POSTPARTUM WEIGHT RETENTION AMONG MOTHERS OF YOUNG CHILDREN WITH SPECIAL HEALTH CARE NEEDS

by
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List of Abbreviations

BMI – Body mass index

CDC – Centers for Disease Control & Prevention

CI – Confidence Interval

CSHCN – Children with special health care needs

FPL – Federal Poverty Level

GWG – Gestational weight gain

IOM – Institute of Medicine

MCHB – Maternal and Child Health Bureau

NH – Non-Hispanic

OR – Odds ratio

PPWR – Postpartum weight retention

PRAMS – Pregnancy Risk Assessment Monitoring System

VIF – Variable inflation factor

WHO – World Health Organization

WIC – Special Supplemental Nutrition Program for Women, Infants, and Children

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Abstract

Background: Postpartum weight retention (PPWR) is a significant risk factor for overweight and obesity in women of childbearing age. In the United States, the trends of high body mass indices in all age groups and the adverse outcomes associated with obesity are crucial, preventable problems in public health and medicine. The perinatal period is a complex time for maternal and child health, as new demands of parenting and care-giving arise alongside dramatic changes in the physiology of women and children. The child's health status, whether or not they have special health care needs, is linked to changes in psychological outcomes in parents and caregivers, but connections between physical outcomes, such as PPWR, have not been thoroughly established.

Purpose: The objective of this analysis was to evaluate whether an association exists between child health status, assessed as having a child with a special health care need (CSHCN), and maternal PPWR.

Methods: I studied the women who had a live birth in 2005 and responded to Oregon's Pregnancy Risk Assessment Monitoring System (PRAMS) survey and the follow-back survey (PRAMS-2) when the child was two years old. Of the 2,806 birth certificates selected for PRAMS, the weighted response was 75.6% for the first survey. For the follow-back surveys, 1,046 of women completed PRAMS-2 surveys, for a weighted response of 47.7%. The primary predictor, CSHCN status, was identified by 10 questions about needs for ongoing services for the two year old child. Self reported maternal weight measurements were of pregravid weight as reported on PRAMS (mean 3.5 months postpartum) and postpartum weight as reported on PRAMS-2 (mean 25 months postpartum); PPWR was calculated from these. The outcome of interest was high

PPWR, defined as retention of over 4.5 kg, which was the amount of PPWR that was associated with overweight status in a 15-year prospective cohort study. Logistic regression modeling was used to measure the association between the predictor and outcome of interest.

Results: In the final sample of 978 subjects, 11.4% women reported having a CSHCN and 41.3% reported high PPWR. There was a positive association between having a CSHCN and experiencing PPWR in the bivariate logistic regression model (OR: 1.85 95% CI: 1.01 – 3.39). Similarly, the odds of reporting PPWR among subjects with CSHCN were 1.98 times those of subjects without CSHCN, after adjustment for parity, pregravid BMI, maternal race/ethnicity, maternal age, breastfeeding, physical activity, food security status, household income, and maternal depression in multivariate logistic regression analysis (OR: 1.98 95% CI: 1.07 – 3.66)

Discussion: Compared to women who did not have a CSHCN, I found that women who had a CSHCN were less likely to lose their pregnancy weight gain. This may be due to dietary changes that occur alongside the increased care and time demands of having a CSHCN. Women may have less time available for exercise, meal preparation, and self care. The findings of this investigation may be applied at the individual and community level to raise awareness about this connection between maternal and child health. Public health professionals and health care providers can use these findings to develop ways to prevent the short and long term consequences of obesity and overweight in new mothers.

