

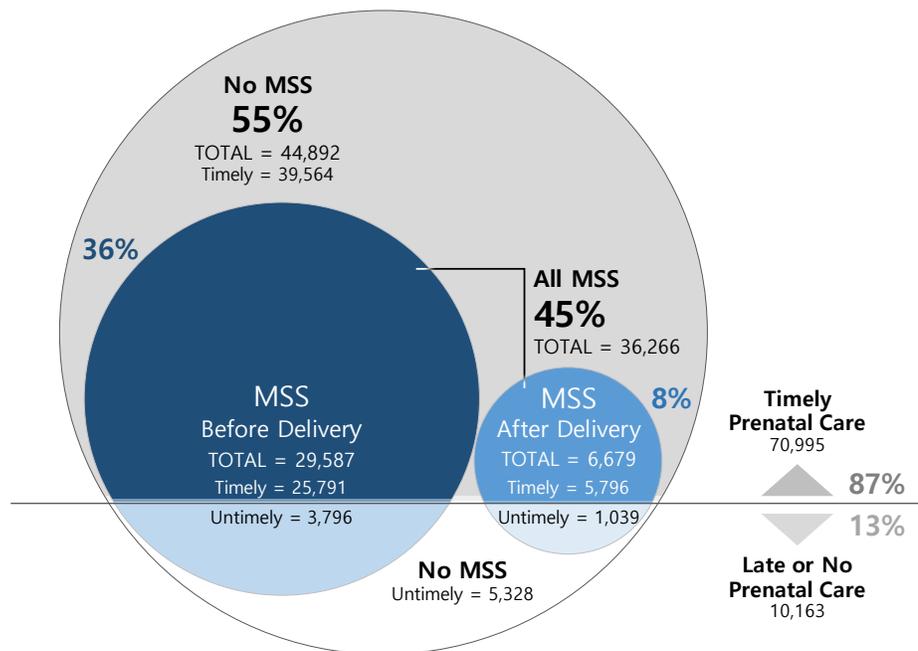
Evaluation of the Health Care Authority's First Steps Maternity Support Services Program in Washington State

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In collaboration with Washington State Health Care Authority First Steps Program

WASHINGTON STATE'S FIRST STEPS PROGRAM BEGAN IN 1989. The First Steps program provides prenatal care and enhanced services to Medicaid-enrolled pregnant and postpartum individuals and their infants. As a supplementary intervention to regular prenatal care, Maternity Support Services (MSS) is one component of the First Steps program that offers preventive health and educational services, including brief interventions, through a multidisciplinary team approach to pregnant and postpartum individuals. In 2009, the Legislature directed the MSS program to target services to pregnant clients with risk factors that lead to higher rates of poor birth outcomes (HB 1244 209.32). While MSS billing rates for providers have not changed, MSS annual expenditures have decreased from approximately \$24 million in 2009 to just \$6.2 million in 2018, far exceeding the original reduction goal.¹ Objectives of this evaluation are to: 1) describe the trend of MSS utilization from 2009-2018; 2) describe MSS utilization by clients' risk levels for adverse birth outcomes 2017-2018; 3) assess the association between prenatal MSS and behavior change or birth outcomes; and 4) assess the effect of receiving both timely prenatal care and prenatal MSS on behavior change or birth outcomes.

FIGURE 1.
 Receipt of Medicaid-Paid Maternity Support Services and Timely Prenatal Care for Washington Women 2017-2018 Deliveries
 TOTAL = 81,158



¹ HCA internal MSS program concept paper/Medicaid Program Operations Integrity/Community Services.

Key Findings

During 2009-2018, the MSS program served 229,744 women, representing 55% of all women with Medicaid-paid maternity care in Washington State. The legislatively mandated program change resulted in a decrease of overall MSS utilization from 69% to 43%, and a reduction of average service units from 21.4 to 10.2 from 2009 to 2018.

Three out of five clients were identified through administrative records as having high level risks that contribute to adverse birth outcomes and were eligible for the maximum level of MSS during 2017-2018. Only 37% of the clients with high level risks received prenatal MSS, with an average 12 service units, compared to 35% (average 11 units) and 38% (average 10 units) of clients with moderate level and low level or non-identified risks, respectively.

Clients receiving prenatal MSS had improved health behaviors and birth outcomes during 2017-2018. After adjusting for demographics and clients' risk factors during pregnancy, prenatal MSS was significantly associated with:

- 32% increase in smoking cessation during pregnancy (95% confidence interval (CI) 1.17-1.48),
- 12% reduction in preterm birth (95% CI 0.83-0.94), and
- 18% increase in breastfeeding (95% CI 1.18-1.25).

Clients receiving both prenatal MSS and timely prenatal care during pregnancy had stronger improved health behaviors and birth outcomes during 2017-2018. After adjusting for demographics and clients' risk factors during pregnancy, receiving both prenatal MSS and timely prenatal care (started within 6 months of pregnancy) was significantly associated with:

- Two-fold increase in smoking cessation during pregnancy (OR 2.14, 95% CI 1.84-2.50),
- 22% reduction in preterm birth (95% CI 0.70-0.86),
- 17% reduction in low birthweight (95% CI 0.75-0.93), and
- Two-fold increase in initiation of breastfeeding (OR 2.18, 95% CI 2.00-2.38).

Goals of MSS include:

Increasing:

- Early access and ongoing use of prenatal and newborn care
- Screening for postpartum mood disorder
- Initiation and duration of breastfeeding
- Family planning knowledge

Decreasing:

- Maternal morbidity and mortality
- Low birth-weight babies
- Premature births
- Infant morbidity and mortality rates
- Health disparities
- The number of unintended pregnancies
- The number of repeat pregnancies within two years of delivery (Healthy birth spacing intervals)
- Tobacco, nicotine, alcohol, marijuana, and drug use during pregnancy
- Pediatric exposure to second-hand smoke

<https://www.hca.wa.gov/assets/billers-and-providers/Mss-icm-bi-20200101.pdf>

MSS Program Overview

Starting in 1989, Washington State’s First Steps program provides prenatal care and enhanced services to Medicaid-enrolled pregnant and postpartum individuals and their infants. Maternity Support Services (MSS) is one component of the First Steps program that offers preventive health and educational services, including brief interventions, through a multidisciplinary team approach to pregnant and recently pregnant women. As a Medicaid State Plan service, the Centers for Medicare & Medicaid Services (CMS) also requires that MSS be offered to all Medicaid-eligible pregnant women. Legislative and CMS requirements were met via a tiered structure that established basic, expanded, and maximum levels of service to clients of low or non-identified risks, moderate level risks, and high level risks, respectively. A screening tool based upon risk factors known to lead to poor birth outcomes helps providers better identify clients with higher level risks (Appendix Table 1).

MSS screens each pregnant client into one of three risk levels and supplements their prenatal care with ancillary services targeted to improve their birth outcomes. Subsequently, the MSS program developed a new service delivery model utilizing tiers while also experiencing other program changes due to overall agency budget reductions including elimination of services (child care, direct referrals to tobacco cessation, and family planning) and elimination of dedicated staff from the Department of Health (DOH) who assisted in jointly administering the program.

FIGURE 2.

Policy Change Impacts on Service Units Allowed

2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No risk level, all could receive up to 60 units of service		Up to 40 units of service at high risk level		NONE or LOW (A)		BASIC		Up to 7	
				MODERATE (B)		EXPANDED		Up to 14	
				HIGH (C)		MAXIMUM		Up to 30	
								Up to 4	
								Up to 6	
								Up to 9	

NOTE: A provider can request a limited extension to exceed the number of MSS units of service (15 minutes/unit) allowed under WAC 182-501-0169, upon approval. HCA provider guides: <https://www.hca.wa.gov/billers-providers-partners/prior-authorization-claims-and-billing/provider-billing-guides-and-fee-schedules>.

MSS delivers enhanced preventive health and education services and brief interventions to eligible pregnant clients. Services are provided as early in a pregnancy as possible, based on the client’s individual risks and needs (First Steps Program MSS provider guide, HCA 2020). MSS screens pregnant mothers who are at risk of having low-birth weight or preterm babies and supplements their prenatal care with services targeted to improve birth outcomes. These services, which include nutrition counseling, mental health counseling, visiting nurses, and education, prevent poor birth outcomes and help moms to create a nurturing, safe environment for their new babies. MSS is also intended to help pregnant moms stop using drugs and alcohol, quit smoking, and increase breast feeding. Sustaining the MSS program has been challenging with a dwindling budget. Compounding the decrease in annual expenditures,² the number of MSS providers decreased by 46 since 2009 with 33 providers located in 27 of the 39 counties in 2018. This study aims to examine how MSS has been provided and whether MSS utilization was associated with clients’ health and birth outcomes. Since MSS was intended to be a supplemental intervention service to timely prenatal care, the outcome analyses also considered the effect when clients receive both timely prenatal care and MSS.

² HCA internal MSS program concept paper/Medicaid Program Operations Integrity/Community Services.

Study Design

This study consisted of four parts. We described MSS utilization over time, MSS utilization based on clients' risk factors, examined the association between prenatal MSS and clients' health or birth outcomes, and examined the combined effect of both prenatal MSS and timely prenatal care on clients' health and birth outcomes.

PART 1. MSS utilization over time

The study cohort included 421,205 women who used the state's MSS, from 42,641 in 2009 to 39,695 in 2018. We assessed the trend of MSS utilization over time including timing of MSS initiation, MSS utilization by provider types, by clients' Medicaid eligibility and demographic characteristics.

PART 2. MSS utilization and clients' risk factors

With limited funding and reduced numbers of providers, MSS were provided based on the client's individual risks. Combining 2017 and 2018 data, we examined MSS utilization by clients with different levels of risks, and risk factors within each level. Clients who had no identifiable risks or who had low level risks upon initial assessment were eligible for basic MSS. All related analyses combined clients with low level risks and non-identified risks as one group. MSS utilization was assessed by timing (MSS initiated during pregnancy or within 60-days post-delivery) and duration (prenatal only, both prenatal and postpartum, or postpartum only).

PART 3. Prenatal MSS utilization and associated health and birth outcomes

Combining 2017 and 2018 data, we estimated the association between prenatal MSS utilization and selected health and birth outcomes. Measurable outcomes in this evaluation included quitting smoking during pregnancy, preterm births, low birthweight, and initiating breastfeeding. Since MSS was intended to be a supplemental intervention service to prenatal care and race/ethnicity is an important factor for the selected outcomes, the multivariable logistic regression models included both timely prenatal care (prenatal care started within 6 months of pregnancy) and race/ethnicity, in addition to other significant risk factors.

PART 4. Combined effect of prenatal MSS and timely prenatal care and associated health and birth outcomes

Using the same approach as in Part 3, we estimated the combined effect of prenatal MSS and timely prenatal care. Instead of treating the two factors independently, we considered timely prenatal care and prenatal MSS in tandem and grouped clients into four categories. Women receiving:

1. Both timely prenatal care and prenatal MSS,
2. Timely prenatal care but no prenatal MSS,
3. Prenatal MSS but no timely prenatal care, and
4. Neither timely prenatal care nor prenatal MSS.

