.053)
Years of education	0.977	(0.878, 1.086)
Number of prior births	1.208	(1.003, 1.454)*
Tobacco use	2.619	(1.711, 4.008)*
Alcohol use	1.882	(0.547, 6.070)
Black race	2.887	(1.932, 4.285)*
Single/not living with married partner	0.909	(0.588, 1.406)
Rural	1.376	(0.994, 1.906)
Most recent prior birth was preterm or low birth weight	1.871	(1.283, 2.729)*
Adequacy of prenatal care	0.965	(0.845, 1.102)

*Significant, $p<0.05$