Introduction and Background

Pregnancy Weight Changes

The weight change of pregnancy is often the most rapid gain and loss of weight women experience in their lives. The Committee to Reexamine IOM Pregnancy Weight Guidelines estimates that adult women in the United States gain 10 to 16.7 kg (22 to 36.8 lb) on average during a pregnancy carried to term.[1] The products of conception (the fetus, placenta, and amniotic fluid) compose 35% of this gestational weight gain (GWG) and the remaining 65% is water, fat-free mass, and fat mass to support the needs of the developing fetus and breastmilk production upon delivery.[2] The distribution of these three types of mass varies with pregravid body type, as demonstrated in an investigation where women with higher body mass indices (BMI) accumulated more fat mass during pregnancy than those with lower BMIs.[3] A variety of other maternal physiological changes take place during pregnancy. The increase in plasma volume that occurs during pregnancy helps meet the increased demand on cardiac output to supply blood to the mother and fetus.[4] Insulin sensitivity decreases during pregnancy, which allows more glucose to cross the placenta to nourish the developing fetus. This decrease in insulin sensitivity varies with pregravid BMI status as well, with different responses to glucose metabolism and increased risk of developing gestational diabetes in obese women.[5,6]

These changes in physiology and body mass take place gradually over gestation. Most women gain between 0.5 and 2 kg during the first trimester and accumulate the remaining weight much more rapidly in the second and third trimesters.[7–11] The fluid shifts following delivery and the high caloric demand of breastfeeding lead to most of the

postpartum weight loss. Women who do not lose the weight accumulated during pregnancy experience postpartum weight retention (PPWR). This burden of increased weight puts women of childbearing age at increased risk for obesity and the health consequences associated with it. As described below, the epidemiological trends in the United States surrounding obesity, GWG, and PPWR highlight these risks.

U.S. Trends in Weight Changes

The obesity epidemic in the United States is a complex challenge to the health of men, women, and children throughout the nation. The National Health and Nutrition Examination Survey (NHANES) estimated the prevalence of obesity (BMI of 30 or greater) as 31.9% in women between 20 and 39 years of age in 2009-2010.[12] The obesity epidemic disproportionately impacts women of color, with prevalence estimates of 56.2% in Non-Hispanic Black women and 37.8% in Hispanic women in the 20-39 year age range**.**

Obesity is associated with many long-term health consequences, like type II diabetes mellitus (DM), hypertension, atherosclerotic cardiovascular disease, and certain cancers**.**[13–15] As more and more women are obese during their childbearing years, the obesity epidemic impacts reproductive health as well. Women who are obese require more frequent prenatal appointments and fetal monitoring than women who are not obese**.**[16] As mentioned above, pregravid BMI is associated with altered weight change patterns and endocrine responses during pregnancy. The current obesity epidemic, and its consequences for women and children, led the Institute of Medicine (IOM) to reexamine the GWG guidelines and issue new recommendations for women depending on their pregravid BMI status.

Recommendations and Guidelines

There have been three sets of national guidelines for GWG in the United States since the 1970s. The first occurred in 1970, in response to the relatively high neonatal and infant mortality rates in the United States, compared to other high-income countries. At the time, clinicians recommended women limit GWG to 10 to 14 pounds. However, in other high-income countries, clinicians observed an association between higher GWG and improved birth outcomes. The *Maternal Nutrition and the Course of Pregnancy*, released in 1970, advised women gain 24 pounds during pregnancy.[17] In 1990, the IOM revised these guidelines to include tailored recommendations for women in certain BMI groups, women of different racial and ethnic backgrounds, adolescent women, women of short stature, and women carrying twins.[18] The 2009 guidelines re-evaluated those established in 1990, in the face of the obesity epidemic and alarming GWG trends. More women were conceiving with BMIs in the overweight and obese range and many were gaining weight above the GWG guidelines. The committee to reexamine the guidelines was particularly interested in addressing women in racial and ethnic minority groups, who are at increased risk for adverse infant and child health outcomes, compared to the Non-Hispanic White population. The proportion of women who identify themselves as ethnic minorities is increasing in the United States, so addressing the health disparities that fall along racial and ethnic lines is more and more important in public health and medicine.