Study Populations

The study population varied by different outcomes. For example, the cohort for quitting smoking during pregnancy was limited to clients who self-reported smoking or using tobacco products during three months prior to the current pregnancy (n=10,870, 14% of all women who gave birth in 2017-2018). The cohort for the outcomes of preterm birth or low birthweight was limited to singleton live births (n=79,327, 98% of all babies born in 2017-2018). The cohort for the outcome of initiating breastfeeding was limited to livebirths (n=79,984).

PART 1.

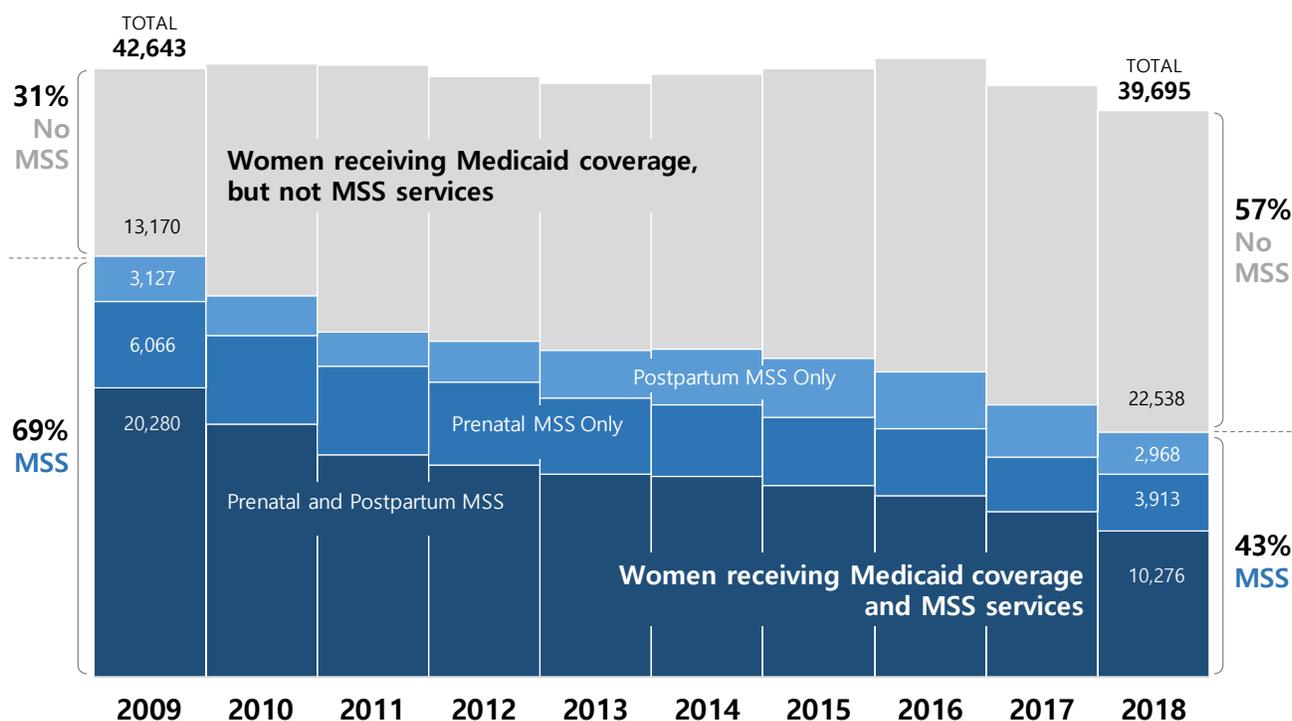
Trend of MSS utilization from 2009 to 2018

Q1 What proportion of Medicaid clients used MSS?

During 2009-2018, the MSS program served 229,744 women, representing 55% of all Medicaid-paid maternity care in Washington State. The program change enacted in 2010 resulted in a decrease of overall MSS utilization from 69% to 43%, and a reduction of average service units from 21.4 to 10.2 from 2009 to 2018.

FIGURE 3.

Women Receiving Medicaid-paid Maternity Care and Maternity Support Services



Q2a Among MSS clients . . . 1) What proportions used prenatal MSS, postpartum MSS, or both?

MSS initiated during pregnancy has the potential to improve health and birth outcomes. Therefore, client receipt of MSS during pregnancy is a program goal; however, it is reasonable for clients to receive MSS only after delivery (postpartum only) based on the individual risks and needs.

In these data:

- The proportion of clients who received MSS during pregnancy but not postpartum (prenatal only) remained steady (21% in 2009 and 23% in 2018),
- The proportion of clients who received only postpartum MSS increased by 7% (10% in 2009 to 17% in 2018), and
- The proportion of clients who received both prenatal and postpartum MSS decreased by 9% (69% in 2009 to 60% in 2018) during the same period of time.

Q2b Among MSS clients . . . 2) When was prenatal MSS initiated: before or after prenatal care?

FIGURE 4.

Timing of MSS Initiation

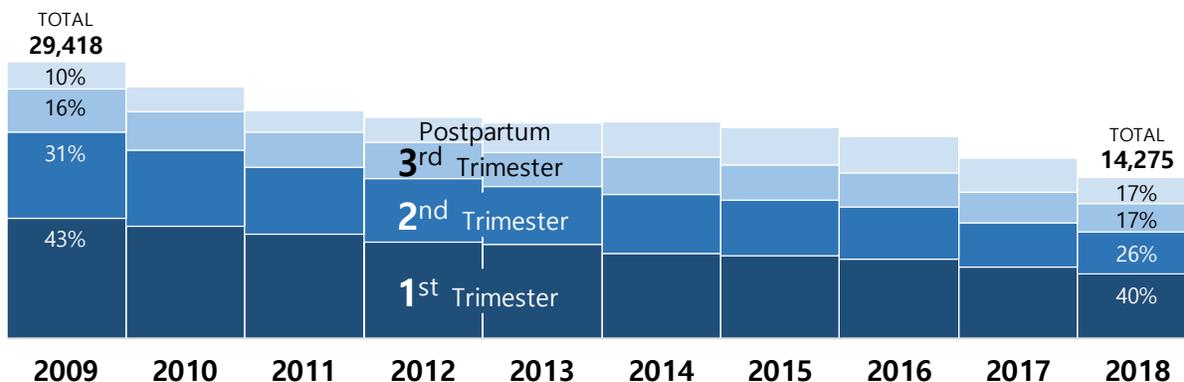
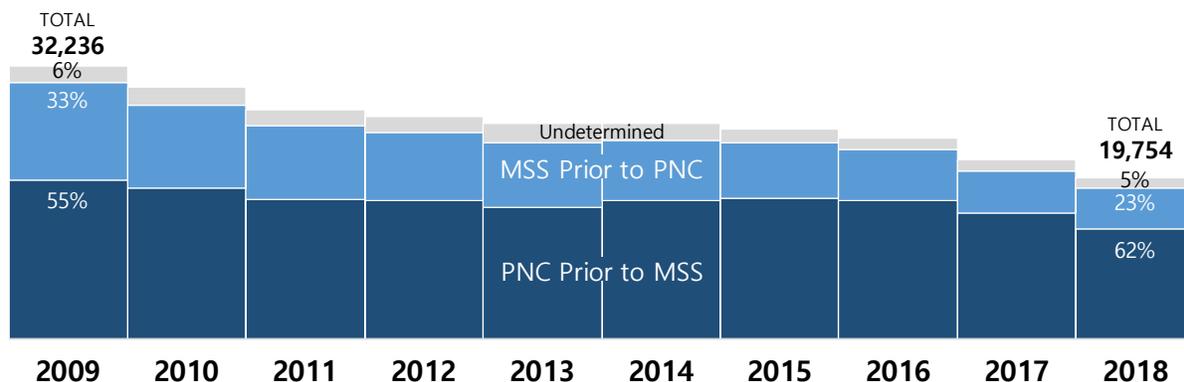


FIGURE 5.

Timing of MSS Initiation versus Prenatal Care Initiation



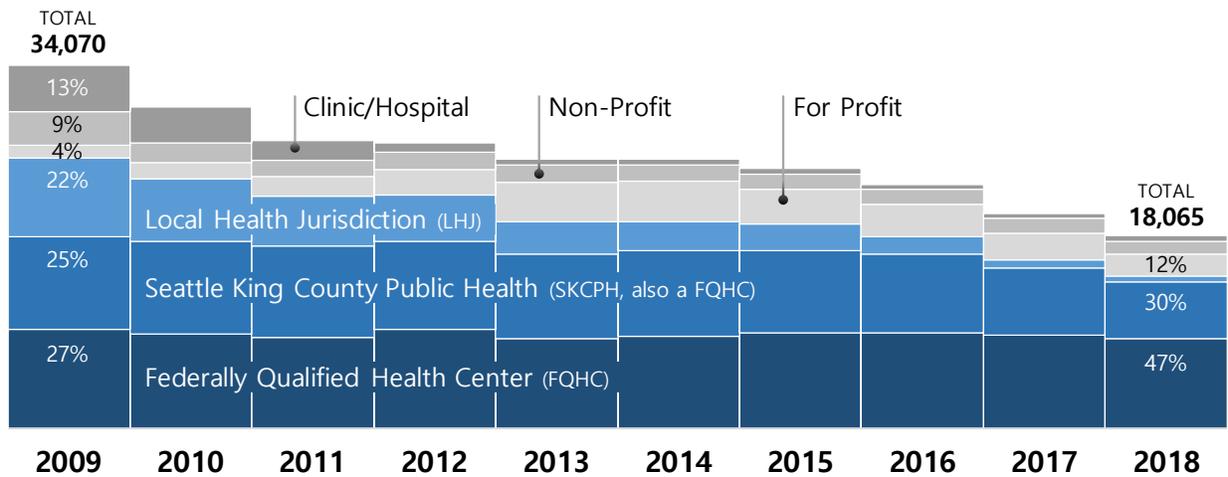
Timely prenatal care improves health and birth outcomes (Barros 1996 and Beeckman 2012). It's also desirable to provide MSS as early in pregnancy as possible. Among all clients receiving MSS, the proportion of women with MSS initiation during the first and second trimester decreased by 8%, from 74% in 2009 to 66% in 2018, whereas the proportion of women with MSS initiated during the third trimester remained similar (around 16%-17%) during the same period of time. Among clients who received both timely prenatal care and MSS during pregnancy, for the majority, MSS was initiated after prenatal care, with a 7% increase from 55% in 2009 to 62% in 2018, accompanied by a downward trend of MSS initiated prior to prenatal care by 10%. In 2018, one in four clients received MSS prior to prenatal care.

Q3 Are there differences in MSS utilization by type of provider?