In 2009's *Weight Gain during Pregnancy: Reexamining the Guidelines* the committee members recommended the weight gain patterns displayed in Table 1.[1] Compared to the 1990 recommendations in which it is recommended that obese women gain between 7

and 11.5 kg, the 2009 recommendations reduce GWG recommendations for obese women to between 5 and 9 kg.[18]

Table 1. Recommendations for total and rate of weight gain during pregnancy, by prepregnancy BMI[a]

	Total weight gain		Rate of weight gain 2nd and 3rd trimester	
Prepregnancy BMI Status (BMI Ranges)	Range in kg	Range in lb	Mean (range) in kg/week	Mean (range) in lb/week
Underweight (<18.5 kg/m^2)	12.5 – 18	28 – 40	0.51 (0.44 – 0.58)	1 (1 – 1.3)
Normal weight (18.5 – 24.9 kg/m^2)	11.5 – 16	25 – 35	0.42 (0.35 – 0.50)	1 (0.8 – 1)
Overweight (25.0 – 29.9 kg/m^2)	7 – 11.5	15 – 25	0.28 (0.23 – 0.33)	0.6 (0.5 – 0.7)
Obese (>= 30 kg/m^2)	5 – 9	11 – 20	0.22 (0.17 – 0.27)	0.5 (0.4 – 0.6)

[a] Rasmussen KM. Weight Gain during Pregnancy: Reexamining the Guidelines. Institute of Medicine; 2009.

An additional, significant change in 2009 was a shift to using World Health Organization (WHO) BMI cutoff points, instead of using the BMI cutoff points used by the IOM in the previous report. The cutoff points are used to determine into which category of pregravid BMI women fall, and therefore determine the amount of weight they are recommended to gain during pregnancy. The newer WHO standards classify women as overweight who would have been classified as obese under the older IOM standards. They also classify fewer women as underweight. The WHO cutoffs for BMI are widely considered to be the standard BMI categories for adults.

A prospective cohort investigation of GWG using the IOM 2009 guidelines, found only 22% of women gained weight within the recommended parameters and 62% of women gained more weight than recommended for their BMI categories. In this group, 53% of women who were classified as ‘overweight’ before pregnancy were classified as ‘obese’ at one year postpartum due to PPWR.[19] This pattern is alarming with respect to maternal

health as well as child health, as the maternal-child dyad is an interactive and complex relationship.

Maternal and Child Weight Interactions

Genetic predisposition and programming interweave with environmental and behavioral factors to produce deep and intricate interactions between maternal and child health. There is a great deal of active research in the area of developmental origins of health and disease, that is, the influences that maternal health in the perinatal period has on the lifelong health of the children from that pregnancy.[20] As in the case of adults, there is an epidemic of childhood obesity in the United States, where nearly 17% of children and adolescents are obese.[21] Investigators in many fields—from epidemiology, genetics, psychology, and more—are investigating the multifactorial cause of childhood obesity. Gestational weight gain is a modifiable maternal factor that is associated with short term factors of infant growth—like birth weight and weight for gestational age—as well as long term childhood growth.[22–24] Overall, increased GWG is associated with larger infants and children. Historically, when it was recommended that women gain a very limited amount of weight during pregnancy, a move towards an increase in GWG was helpful in reducing infant mortality. Globally, in places with very limited access to food, higher GWG patterns still improve outcomes for infants. However, GWG patterns in the United States are different than those in lower income countries and women face different health struggles. High GWG and PPWR have adverse consequences for women, so the current evidence supports the recommendation that U.S. women to gain weight within the guidelines of the 2009 IOM recommendations.[25–28]

To avoid PPWR, the 2009 guidelines also recommend supporting women through postpartum weight loss by developing individualized clinical plans.[1] One of the first steps for clinicians and public health professionals in developing these plans is identifying women at risk for high GWG and PPWR. As mentioned above, pregravid BMI and race are associated with differing GWG and PPWR patterns, with obese and non-White women experiencing more adverse weight outcomes.[19,29,30] There is also an association between PPWR and maternal depression.[31,32] While there is a lack of evidence about other psychosocial factors associated with PPWR and GWG, lack of sleep, low physical activity, and lower socioeconomic status have emerged as risk factors for PPWR.[31,33–36] These factors suggest that PPWR patterns are complex and related to more than just individual-level characteristics. These findings suggest that women need supportive environments—at home, in the clinical setting, and in the wider community—which facilitate postpartum weight loss.

Few investigations have explored the interplay between maternal health outcomes like PPWR and infant and child health outcomes. Infant hospitalization is positively associated with PPWR, though a statistically significant association was reported in only one of the two investigations that measured the associaton.[34,37] However, this relationship is of note to clinicians and designers of public health programs. As posited by the authors, women with hospitalized infants may experience different eating patterns or physical activity limitations than mothers who do not have hospitalized infants.[34] They may also have different environmental stressors and use different coping techniques. They may also have challenging financial experiences that limit funds available for healthy food and self-care. A more thorough investigation of this

association—between child health status and PPWR—may highlight areas for increased monitoring and support for maternal health.

Children with Special Health Care Needs: Definition and Evolution of Terminology

One way to explore child health status in a broad way is to classify children based on their need for health care and other related services. The term 'children with special health care needs' (CSHCN) arose as an inclusive classification and a shift away from narrow diagnosis-based classifications of children who require more health care and services than children in general. Specifically, the Maternal and Child Health Bureau established the definition "Children with special health care needs are those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally."[38] Between 2009 and 2010, it is estimated that 15.1% of children in the United States had special health care needs, as reported by parents and caregivers.[39] These needs are for specialized medical care, mental health services, physical, occupational, or speech therapy. They also include needs for medications, special diets, home health care, durable medical equipment, and use of assistive devices. Caregivers can also note a special health care need if the child is functionally limited in some way from keeping up with his or her peers. As cohorts of children age, they develop more chronic care needs, so the prevalence of CSHCN increases over time in each cohort. This is a very diverse group of infants, children, and youth. The group is composed of children with congenital heart conditions that require surgical interventions, long-term echocardiography monitoring, and complex medication regimens. Other children may have asthma, a diagnosis that comes with a much less complex treatment

regimen, but still requires rigorous management from parents, caregivers, and clinicians. This diverse group of children and their families need more coordinated health care and are vulnerable to gaps in insurance coverage and high costs of health care in the U.S.[40–44] The experience of families with CSHCN is complex, but represents potential avenues for health care quality improvement for mothers, fathers, caregivers, and the children themselves.

Family Experiences with Children with Special Health Care Needs

Family dynamics change when taking care of CSHCN. Parents and guardians of CSHCN report significant amounts of time spent providing care and managing their children's illnesses.[45–48] Having a CSHCN impacts the financial and employment experience of parents and caregivers.[49–53] Mothers report less time for self-care and family members may experience more adverse mental health outcomes such as depression and anxiety, in addition to stress and fatigue.[54–59] Families with positive coping strategies and strong social support networks appear to experience fewer of these adverse outcomes.[57,59] Little evidence exists on the long-term physical health outcomes among parents and caregivers of CSHCN; more investigations explore mental health outcomes given the more straightforward connection between mental health outcomes and the rigors of increased parenting demands. The investigations noting the associations between infant hospitalization—a very early special heath care need—and PPWR are some of the first linkages of this kind.

While the experiences of families with CSHCN vary, the interconnected influences of maternal and child health outcomes are apparent throughout the population. I hypothesize a positive association between having a two-year old CSHCN and

experiencing high maternal weight retention at two years postpartum. If an increased risk for PPWR among mothers of CSHCN becomes apparent, providers of obstetric and pediatric health care can provide more individualized care plans for weight management, as recommended by the IOM. From a policy perspective, this may influence programs aimed at addressing and preventing childhood obesity by enhancing perinatal and early childhood nutrition programs. Advocacy groups may use the findings of this investigation to reach out to key players and members to develop ways to mitigate this risk.