Currently, there are 33 providers serving 27 (of 39) counties with a majority of providers being Federally Qualified Health Centers (FQHC). The primary reason FQHCs have continued offering MSS is because they receive the FQHC encounter rate, and therefore higher reimbursement for the services they provide. Since 2005, MSS billing rates have not changed, making the services unsustainable for other providers.³

³ HCA internal MSS program concept paper/Medicaid Program Operations Integrity/Community Services.

FIGURE 6.
MSS Women Served by Provider



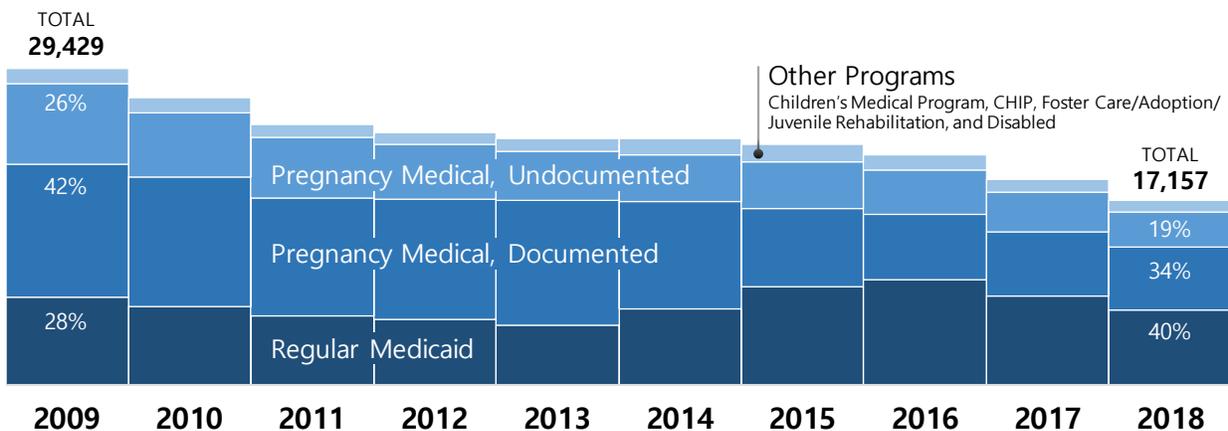
From 2009 to 2018, the proportions of MSS provided by: FQHCs, including Seattle King County Public Health Department (SKCPH) which is also a FQHC, increased 25% (from 52% to 77%); Local Health Jurisdictions (LHJ) decreased 19% (from 22% to 3%); For Profit providers increased 8% (from 4% to 12%); and other Non-Profit agencies and Clinics/Hospitals decreased.

Q4 Are there differences in MSS utilization by clients' Medicaid eligibility?

Regular Medicaid. The proportion of women using MSS who were in the Regular Medicaid category (i.e. eligible for Temporary Assistance to Needy Families (TANF) or who were in the Medicaid Expansion group after implementation of the Affordable Care Act (ACA)) increased from 28% in 2009 to 40% in 2018. The increase was also in line with the implementation of the ACA, which resulted in an increase in the number of Regular Medicaid clients starting in 2014. MSS utilization by this group tapered after 2016.

Pregnancy Medical. The percentages of women using MSS who were Medicaid-eligible solely due to pregnancy decreased, both among documented and undocumented women, from a combined 68% in 2009 to 53% in 2018.

FIGURE 7.
MSS Women by Medicaid Eligibility



Q5 Are there differences in MSS utilization by clients' demographic characteristics?

TABLE 1.

Demographic Characteristics and MSS Utilization

Percent of women within each subgroup who received MSS

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Medicaid Women with Deliveries	42,643	42,779	43,014	42,000	41,543	42,117	42,582	43,371	41,463	39,695
AGE										
Medicaid Women										
16 or younger	2%	2%	1%	1%	1%	1%	1%	1%	0%	0%
17-19	12%	11%	10%	10%	8%	8%	7%	7%	6%	6%
20-24	34%	32%	32%	31%	31%	29%	27%	26%	26%	25%
25-29	28%	28%	29%	29%	30%	30%	31%	32%	31%	31%
30-34	16%	17%	18%	19%	19%	21%	21%	22%	22%	23%
35-39	5%	5%	5%	5%	5%	5%	5%	5%	11%	11%
40+	2%	2%	2%	2%	2%	2%	3%	3%	3%	3%
MSS Utilization										
16 or younger	85%	78%	67%	71%	72%	66%	69%	69%	59%	59%
17-19	77%	69%	62%	64%	59%	62%	62%	57%	54%	54%
20-24	68%	61%	55%	54%	53%	54%	53%	50%	47%	44%
25-29	66%	60%	54%	54%	53%	52%	49%	47%	44%	41%
30-34	67%	62%	56%	55%	55%	54%	52%	48%	44%	42%
35-39	69%	66%	61%	58%	59%	57%	54%	51%	49%	44%
40+	72%	65%	65%	60%	64%	63%	58%	54%	51%	49%
RACE/ETHNICITY <i>not mutually exclusive</i>										
Medicaid Women										
White Non-Hispanic	52%	53%	53%	53%	53%	53%	52%	51%	51%	50%
Hispanic	32%	31%	30%	30%	30%	29%	30%	30%	29%	30%
African American	7%	7%	8%	8%	9%	9%	9%	9%	10%	10%
Native American	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Pacific Islander	2%	2%	2%	2%	3%	3%	3%	3%	5%	5%
Asian	6%	6%	6%	6%	6%	7%	7%	7%	7%	7%
Other Non-Hispanic	1%	2%	2%	1%	1%	1%	1%	1%	2%	2%
MSS Utilization										
White Non-Hispanic	59%	50%	43%	43%	43%	42%	39%	36%	32%	30%
Hispanic	83%	78%	72%	71%	67%	67%	67%	64%	61%	58%
African American	85%	80%	77%	76%	77%	77%	74%	69%	64%	60%
Native American	58%	52%	47%	48%	49%	48%	45%	44%	40%	36%
Pacific Islander	76%	67%	63%	62%	66%	67%	64%	60%	57%	52%
Asian	76%	71%	67%	66%	66%	66%	61%	57%	52%	48%
Other Non-Hispanic	79%	80%	76%	69%	65%	61%	72%	68%	58%	54%
EDUCATION										
Medicaid Women										
Less than H.S. or GED	34%	31%	29%	27%	25%	25%	23%	23%	21%	21%
High school or GED	33%	33%	34%	34%	35%	34%	33%	33%	33%	34%
At least college	33%	36%	37%	39%	40%	41%	43%	45%	44%	43%

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total Medicaid Women with Deliveries	42,643	42,779	43,014	42,000	41,543	42,117	42,582	43,371	41,463	39,695
MSS Utilization										
Less than H.S. or GED	78%	73%	67%	66%	65%	64%	64%	62%	59%	56%
High school or GED	68%	61%	55%	56%	55%	55%	54%	51%	48%	44%
At least college	61%	54%	48%	48%	48%	47%	44%	41%	38%	36%
SPOKEN LANGUAGE										
Medicaid Women										
English	79%	81%	82%	83%	84%	86%	86%	86%	85%	85%
MSS Services										
English	64%	57%	51%	52%	51%	51%	49%	46%	42%	39%
Other than English	88%	83%	78%	76%	75%	76%	77%	72%	71%	68%

Age. The age distribution of Medicaid women who gave birth shifted steadily towards older age. The proportion of women who gave birth as teens or ages 20-24 decreased 11%, while the proportion ages 25-39 increased 16% from 2009 to 2018. The pattern of MSS utilization by age group remained similar over time, with a higher proportion of younger or older aged women receiving MSS than women ages 25-34.

Race/ethnicity. Among Medicaid women who gave birth in 2018, race/ethnicity identification (not mutually exclusive) was 50% Non-Hispanic White, 30% Hispanic, 10% African American, 7% Asian, and 5% Native American. At 5%, Pacific Islanders more than doubled in proportion from 2009 to 2018, while the changes were within 2% of the earlier proportions for other race/ethnicity groups. Hispanic and African American women used more MSS than other race/ethnicity groups. Non-Hispanic White and Native American women used less MSS and did not increase utilization over time. In 2018, about six in ten Hispanic and African American women and three in ten Non-Hispanic White and Native American women used MSS, compared to about five in ten among other race/ethnicity groups.

Education level. The population of Medicaid women who gave birth shifted steadily towards higher education levels during 2009-2018, a 10% increase for those with at least a college degree and 12% decrease for less than high school or GED. This coincided with an increase in age at delivery. MSS utilization was lower as education level increased across all years; for example, 56% among women having less than high school or GED versus 36% among those having at least a college education in 2018.

English proficiency. Accounting for 15% of all Medicaid women who gave birth in 2018, a higher percentage of non-English speaking women received MSS than their English-speaking counterparts, 68% compared to 39%.

PART 2.

MSS utilization and clients' risks of adverse health outcomes, 2017-2018

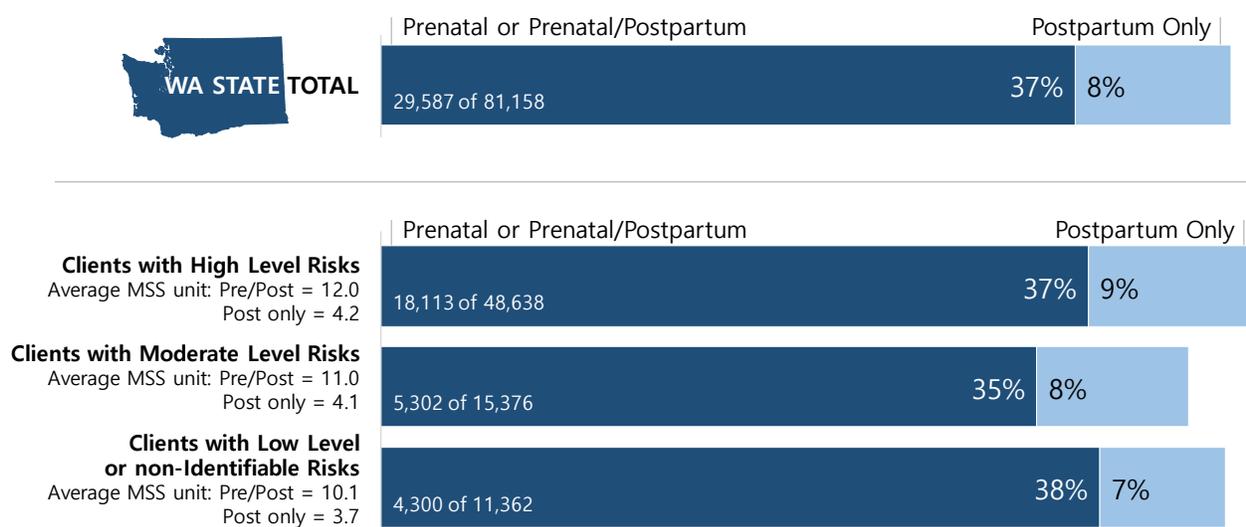
Among women who gave birth in 2017-2018, about three in five (60%) were identified through administrative records as having high level risks and were eligible for the maximum MSS, 30 units total or nine units if postpartum only. One in five clients (20%) had moderate level risks and were eligible for expanded MSS, 14 units total or six units if postpartum only. One in five clients (21%) had low risks or no identifiable risks and were eligible for basic MSS, 7 units total or 4 units if postpartum only.

Q1 Was MSS provided based on the client's individual risks and needs?

Only 37% of the clients having high level risks received prenatal MSS (average 12.0 MSS units), compared to 35% (average 11.0 MSS units) and 38% (average 10.0 MSS units) of clients having moderate level and low level or no-risks, respectively. Since proportions of MSS utilization are similar between clients with high risk levels and those with low or no-risk levels, these data suggest that MSS was offered to clients in need, not solely based on individual's risks.

FIGURE 8.

Maternity Support Services Received by Clients' Risk Levels



MSS utilization varied by clients identified with different risk factors. Half of women who were African American, and more than half of those age younger than 16 at conception, used MSS during pregnancy (i.e. prenatal MSS). About two out of five clients who were identified with the following risks used prenatal MSS: cognitive or developmental disability, Pacific Islander, chronic or gestational diabetes, age over 35, obese or underweight but with proper weight gain during pregnancy.

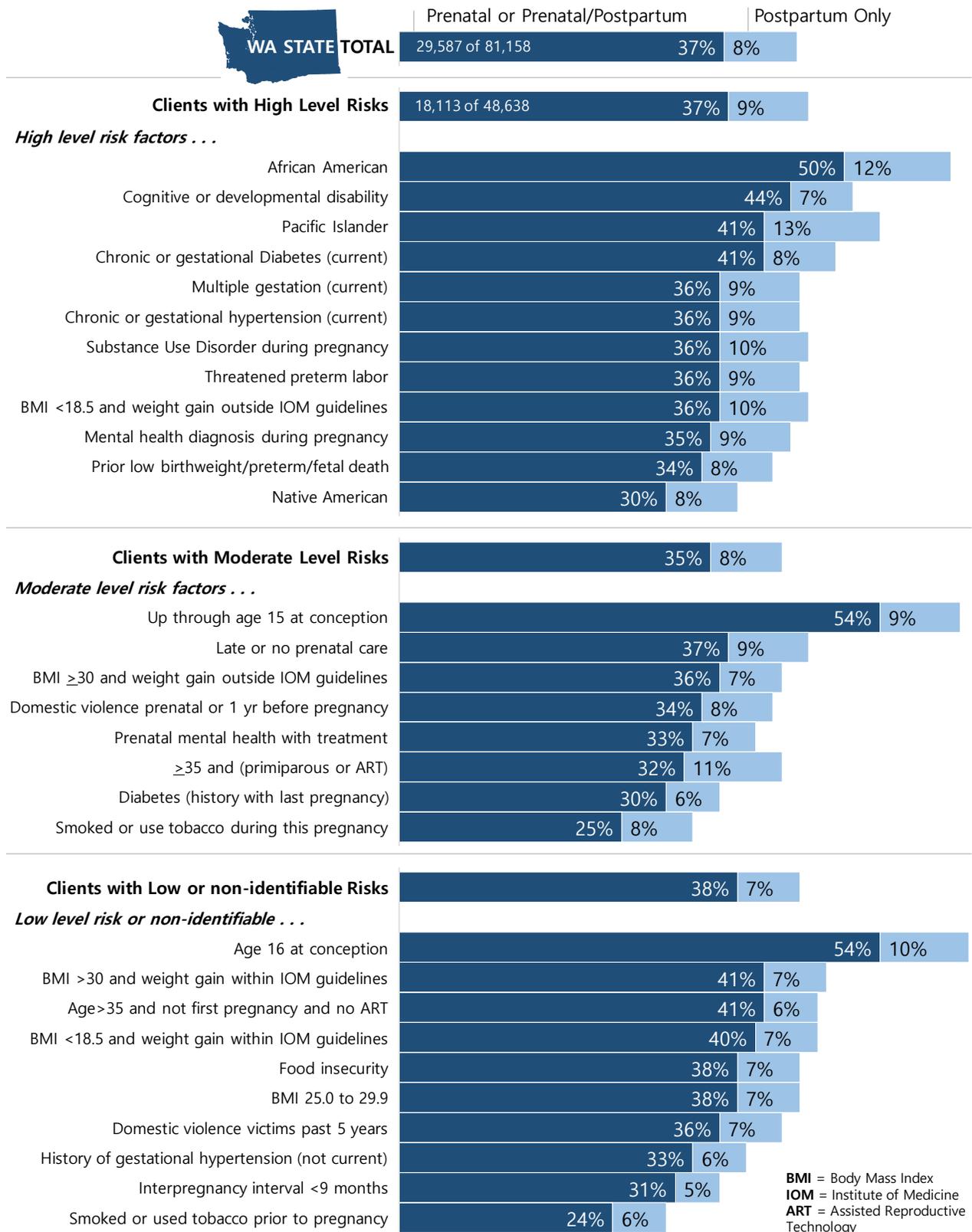
Less than one out of three clients with the following risks used prenatal MSS: Native American, diabetes in previous pregnancy, smoked or used tobacco prior to current pregnancy and continued use during pregnancy.

Additional MSS units were available if requested by the provider and approved by the First Steps Program (<https://www.hca.wa.gov/assets/billers-and-providers/Mss-icm-bi-20200101.pdf>). A small fraction of clients exceeded allowable MSS units (8%). The majority (68%) of these extra MSS units was provided to clients whose calculated risk levels were low or non-identifiable.

One in four (26%) of extra MSS units were used by clients with moderate level risks and one in twenty (5%) by clients with high level risks. 95% of extra units were provided to three race/ethnicity groups: Hispanics (61.4%); Non-Hispanic white (26.5%); and Asian (7.0%). The remaining 5% were provided to the three high risk race/ethnicity groups: Native American; Pacific Islander; and African American.

FIGURE 9.

Maternity Support Services and Risk Factors, by Level of Risks



PART 3.

Prenatal MSS utilization and clients' health and birth outcomes, 2017-2018

Q₁ Was receiving prenatal MSS associated with quit smoking?

Among pregnant women who self-reported smoking or using tobacco products during three months prior to pregnancy, 293 (2.7%), 2,042 (18.8%) and 8,535 (78.5%) were identified as having low, moderate, and high level risks, respectively. By definition, women with low level risks did not include women who smoked during pregnancy. Among clients with moderate or high level risks who received prenatal MSS, 40% quit smoking during pregnancy, compared to 38% (moderate level risk) and 36% (high level risks) of total clients in these categories, and 34% of those with high level risks, who did not receive prenatal MSS ($P < 0.05$).

Receiving any prenatal MSS was associated with a 32% increase in quitting smoking (95% confidence interval (CI) 1.17-1.48). Receiving timely prenatal care was associated with a 39% increase in quitting smoking (95% CI 1.20-1.61). Hispanic, Non-Hispanic Pacific Islander, African American and Asian women receiving prenatal MSS were more likely to quit smoking during pregnancy compared to Non-Hispanic White women (the reference group). Women with a high risk level were 9% less likely to quit smoking than women with moderate risk level (95% CI 0.82-1.00).

TABLE 2.

Quit Smoking by Prenatal MSS for Washington Women with Medicaid-Paid Maternity Care, 2017-2018

Among clients who smoked three months prior to pregnancy

	Total	Quit Smoking			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
All births to Medicaid women who smoked prior to pregnancy	10,870	37.8%	41.0%	36.4%	1.32	1.17	1.48
Timely prenatal care*	8,853	40.6%	43.4%	39.3%	1.39	1.20	1.61
By Risk Factors							
Race/ethnicity**							
White, Non Hispanic (reference)	8,509	35.5%	36.6%	35.0%	1.00		
Hispanic	994	51.5%	57.6%	47.6%	1.57	1.31	1.90
Asian, Non Hispanic	170	60.6%	60.0%	61.0%	2.35	1.58	3.50
Native American, Non Hispanic	457	38.3%	53.6%	33.4%	1.29	0.99	1.69
African American, Non Hispanic	424	42.5%	43.9%	41.0%	1.56	1.20	2.03
Pacific Islander, Non Hispanic	205	50.2%	60.3%	44.1%	1.97	1.39	2.79
Any other race/ethnicity	111	18.0%	25.0%	14.7%	0.55	0.29	1.04
Age ≥35 and (primiparous or ART)	120	45.8%	48.8%	44.2%	1.06	0.65	1.75
Age < 16 years old at delivery	28	42.9%	53.3%	30.8%	1.49	0.60	3.68
BMI ≥30 and weight gain outside IOM guidelines	2,596	42.4%	43.8%	41.7%	1.15	1.00	1.32
Chronic or gestational diabetes (current pregnancy)	863	41.9%	45.3%	40.4%	1.02	0.85	1.21
Age < 17 years old at delivery	53	41.5%	47.4%	38.2%	1.20	0.59	2.43
BMI 25.0 to 29.9	2,326	39.3%	43.4%	37.5%	1.03	0.89	1.18

	Total	Quit Smoking			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
Chronic or gestational hypertension (current pregnancy)	2,204	39.2%	41.7%	37.9%	1.11	0.96	1.27
Threatened preterm labor	1,120	37.7%	44.7%	34.5%	1.20	1.01	1.42
BMI ≥30 and weight gain within IOM guidelines	596	37.6%	39.0%	36.9%	0.95	0.74	1.21
Mental health diagnosis during pregnancy, no treatment	2,913	35.0%	37.7%	33.8%	0.93	0.80	1.07
Food insecurity	9,078	34.4%	38.4%	32.5%	0.64	0.55	0.74
Prenatal mental health diagnosis with treatment	4,507	33.9%	37.3%	32.3%	0.96	0.84	1.09
BMI <18.5 and weight gain outside IOM guidelines	127	33.9%	43.6%	29.5%	1.18	0.74	1.88
Diabetes (history with last pregnancy)	298	33.6%	38.4%	32.0%	0.97	0.69	1.37
BMI <18.5 and weight gain within IOM guidelines	158	33.5%	42.6%	29.7%	0.59	0.34	1.01
Interpregnancy interval < 9 months	1,395	32.1%	33.7%	31.4%	0.85	0.72	1.01
Gestational hypertension in past pregnancy (not current)	862	30.7%	30.9%	30.7%	0.71	0.57	0.88
Age ≥35 and not first pregnancy and no ART	839	29.3%	33.6%	27.4%	0.69	0.56	0.86
Prior low birthweight/preterm/fetal death	1,570	29.3%	31.0%	28.7%	0.88	0.75	1.04
Cognitive or developmental disability	136	26.5%	24.1%	28.0%	0.62	0.36	1.06
Substance use disorders during pregnancy	4,668	26.3%	31.7%	23.5%	0.68	0.61	0.77
Domestic violence prenatal or 1 year before pregnancy	1,451	23.5%	31.4%	19.6%	0.77	0.64	0.91
By Level of Risks***							
Unduplicated total for low or no risks	293	100%	100%	100%	n/a	n/a	n/a
Unduplicated total for moderate level risks (reference)	2,042	38.3%	39.7%	37.8%	1.00		
Unduplicated total for high level risks	8,535	35.6%	39.7%	33.6%	0.91	0.82	1.00

* Timely prenatal care (started within 6 mo. of pregnancy) is mutually exclusive of late or no prenatal care, which is a risk factor.