Material and Methods

The primary aim of this investigation is to answer the question: Is there an association between having a two-year-old child with a special health care need and experiencing postpartum weight retention?

Oregon Pregnancy Risk Assessment Monitoring System

This investigation used data from the Oregon Pregnancy Risk Assessment Monitoring System (PRAMS) and its follow-back survey PRAMS-2 (See Appendices A and B). The Public Health Division of the Oregon Health Authority takes stratified random samples of live births from birth certificate records to identify participants for PRAMS. Certain subpopulations of interest are oversampled in order to make inferences on minority groups that would not be adequately represented in a purely random sample of the state population. This technique oversamples from subpopulations of mothers who gave birth to low birth weight babies and mothers from underrepresented race/ethnicity groups. Women were excluded from participation if they chose adoption and in the case of multiple births, one of the infants was randomly selected to be in the sampling frame. Participants were also excluded if their children were not living at the administration of the surveys.

To allow the data to be used to make population-based inferences, each participant is assigned a weight to account for the study population's characteristics. The first factor is based on over-sampling techniques, so Non-Hispanic White mothers who give birth to very low birth weight infants and mothers in certain less prevalent race/ethnicity groups receive a proportionate weight.

The second factor is based on mothers who do not respond. This weighting process operates on the assumption that mothers in certain categories are less likely to respond, but the responses of women who do respond are likely to be similar to non-responders, on average. These categories are collapsed until each cell has at least 25 responders, to prevent a small number of responses from distorting the data. Categories with lower response rates (e.g., mothers with less education or lower incomes) are assigned higher non-response weights.

The final weighting factor is based on non-coverage of the surveillance methods. In theory, the sampling technique may miss some eligible mothers due to late processing or duplicate records, so this process assigns a weight to available samples to account for this non-coverage. This is a less critical issue for mail/telephone surveillance systems, so this adjustment factor is not usually greater than one. The three weights are applied to each participant and addressed during the statistical analysis.

The surveys are administered in a systematic way, from the child's birth for PRAMS and until just after the child's second birthday for PRAMS-2. At 2-4 months post-partum, mothers receive a preletter, introducing them to PRAMS and the protocol. Within 3-7 days, an initial questionnaire packet is mailed, and 7-10 days following that packet, mothers receive a tickler—a thank you note and reminder. For mothers who have not yet responded, a second questionnaire packet follows 7-10 days after the tickler. Seven to ten days following the second packet mailing, the remaining non-responders receive a telephone follow-up call. Over 2-3 weeks, mothers are contacted up to 15 times, with calls staggered over different times of day and days of the week. The state of Oregon uses PRAMTrac software, developed by the Centers for Disease Control (CDC), to track

mailing, telephone calls and responses over this 60-95 day data collection process.[60] These collection methods are used for PRAMS-2 surveys in the cohort of mothers and children who participated in PRAMS.

This investigation uses data from births in Oregon in 2005. Data from these births were collected on PRAMS surveys administered in 2005 and 2006. The mean time from birth to survey completion for PRAMS was 3.5 months postpartum. Many questions on PRAMS encompass the pregravid health status of the participants. For the purposes of this investigation, 'Time 1' refers to the pregravid time period or the time just before the participant became pregnant with their new baby.

All women who participated in PRAMS were contacted for the follow-back survey PRAMS-2, except those whose child had died and those who indicated "Do not contact me again" on their PRAMS consent form. For the purposes of this investigation, 'Time 2' refers to two years postpartum. The mean response time for PRAMS-2 was 25 months postpartum for 2005 births. Responses to PRAMS-2 responses are weighted as described above, with the final weighting variable as the product of all three weighting factors.