** Race/ethnicity groups of African American, Native American and Pacific Islander are considered high risks. BMI: Body Mass Index; IOM: Institute of Medicine; ART: Artificial Reproductive Technology.

*** Level of risks are not mutually exclusive except for level totals. Refer to Technical Notes for risk factor definitions and assignment of clients to risk levels.

**** Multivariable adjusted odds ratio estimates. Two separate multivariable logistic regression models: 1) by risk factors and 2) by risk levels. All models included prenatal MSS and timely prenatal care. **Bold** indicates statistically significant at 5% level.

Q2 Was receiving prenatal MSS associated with decreased preterm births?

The prevalence of preterm birth among Medicaid mothers who had a singleton liveborn delivery during 2017-2018 was less than 4% (3.0% among clients at low level or non-identifiable risks and 3.6% among clients at moderate level risks). This is similar to the rate for the non-Medicaid population.⁴ The prevalence of preterm birth was 11% among clients with high level risks. Medicaid clients who received prenatal MSS had a lower rate of preterm birth (10.3%) than those who did not receive prenatal MSS (11.5%, $p < 0.05$).

Adjusting for potential risk factors, receiving any prenatal MSS was associated with a 12% decrease in preterm birth (95% CI 0.83-0.94), while receiving timely prenatal care was not significantly associated with preterm birth, OR 0.94 (95% CI 0.87-1.02). The most important factor for preterm birth was

⁴ Perinatal Indicators Report. Washington State Department of Health. https://www.doh.wa.gov/Portals/1/Documents/Pubs/950-153_PerinatalIndicatorsforWashingtonResidents.pdf.

threatened preterm labor (diagnosis code 644.0 for ICD-9-CM and 060.00 for ICD-10-CM), followed by poor birth outcomes in prior deliveries including low birthweight, preterm or fetal death, chronic or gestational hypertension, and underweight with no proper weight gain during pregnancy. The likelihood of a preterm birth for women with these conditions ranged two- to four-fold higher than for those without. The risk factors of SUD during pregnancy, cognitive or developmental disability, experiencing domestic violence, and smoking or tobacco use during pregnancy were also significantly associated with preterm births. Age over 35 at delivery and giving birth for the first time or used artificial reproductive technology for conception, and most of the race/ethnicity groups compared to Non-Hispanic White were also associated with preterm birth.

TABLE 3.

Preterm Births by Prenatal MSS for Washington Women with Medicaid-Paid Maternity Care, 2017-2018 Deliveries

Single live births with valid gestational age

	Total	Preterm Births			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
All births to Medicaid women (single, live, valid birthweight)	79,327	7.8%	7.5%	8.0%	0.88	0.83	0.94
Timely prenatal care*	69,399	7.6%	7.6%	7.7%	0.94	0.87	1.02
By Risk Factors							
Race/ethnicity**							
White, Non Hispanic (reference)	39,881	7.4%	7.3%	7.4%	1.00		
Hispanic	23,730	7.6%	7.1%	8.1%	1.27	1.18	1.36
Asian, Non Hispanic	4,469	8.2%	7.0%	9.1%	1.46	1.30	1.66
Native American, Non Hispanic	1,921	12.4%	13.2%	12.1%	1.49	1.28	1.73
African American, Non Hispanic	5,370	9.2%	8.4%	10.1%	1.37	1.23	1.52
Pacific Islander, Non Hispanic	1,863	8.6%	7.9%	9.1%	1.34	1.12	1.60
Any other race/ethnicity	2,093	9.1%	8.1%	10.0%	1.39	1.17	1.65
Threatened preterm labor	5,565	24.0%	24.3%	23.8%	3.93	3.65	4.22
Prior low birthweight/preterm/fetal death	8,532	19.9%	18.9%	20.4%	2.86	2.67	3.06
BMI < 18.5 and weight gain outside IOM guidelines	721	16.6%	12.4%	19.0%	2.38	1.92	2.95
Chronic or gestational hypertension (current pregnancy)	12,903	16.0%	15.5%	16.2%	2.60	2.44	2.77
Cognitive or developmental disability	863	14.8%	14.9%	14.8%	1.59	1.29	1.95
Domestic violence prenatal or 1 year before pregnancy	4,018	13.9%	12.2%	14.8%	1.26	1.12	1.40
Gestational hypertension in past pregnancy (not current)	5,464	13.7%	14.0%	13.5%	1.00	0.91	1.10
Substance use disorder (SUD) during pregnancy	9,957	13.4%	11.0%	14.7%	1.60	1.47	1.74
Chronic or gestational diabetes (current pregnancy)	10,537	12.7%	12.3%	13.0%	1.54	1.43	1.66
Diabetes (history with last pregnancy)	2,504	12.6%	13.4%	12.2%	1.00	0.87	1.15
Smoked or use tobacco during this pregnancy	8,796	11.6%	9.7%	12.4%	1.23	1.04	1.45
Age ≥35 and (primiparous or ART)	1,140	11.5%	10.7%	12.0%	1.61	1.32	1.96
Quit smoking <3 months prior to pregnancy (not current)	10,784	10.9%	9.5%	11.5%	0.99	0.85	1.15
Age ≥35 and not first pregnancy and no ART	8,092	10.7%	10.6%	10.8%	1.19	1.09	1.29

	Total	Preterm Births			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
Mental health diagnosis during pregnancy no treatment	12,865	10.3%	10.1%	10.3%	1.11	1.03	1.20
BMI ≥30 and weight gain within IOM guidelines	5,191	9.4%	9.0%	9.6%	1.05	0.94	1.17
Prenatal mental health diagnosis with treatment	20,915	8.9%	8.4%	9.2%	1.02	0.95	1.10
Interpregnancy interval < 9 months	9,380	8.9%	9.0%	8.9%	1.04	0.96	1.13
Food insecurity	44,016	8.7%	8.0%	9.2%	1.01	0.95	1.07
BMI ≥30 and weight gain outside IOM guidelines	17,921	8.5%	8.6%	8.5%	0.90	0.84	0.97
BMI <18.5 and weight gain within IOM guidelines	853	7.4%	5.6%	8.4%	1.06	0.81	1.39
BMI 25.0 to 29.9	19,123	7.1%	6.9%	7.2%	0.90	0.84	0.97
Age <17 years old at delivery	601	6.8%	5.9%	7.8%	1.00	0.71	1.39
Age <16 years old at delivery	445	6.5%	5.0%	8.3%	0.93	0.63	1.37
By Level of Risks***							
Unduplicated total for low or no risks (reference)	17,134	3.0%	3.1%	2.9%	1.00		
Unduplicated total for moderate level risks	15,684	3.6%	3.6%	3.6%	1.17	1.03	1.32
Unduplicated total for high level risks	46,509	11.0%	10.3%	11.5%	3.96	3.61	4.35

* Timely prenatal care (started within 6 mo. of pregnancy) is mutually exclusive of late or no prenatal care, which is a risk factor.

** Race/ethnicity groups of African American, Native American and Pacific Islander are considered high risks. BMI: Body Mass Index; IOM: Institute of Medicine; ART: Artificial Reproductive Technology.

*** Level of risks are not mutually exclusive except for level totals. Refer to Technical Notes for risk factor definitions and assignment of clients to risk levels.

**** Multivariable adjusted odds ratio estimates. Two separate multivariable logistic regression models: 1) by risk factors and 2) by risk levels. All models included prenatal MSS and timely prenatal care. **Bold** indicates statistically significant at 5% level.

Q3 Was receiving prenatal MSS associated with decreased low birthweight?

The prevalence of singleton low birthweight deliveries was about 3.5-fold higher among clients with high level risks (8.4%) than for those with moderate level (2.8%), or low level or non-identifiable risks (2.5%). There was no difference in low birthweight rates between clients receiving prenatal MSS and no prenatal MSS.

A similar approach on low birthweight revealed that neither receiving prenatal MSS nor timely prenatal care was associated with low birthweight, OR 0.95 (95% CI 0.89-1.01) and OR 0.92 (95% CI 0.84-1.00), respectively. The most significant factors associated with low birthweight were underweight women who did not gain enough weight during pregnancy, chronic or gestational hypertension, threatened preterm labor, prior low birthweight, preterm or fetal death, and age over 35 who were giving birth for the first time or used artificial reproductive technology for conception.

In addition, a few factors were associated with a decreased likelihood of low birthweight: overweight (BMI 25.0-29.9), obese and weight gain within or outside IOM guideline, and history of gestational hypertension without gestational hypertension in the current pregnancy.

TABLE 4.

Low Birthweight by Prenatal MSS for Washington Women with Medicaid-Paid Maternity Care, 2017-2018 Deliveries

Single live births with valid birthweight

	Total	Low Birth Weight			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
All births to Medicaid women (single, live, valid birthweight)	79,327	6.0%	6.0%	6.0%	0.95	0.89	1.01
Timely prenatal care*	69,399	5.8%	6.0%	5.7%	0.92	0.84	1.00
By Risk Factors							
Race/ethnicity**							
White, Non Hispanic (reference)	39,881	5.6%	5.9%	5.6%	1.00		
Hispanic	23,730	5.5%	5.2%	5.9%	1.31	1.21	1.41
Asian, Non Hispanic	4,469	7.7%	7.5%	7.9%	1.83	1.61	2.08
Native American, Non Hispanic	1,921	7.0%	7.3%	6.9%	1.03	0.85	1.25
African American, Non Hispanic	5,370	8.4%	8.4%	8.4%	1.68	1.49	1.88
Pacific Islander, Non Hispanic	1,863	7.0%	6.6%	7.4%	1.61	1.33	1.96
Any other race/ethnicity	2,093	7.2%	6.6%	7.8%	1.48	1.23	1.79
BMI <18.5 and weight gain outside IOM guidelines	721	19.0%	15.4%	21.0%	3.25	2.66	3.99
Threatened preterm labor	5,565	15.4%	15.8%	15.2%	2.75	2.53	3.00
Prior Low birthweight/Preterm/fetal death	8,532	14.1%	13.6%	14.4%	2.71	2.51	2.92
Cognitive or developmental disability	863	13.1%	13.4%	12.9%	1.98	1.60	2.46
Chronic or gestational HBP (current pregnancy)	12,903	12.8%	13.4%	12.4%	3.14	2.93	3.37
Age ≥35 and (primiparous or ART)	1,140	11.8%	11.9%	11.8%	2.11	1.74	2.56
Substance use disorder during pregnancy	9,957	11.0%	10.3%	11.4%	1.62	1.48	1.77
Smoked or use tobacco during this pregnancy	8,796	10.3%	9.7%	10.5%	1.44	1.21	1.73
Domestic violence prenatal or 1 year before pregnancy	4,018	9.6%	8.7%	10.0%	1.04	0.92	1.18
Quit smoking <3 months prior to pregnancy (not current)	10,784	9.5%	9.1%	9.7%	1.09	0.92	1.29
BMI <18.5 and weight gain within IOM guidelines	853	8.3%	6.9%	9.1%	1.41	1.09	1.82
Gestational hypertension in past pregnancy (not current)	5,464	8.1%	8.6%	7.9%	0.76	0.68	0.85
Mental health diagnosis during pregnancy no treatment	12,865	7.9%	7.9%	7.9%	1.12	1.03	1.22
Age ≥35 and not first pregnancy and no ART	8,092	7.4%	7.6%	7.3%	1.11	1.01	1.22
Chronic or gestational Diabetes (current pregnancy)	10,537	7.3%	7.8%	7.0%	1.08	0.99	1.18
Age <16 years old at delivery	445	7.2%	7.9%	6.3%	1.28	0.89	1.86
Food insecurity	44,016	6.7%	6.6%	6.8%	1.00	0.93	1.08
Prenatal mental health with treatment	20,915	6.4%	6.7%	6.3%	0.95	0.88	1.03
BMI ≥30 and weight gain within IOM guidelines	5,191	6.3%	7.0%	5.9%	0.85	0.75	0.97
Age <17 years old at delivery	601	6.3%	5.9%	6.8%	1.14	0.81	1.61
Interpregnancy interval < 9 months	9,380	6.1%	6.0%	6.2%	0.96	0.87	1.05
Diabetes (history with last pregnancy)	2,504	6.0%	7.6%	5.2%	0.76	0.64	0.92
BMI ≥30 and weight gain outside IOM guidelines	17,921	5.3%	5.4%	5.2%	0.65	0.59	0.70
BMI 25.0 to 29.9	19,123	5.2%	5.3%	5.1%	0.76	0.70	0.82

	Total	Low Birth Weight			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
By Level of Risks***							
Unduplicated total for low or no risks (reference)	17,134	2.5%	2.7%	2.4%	1.00		
Unduplicated total for moderate level risks	15,684	2.8%	2.7%	2.9%	1.11	0.97	1.27
Unduplicated total for high level risks	46,509	8.4%	8.2%	8.5%	3.53	3.19	3.91

* Timely prenatal care (started within 6 mo. of pregnancy) is mutually exclusive of late or no prenatal care, which is a risk factor.
 ** Race/ethnicity groups of African American, Native American and Pacific Islander are considered high risks. BMI: Body Mass Index; IOM: Institute of Medicine; ART: Artificial Reproductive Technology.
 *** Level of risks are not mutually exclusive except for level totals. Refer to Technical Notes for risk factor definitions and assignment of clients to risk levels.
 **** Multivariable adjusted odds ratio estimates. Two separate multivariable logistic regression models: 1) by risk factors and 2) by risk levels. All models included prenatal MSS and timely prenatal care. **Bold** indicates statistically significant at 5% level.

Q4 Was receiving prenatal MSS associated with increased initiation of breastfeeding?

The proportion of infants initiating breastfeeding as reported in the birth certificate ranged from 89% among clients with high level risks who did not receive prenatal MSS to 96% among clients with low level or non-identifiable risks.

Receiving any prenatal MSS was associated with an 18% increase in breastfeeding initiation (95% CI 1.11-1.25). There was a stronger association with timely prenatal care: a 69% increase (95% CI 1.57-1.80). Except for Asian, women of all other race/ethnic groups were less likely to initiate breastfeeding than Non Hispanic White women (the reference group). Women who gave birth to healthy babies (APGAR score ≥ 7 at 5 min after birth) were four times more likely to initiate breastfeeding than women who had babies with lower APGAR scores. Women with high level risks (OR 0.40, 95% CI 0.37-0.44) or moderate level risks (OR 0.83, 95% CI 0.75-0.93) were less likely to initiate breastfeeding than women with low level or non-identifiable risks. Many risk factors that were important for adverse birth outcomes were also significantly associated with decreased likelihood to initiate breastfeeding. In a separate model for which prenatal depression or anxiety was added in as an independent variable, the result indicated that women with prenatal depression or anxiety were 35% less likely to initiate breastfeeding (95% CI 0.61-0.69).

TABLE 5.

Breast Feeding by Prenatal MSS for Washington Women with Medicaid-Paid Maternity Care, 2017-2018 Deliveries

Initiation of breast feeding with a valid APGAR score for new born at 5 minutes after births

	Total	Breast Feeding			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
All births to Medicaid women	79,984	91.7%	92.2%	91.5%	1.18	1.11	1.25
Timely prenatal care*	69,996	92.6%	92.8%	92.6%	1.69	1.57	1.80
By Risk Factors							
APGAR Score							
APGAR Score 7-10	78,575	92.1%	92.6%	91.9%	4.58	4.04	5.20
APGAR Score 1-6 (reference)	1,409	69.8%	72.5%	68.3%	1.00		
Race/ethnicity**							
White, Non Hispanic (reference)	40,441	91.8%	91.3%	92.0%	1.00		
Hispanic	23,696	92.0%	92.9%	91.1%	0.67	0.63	0.72

	Total	Breast Feeding			Odds Ratio****		
		Percent of Total	With Prenatal MSS	No Prenatal MSS	Odds Ratio	95% Confidence Interval	
Asian, Non Hispanic	4,498	94.4%	95.6%	93.4%	0.89	0.77	1.02
Native American, Non Hispanic	1,929	83.6%	85.0%	83.1%	0.62	0.54	0.71
African American, Non Hispanic	5,448	91.5%	91.8%	91.2%	0.85	0.77	0.95
Pacific Islander, Non Hispanic	1,871	89.4%	91.2%	88.0%	0.67	0.57	0.79
Any other race/ethnicity	2,101	90.5%	92.1%	88.8%	0.75	0.64	0.90
Age ≥35 and (primiparous or ART)	1,100	93.1%	93.6%	92.8%	1.00	0.78	1.28
BMI <18.5 and weight gain within IOM guidelines	833	92.9%	93.6%	92.5%	1.10	0.83	1.45
BMI 25.0 to 29.9	19,295	92.7%	93.3%	92.3%	1.10	1.03	1.18
BMI ≥30 and weight gain within IOM guidelines	5,346	91.5%	91.4%	91.6%	0.98	0.88	1.09
BMI ≥30 and weight gain outside IOM guidelines	18,122	90.9%	90.9%	90.9%	0.95	0.89	1.02
Chronic or gestational diabetes (current pregnancy)	10,683	90.8%	91.1%	90.6%	0.90	0.83	0.97
Age <16 years old at delivery	438	90.6%	89.3%	92.2%	0.92	0.66	1.28
Diabetes (history with last pregnancy)	2,511	90.5%	90.8%	90.3%	1.05	0.90	1.22
Age ≥35 and not first pregnancy and no ART	8,228	90.4%	90.9%	90.1%	0.84	0.77	0.91
BMI <18.5 and weight gain outside IOM guidelines	714	90.3%	92.1%	89.4%	0.89	0.68	1.15
Mental health diagnosis during pregnancy no treatment	13,108	89.7%	90.3%	89.5%	0.96	0.89	1.03
Food insecurity	44,370	89.4%	90.5%	88.8%	0.71	0.66	0.75
Prenatal mental health with prenatal mental health services	21,032	89.2%	90.0%	88.8%	0.92	0.87	0.99
Interpregnancy interval <9 months	9,609	89.0%	90.5%	88.2%	0.78	0.72	0.84
Age <17 years old at delivery	585	88.7%	88.5%	88.9%	0.68	0.52	0.89
Chronic or gestational hypertension (current pregnancy)	13,293	88.6%	88.8%	88.5%	0.78	0.73	0.83
Gestational hypertension in past pregnancy (not current)	5,519	87.9%	87.8%	87.9%	0.84	0.76	0.92
Threatened preterm labor	5,906	87.0%	87.8%	86.6%	0.72	0.66	0.79
Prior low birthweight/preterm/fetal death	8,686	86.6%	88.5%	85.6%	0.74	0.68	0.79
Cognitive or developmental disability	863	84.0%	83.0%	84.8%	0.63	0.52	0.77
Quit smoking <3 months prior to pregnancy (not current)	10,899	83.8%	85.1%	83.2%	1.00	0.87	1.16
Smoked or use tobacco during this pregnancy	8,884	81.7%	83.8%	80.8%	0.53	0.46	0.62
Substance use disorder during pregnancy	10,001	79.9%	83.2%	78.1%	0.49	0.46	0.53
Domestic violence prenatal or 1 year before pregnancy	4,048	79.7%	83.8%	77.4%	0.70	0.64	0.77
By Level of Risks***							
Unduplicated total for low or no risks (reference)	16,818	96.0%	95.6%	96.2%	1.00		
Unduplicated total for moderate level risks	15,408	94.2%	94.3%	94.1%	0.83	0.75	0.93
Unduplicated total for high level risks	47,758	89.5%	90.4%	88.9%	0.40	0.37	0.44

* Timely prenatal care (started within 6 mo. of pregnancy) is mutually exclusive of late or no prenatal care, which is a risk factor.

** Race/ethnicity groups of African American, Native American and Pacific Islander are considered high risks. BMI: Body Mass Index; IOM: Institute of Medicine; ART: Artificial Reproductive Technology.

*** Level of risks are not mutually exclusive except for level totals. Refer to Technical Notes for risk factor definitions and assignment of clients to levels.

**** Multivariable adjusted odds ratio estimates. Two separate multivariable logistic regression models: 1) by risk factors and 2) by risk levels. All models included prenatal MSS and timely prenatal care. **Bold** indicates statistically significant at 5% level.

PART 4.

Combined effect of prenatal MSS and timely prenatal care on clients' health and birth outcomes, 2017-2018

Among Medicaid women who gave birth in 2017-2018 (n=79,327), 32% received both prenatal MSS and timely prenatal care; 55% received timely prenatal care but no prenatal MSS. The remaining 13% of clients who did not receive timely prenatal care were identified as having moderate or high risks and eligible for receiving prenatal MSS but only 5% did, leaving 8% of clients receiving neither prenatal care nor prenatal MSS.

FIGURE 10.