Data Management

The Public Health Division of the Oregon Health Authority manages the data collected by PRAMS in the state of Oregon. The staff members are responsible for the monitoring of the telephone interviews to complete the surveys, confirmation of the data entry, and correction of data entry errors. Following completion of the PRAMS Data Use Agreement, I obtained a dataset in STATA format that contained data gathered from 2005 to 2008. The Oregon Health & Science University Institutional Review Board

designated the project exempt from review, because the data did not contain personal identifying information.

For 2005 births, 2,806 birth certificates were selected for survey administration and in 2005 and 2006, 1,914 women completed the PRAMS surveys. Of those 2005 births, 1,046 women completed PRAMS-2, for a follow-back response of 47.7%, which was weighted back to the sample from which the original sample was drawn. Sixty women were excluded for not completing both weights at Time 1 and Time 2. Two women were excluded for not completing any of the CSHCN questions. Overall, 984 completed the questions addressing the primary predictor (CSHCN status) and outcome (weights at Time 1 and Time 2) of interest in this investigation. Six women reported weights that were biologically implausible, so 978 women were included in the final analysis.

Variable Selection

Outcome

The outcome or dependent variable of interest is the change in weight from before pregnancy to the time of completion of the PRAMS-2 survey. This is estimated from self-reported maternal weight at Time 1 and Time 2; PPWR is calculated by subtracting weight at Time 1 in kilograms (kg) from weight at Time 2 in kg. Question 5 in PRAMS asks, "Just before you got pregnant with your new baby, how much did you weigh?" and provides spaces for women to report their weights in pounds (lb) or kg. Question 37 in PRAMS-2 asks, "How much do you weigh now?" and provides spaces for women to report their weights in lb or kg. All maternal reported weights were converted to kg for analysis and PPWR was calculated in kg.

High weight retention was defined as over 4.5 kg of weight retained at two years postpartum, based on clinical significance and an assessment of prior literature.[34,37] In a prospective cohort investigation of parous women, weight retention of over 4.5 kg or at one year postpartum was significantly associated with overweight status at 15 years postpartum.[61] For analysis, the high weight retention variable was coded as 0 for weight retention of 4.5 kg or fewer and 1 for 4.51 kg or more.

Predictors

The main predictor or independent variable of interest is having a two-year-old child with a special health care need. Question 79b on PRAMS-2 asks, "Please circle Y (Yes) or N (No) for each of the following. Does your two-year-old have an ongoing need (lasting six months or more) for …?

1. Specialty health care
2. Behavioral health or mental health services
3. Physical therapy
4. Occupational therapy
5. Speech services
6. Medication
7. Home health services
8. Special diet
9. Use of assistive devices
10. Durable medical equipment"

When subjects reported "Y (Yes)" to of any of the ten needs, they were categorized as having a CSHCN, coded as 1. When they reported "N (No)" to all of the ten needs, they were categorized as not having a CSHCN, coded as 0. This definition is similar to the screener the Maternal and Child Health Bureau (MCHB) uses to identify CSHCN.[62] It differs in that the MCHB screener also asks whether the child is limited or prevented from doing things most children of the same age group do.

Other independent variables of interest, predictor variables, were based on responses on the child's birth certificate, PRAMS, and PRAMS-2. Respondent parity was assessed in PRAMS, in which Question 7 asks, "Before your got pregnant with your new baby, did you ever have any other babies who were born alive?". Respondents who responded "Yes" were classified as multiparous, coded as 1. Those who responded "No" were classified as primiparous, coded as 0.