Adjusted Odds Ratios, Preventive Factors for Medicaid Women with Births in 2017-2018

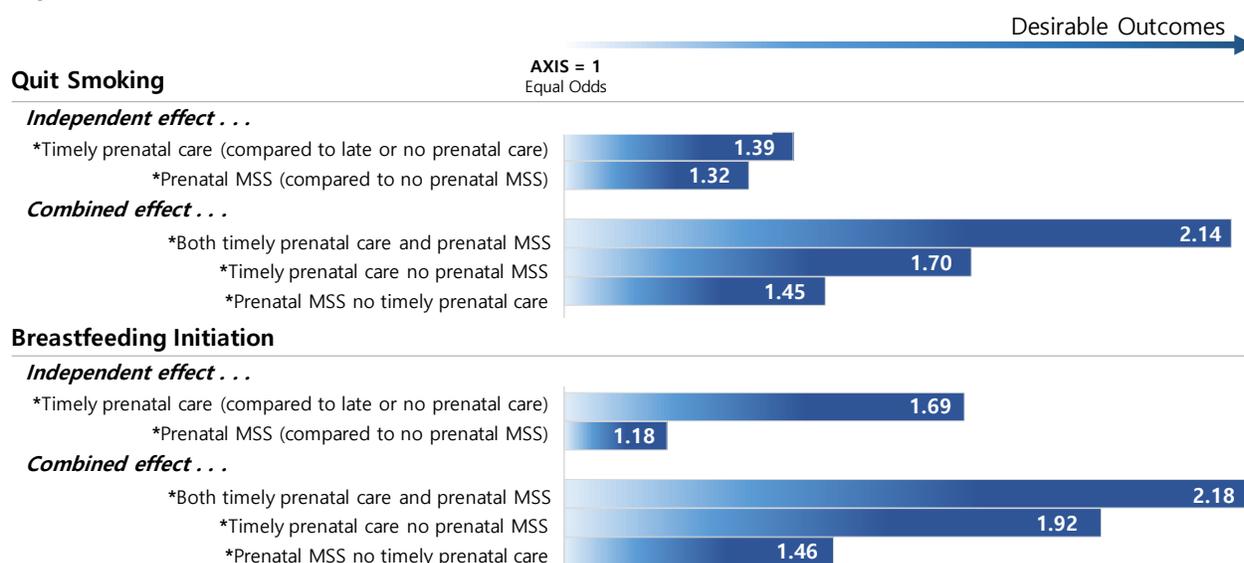
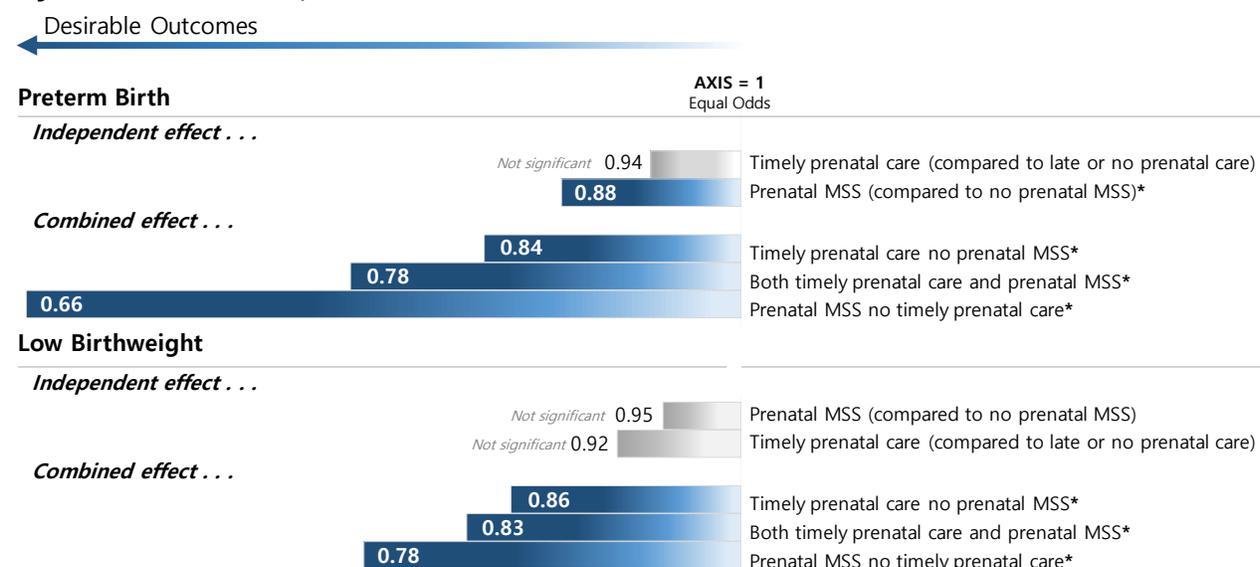


FIGURE 11.

Adjusted Odds Ratios, Desirable Outcomes for Medicaid Women with Births in 2017-2018



*Indicates statistically significant at p<.05. Multivariable logistic regression adjusting for clients' demographics and other risk factors identified by administrative data. Receiving "neither timely prenatal care nor prenatal MSS" was a reference group for estimate of the combined effect.

Clients receiving both prenatal MSS and timely prenatal care during pregnancy were associated with improved health and birth outcomes; the association was stronger compared to either timely prenatal care or prenatal MSS alone. After adjusting for demographics and clients' risk factors, receiving both prenatal MSS and timely prenatal care was associated with more than a two-fold increase in quit smoking during pregnancy (OR 2.14, 95% CI 1.84-2.50) and initiation of breastfeeding (OR 2.18, 95% CI 2.00-2.38). The combined effect of both timely prenatal care and prenatal MSS was significant in reducing risk of preterm birth (OR 0.78, 95% CI 0.70-0.86) and low birthweight (OR 0.83, 95% CI 0.75-0.93). When timely prenatal care and prenatal MSS were treated as independent factors, only prenatal MSS was associated with reduced risk of preterm birth (reference table or chart in Part 3). These results provides evidence that HCA's First Steps programs work well if clients were provided both prenatal MSS and timely prenatal care.

Discussion

This study describes MSS utilization over time and assesses the effect of prenatal MSS on health and birth outcomes by different risk factors. Despite the challenges of limited funding, Washington State provided MSS to about two out of five Medicaid eligible women who gave birth in 2017-2018. The findings of this study suggest that Medicaid clients receiving prenatal MSS had increased smoking cessation during pregnancy, increased breastfeeding initiation and decreased preterm births. Furthermore, Medicaid clients may have benefited from using both prenatal MSS and timely prenatal care which resulted in increased effects on healthy behaviors and positive birth outcomes such as reducing the rate of low birthweight babies.

The Need for MSS

Smoking cessation. Pregnancy presents a unique opportunity for smoking cessation (Boucher 2016, Scherman 2018, Soneji 2019). In the US in 2014, approximately one quarter of the 10.9% who reported smoking prior to pregnancy had quit (Scherman 2018). Data in Washington indicated that four in ten Medicaid clients (40%) quit smoking during pregnancy. Smoking cessation, especially early in pregnancy, was associated with reduced risk of preterm birth (relative decrease up to 20%) even for high-frequency cigarette smokers. Through brief interventions, MSS may have helped women who are otherwise more likely to continue smoking during pregnancy to quit.

Breastfeeding. Healthy People 2020 sets national health objectives for mothers who initiate breastfeeding to 81.9% (Healthy People 2020). Among Washington Medicaid clients who gave birth in 2017 and 2018, 91.7% initiated breastfeeding, which exceeded the national goal and was higher than the 89.2% among Women, Infant and Children Nutrition Program recipients in 2017⁵. Many delivery hospitals and birth centers, and community health centers established an environment that is more broadly supportive of breastfeeding through voluntary participation in Breastfeeding Friendly Washington. MSS helps reinforce the efforts within the health care system.

Preterm birth and low birth weight babies. Preterm birth and low birth weight accounted for about 17% of infant deaths in 2017 (Kochanek, 2019). While the rates of preterm and low birthweight in Washington State were lower than the national median rates (of 10.0% and 8.3%, respectively in 2017) and the Healthy People 2020 target rates (of 9.4% and 7.8%, respectively), pregnant women on Medicaid with high level risks were four-fold higher in rates of preterm and low birthweight compared to lower risk women. Three in four (75%) clients were identified as having more than one risk and one

⁵ Washington State Department of Health. <https://www.doh.wa.gov/YouandYourFamily/Breastfeeding>

in four (25%) clients as having more than four risks in 2017 and 2018. Having a higher number of risks was correlated with higher rates of preterm birth and low birthweight in these data.

Further, among singleton deliveries, African American and American Indian/Alaska Native continue to be disproportionately represented with higher rates of preterm birth and low birthweight. Controlling for racial disparities in multivariable analyses in this study, race and ethnicity were grouped as mutually exclusive categories, using non-Hispanic White as a reference group. The results of this study, including the rates of and the effect of prenatal services on the outcomes, should be interpreted with caution because some clients are multiracial.

Challenges for mothers. Pregnancy may be an additional stressor for women already living in stressful environments. Medicaid clients who are pregnant encounter additional challenges in seeking traditional medical prenatal care or MSS, ranging from taking time off work, arranging transportation and child care, to unemployment and housing instability. Women with high levels of stress and anxiety and low levels of social support experience a higher rate of pregnancy-related complications, mental illness, and adverse neonatal outcomes (Roy-Matton 2011, Vrekoussis 2010). Nearly 20% of Medicaid women in our state who gave birth in 2017 and 2018 were identified with depression or anxiety and 15% with a substance use disorder. Addressing clients' needs in coping with these mental health and health issues is worthy of attention. MSS could play a critical role in providing social support for these clients.

Study Considerations and Complexities

Given that MSS is an expanded service for a traditional medical model of care, this study examines the independent effect of prenatal MSS as well as the combined effects of both prenatal MSS and timely prenatal care on maternal health behaviors and birth outcomes. By improving the likelihood of smoking cessation and initiating breastfeeding, prenatal MSS has resulted in tangible benefits for both mothers and newborns. These analyses may also help evaluate potential benefits of MSS that are difficult to measure. For example, MSS might make a difference in impacting the well-being of pregnant women through building trusting relationships that allow providers to better address the psychosocial needs of their clients. When clients with high level risks received timely prenatal care, the addition of prenatal MSS represented an improvement over traditional prenatal care on health outcomes.

An earlier study on women that were medically high-risk and enrolled in Aid to Families with Dependent Children in Washington State suggested that implementing both Medicaid MSS and case management programs was associated with a decrease in low birthweight rates (Baldwin 1998). The current study supports this result and also presents a complex picture that reducing preterm deliveries and increasing the number of babies born at a healthy weight are challenging goals that may be difficult to accomplish by MSS alone (at least in its current form of practice), especially among members of a high risk population. For example, Medicaid clients with a previous preterm birth are more likely to have a subsequent preterm birth than those without a previous preterm birth (McManemy 2007 and Yang 2016). Though the regression statistic models utilized in these analyses control for this risk factor along with other primary factors of preterm birth such as hypertension, there could be unobservable factors related to previous preterm births that are unaccounted for in these analyses. The effects of prenatal MSS on birth and health outcomes varies by the mother's characteristics (age, race/ethnicity) and risks identified and therefore these are important considerations.

Study Limitations

There are important limitations to this study. First, MSS enrollees' risk profiles were assessed using administrative data rather than from provider determination. The risk factors and risk levels identified in this study may not be the same as those assessed by MSS providers at intake. Some high level risk factors, such as gestational hypertension, gestational diabetes, and diagnosis of threatened preterm labor, may not yet be present and evident to MSS providers at intake. These data limitations and the timing of risk identification could be the reasons why less than half of pregnant women with high level risks received prenatal MSS. Second, prenatal MSS was treated as dichotomous in the analyses, without considering MSS units and specific services provided. Specifically, this study did not consider whether the services were provided by a registered nurse, dietitian, or health specialist; whether the services were a brief assessment of risk factors or an educational intervention related to improving a pregnancy or parenting outcome; or whether services are obtained via an office visit, a home visit, via telehealth, or at a group setting. These differences in prenatal MSS may have different effects on health and birth outcomes. Third, there could be selection bias in the characteristics of those who participate in MSS compared to those who do not. Even though our analyses controlled for a number of characteristics, we did not identify women who may have been offered but declined MSS, and did not consider women whose circumstances make referral to MSS more difficult including delayed or non-compliant prenatal care. Future case studies may help address these limitations.

Future Work and Conclusions

Future studies on the relationships between geography and health may help in understanding Medicaid clients' access to MSS and other health services. More evaluations on other outcomes such as cesarean section rates among low risk clients, infant mortality, and birth spacing are needed to further explore the potentially broader effects of MSS on improving and promoting healthy birth outcomes and ensuring access to health care for women and their infants.

Though the results of this study are promising, until the impact analyses are complete, we will be unable to conclude whether MSS intervention is reducing preterm and low birthweight deliveries compared to women who do not receive MSS. Future impacts analyses that use propensity-score-weighted comparison groups are needed in order to more precisely determine the overall impacts of MSS on health behavioral and birth outcomes.

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APPENDIX DETAIL

TABLE 1.

Risk Factors and Level of MSS**

High Level Risks – Maximum MSS	Moderate Level Risks – Expanded MSS	Low Level or Non-Identifiable Risks – Basic MSS
<ul style="list-style-type: none"> • African American • Native American • Pacific Islander • Underweight and weight gained outside the IOM guidelines • Chronic or gestational diabetes • Chronic or gestational hypertension • Diagnosis of threatened preterm labor • Substance/alcohol abuse during pregnancy • Severe mental health diagnosis no treatment • Developmental disability • Prior low birthweight or premature baby or fetal death • Multiple gestation 	<ul style="list-style-type: none"> • Age less than 16 years old at delivery • History of gestational diabetes • Smoking or tobacco use during pregnancy • Age 35 years old and (primiparous or assisted reproductive technology, ART) • Prenatal care began after 6 months or no prenatal care • Obese and weight gain outside IOM guidelines • Domestic violence during pregnancy • Mental health diagnosis with treatment 	<ul style="list-style-type: none"> • Age 35 years old and not first pregnancy or ART • Age 17 years old at delivery • History of gestational hypertension • Inter-pregnancy interval less than 9 months • Food insecurity • BMI <18.5 or ≥30 and weight gain within IOM guideline • Smoked before pregnancy • MSS began ≥14 and <24 weeks and prior to PNC • Overweight

**HCA provider guides: Guide prior to 6/21/10; 6/21/10 guide; 3/1/11 guide.

TABLE 2.

Institute of Medicine Weight Gain Recommendations for Pregnancy

Prepregnancy Weight Category	Body Mass Index*	Recommended Range of Total wt gain (lb)	Recommended Rates of wt gain† in the 2nd and 3rd trimester (lb/wk) (mean range [lb/wk])
Underweight	Less than 18.5	28–40	1 (1–1.3)
Normal Weight	18.5–24.9	25–35	1 (0.8–1)
Overweight	25–29.9	15–25	0.6 (0.5–0.7)
Obese (includes all classes)	30 and greater	11–20	0.5 (0.4–0.6)

* Body mass index is calculated as weight in kilograms divided by height in meters squared or as weight in pounds multiplied by 703 divided by height in inches squared.

† Calculations assume a 1.1–4.4 lb weight gain in the first trimester.

Modified from Institute of Medicine (US). Weight gain during pregnancy: reexamining the guidelines. Washington, DC. National Academies Press; 2009. ©2009 National Academy of Sciences.

TECHNICAL NOTES

DATA SOURCES

First Steps Database (FSDB) links the vital records from Washington State Department of Health and Medicaid clients' claims and encounters from Washington's Health Care Authority. Measures on health were derived from RDA's Analytic Research Metadata Management Application. Limited to births within Washington State borders starting in 2014.

DEFINITIONS OF MATERNITY SUPPORT SERVICES AND PRENATAL CARE

- **Maternity Support Services (MSS):** A client who used services as indicated by the Current Procedure Technology (CPT) and Healthcare Common Procedure Coding System (*HCPCS*) codes with the required modifiers, based on the HCA Provider Billing Guide. Limited to paid claims.
- **Timing of MSS initiation:** A client whose first MSS service was during pregnancy is considered a prenatal MSS. A client who did not use any MSS during pregnancy but used MSS during the 60-days post-delivery is considered a postpartum only MSS. A client that used prenatal MSS and did not use MSS after delivery is considered prenatal only MSS. A client that began using MSS during pregnancy and continued to use MSS after delivery is considered both prenatal and postpartum MSS.
- **Prenatal care:** The month prenatal care began is calculated based on the birth certificate date and the date of first prenatal visit, and was categorized as first trimester (month 1-3), after first trimester (month>3), no prenatal care, and unknown.
- **Timely prenatal care:** Prenatal care initiated during the 1st or 2nd trimesters, determined based on the birth certificate. Prenatal care initiated after 6 months into pregnancy was considered late. Late or no prenatal care was treated the same as a risk factor of moderate level. Timely prenatal care in this study is mutually exclusive of late or no prenatal care.

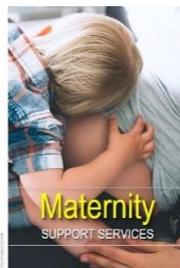
DEFINITIONS OF OUTCOMES

- **Quit smoking:** Clients who self-reported no smoking or using tobacco products at 1st, 2nd, or 3rd trimesters, based on the birth certificate. The quit smoking outcome was determined in a limited subset of clients who self-reported smoking or using tobacco products during the three months prior to pregnancy (14% of all Medicaid clients who gave birth in 2017-2018).
- **Birth:** Defined based on diagnosis-related group codes, ICD-9-CM and ICD-10-CM diagnosis and procedure codes, current procedure terminology codes, and vital statistics birth records linked to Medicaid claims in the First Steps Database.
- **Preterm birth:** Preterm birth is taken directly from the birth certificate reported gestational age and identifies deliveries that occurred before 37 completed weeks of gestation. Preterm births in this study were limited to singleton liveborn babies. Gestational age is defined as the best obstetrical estimate of the weeks of gestation completed at the time of delivery to a liveborn or fetal death.
- **Low birthweight:** Birth weight, as recorded on the birth certificate, of less than 2,500 grams is considered low birth weight. Low birthweight in this study was limited to singleton liveborn babies.
- **Initiation of breastfeeding:** Initiating of breastfeeding is taken directly from the birth certificate. Limited to liveborn babies with any APGAR score taken at 5 min.

DEFINITIONS OF OTHER VARIABLES

- **Client's risk factors and level of risks:** MSS providers assess the risk factors of each client and provide tiered MSS services using a screening tool at intake. Clients who had no identifiable risks are eligible for the lower tier of MSS units, the same as clients with low level risks. This analysis used administrative data (Medicaid clients' claims and encounter data) for defining a client's risk factors. Clients with different level of risks are mutually exclusive. In the case that a client had more than one risk factor(s) associated with differing level of risks, the highest risk level was assigned to that client. For example, a client with developmental disabilities (high level risk) may also have a history of gestational diabetes (a moderate level risk) and be overweight (a low level risk). This client would be classified as having high level risks.

- **Maternal race/ethnicity:** The race/ethnicity groups were created by FSDB based on self-reported measures of race and ethnicity on the birth certificate. Except for the MSS utilization over time, race/ethnicity groups are mutually exclusive.
- **Weight gained during pregnancy:** Institute of Medicine (IOM) guidelines define weight gained inside or outside of guideline ranges that vary by client's pre-pregnancy body weight (see Appendix Table 2 for details).
- **Threatened preterm labor:** Diagnosis code 644.0 for ICD-9-CM and 060.00 for ICD-10-CM.
- **Medicaid-paid:** An FSDB Medicaid case is a woman who had at least one of the following: 1) Paid claim(s)/encounter(s) during the prenatal period; 2) Paid delivery-related claim(s)/encounter(s); and 3) At least three full months of managed care enrollment (defined by paid managed care capitation claims) in the six months before delivery.
- **Regular Medicaid/TANF:** Women who were in the Medicaid Expansion group after implementation of the Affordable Care Act, or Temporary Aid for Needy Family clients who received cash grants in addition to Medicaid coverage. (TANF clients are no longer evident as of about April of 2015 or so).
- **Pregnancy Medical:** These women have incomes that are higher than Regular Medicaid/TANF, and are Medicaid-eligible solely because of pregnancy. Undocumented clients are also eligible for pregnancy medical. These women are separated out in the analyses from other MSS women due to differing characteristics and outcomes.
- **Gestational diabetes:** This measure is taken directly from an indicator for gestational diabetes on the birth certificate.
- **Gestational hypertension:** This measure is taken directly from an indicator for gestational hypertension on the birth certificate.
- **Mental health diagnosis:** Derived from fee-for-service (FFS) paid claims and managed care encounters accepted into the ProviderOne Operational Data Store (P1 ODS), and assessments processed through the Comprehensive Assessment Reporting Evaluation (CARE) tool. These are claims, encounters or assessments that indicate a mental illness diagnosis that additionally falls within one of the 23 RDA—defined diagnostic groupings, <https://armm.rda.dshs.wa.lcl/>.
- **Substance use disorder (SUD):** Derived from the monthly indication of SUD treatment or related services paid for by the Division of Health and Recovery (DBHR).
- **Domestic violence victim:** Domestic violence was flagged based on domestic violence identified in the comprehensive evaluation, participation in the address confidentiality program, or being granted permission not to cooperate with Division of Child Support due to domestic violence as recorded in ACES; or based on domestic violence arrests or convictions of the client.
- **Inter-pregnancy interval:** Among clients with Medicaid-paid maternity care and that had at least two deliveries by different pregnancies, the time (in months) elapsed between the women's last delivery and the conception of the next pregnancy.
- **Food insecurity:** Recipients of Basic Food in Washington that helps people with low incomes make ends meet by providing monthly benefits to buy food. This is also known as the US Department of Agriculture (USDA), Supplemental Nutrition Assistance Program (SNAP).



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