Pregravid BMI was based on self-reported weight and height estimates on the PRAMS survey . Question 5 in PRAMS asks, "Just before you got pregnant with your new baby, how much did you weigh?" and provides spaces for women to report their weights in lb or kg. Question 6 in PRAMS asks, "How tall are you without shoes?" and provides spaces for women to report their height in feet and inches or centimeters. Weight estimates were converted to kg and height estimates were converted to meters (m). Body mass index was calculated using the formula BMI = weight in kg / (height in m)^2. Subjects were classified as "Underweight", "Normal weight", "Overweight", and "Obese" based on the World Health Organization classification of BMI.[63]

Maternal age was obtained from the birth certificate as reported in years. This was coded as a dichotomous variable with subjects aged 24 years or younger coded as 0 and subjects aged 25 years or older as 1. Maternal race/ethnicity was also collected on the birth certificate. Subjects were classified as "Hispanic", "Non-Hispanic Black/African-American", "Non-Hispanic American Indian/Alaskan Native", "Non-Hispanic White", and "Non-Hispanic Asian/Pacific Islander."

The following predictor variables were measured at Time 2: breastfeeding, physical activity, household income status, food security status, and maternal depression. They were not assessed as confounders, as many were conceptualized as mediators in the relationship between having a CSHCN and PPWR. Unlike a confounder, they were in the causal pathway between the exposure and outcome of interest.[64,65] Breastfeeding experience is measured at Time 2. Question 48 in PRAMS-2 asks, "Did you ever breastfeed or pump breast milk to feed your child, who is now two-years-old?" This was coded as a dichotomous variable with subjects reporting "No" coded as 0 and subjects reporting "Yes" as 1. Physical activity was estimated in PRAMS-2 as well. Question 34 on PRAMS-2 asks, "In the past month, how many days a week did you get at least 30 minutes of physical activity or exercise? (For example, walking, dancing, yard work, or sweeping.)" Subjects had the option to respond "Less than 1 day per week", "1 to 4 days per week", and "5 or more days a week". This was coded as a dichotomous variable with subjects reporting "Less than 1 day per week" coded as 0 (not physically active) and subjects reporting "1 to 4 days per week", and "5 or more days a week" as 1 (physically active). Question 40 on PRAMS-2 asks, "What is your total annual household income before taxes? Include your income, your spouse's/partner's income, and any other

income you may have.". Subjects had the option to respond "Less than $10,000", "$10,000 to $14,999", "$15,000 to $19,999", "$20,000 to $24,999", "$25,000 to $29,999", "$30,000 to $34,999", "$35,000 to $49,999", or, "$50,000 or more". Question 41 asks, "How many people, including yourself, depend on this income?" and provides a blank space for reporting the number of people. Household income was classified based on the Federal Poverty Level (FPL) in 2005. These levels classify households based on income and number of people dependent on that income (Table 2).[66] Income was coded as a dichotomous variable based on the FPL with subjects classified as above 100% of the FPL, coded as 1, and at or below 100% of the FPL, coded as 1.

Table 2. Poverty guidelines of the U.S. Department of Health and Human Services in 2005

Persons in family unit	Annual household income[a]
1	$9,570
2	$12,830
3	$16,090
4	$19,350
5	$22,610
6	$25,870
7	$29,130
8	$32,390
For each additional person, add	$3,260

[a]For households in the 48 contiguous states and District of Columbia

Food security status is measured at Time 2. Question 35 in PRAMS-2 asks, "In the past 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?" This was coded as a dichotomous variable with subjects reporting "No" coded as 1 and subjects reporting "Yes" as 0. Maternal depression is measured at Time 2. Question 22b in PRAMS-2 asks, "In the past 12 months, has there been a period of two or more weeks when almost every day you felt sad, blue, or depressed most of the day [or] lost interest or pleasure in most things you usually cared about or enjoyed?"

This was coded as a dichotomous variable with subjects reporting "No" to both options coded as 0 and subjects reporting "Yes" to either as 1.

Statistical Analysis

Descriptive Statistics

Simple frequency statistics were used to estimate the prevalence of high weight retention in this sample. One way frequency tables quantified the un-weighted number of subjects in each weight retention category. One way frequency tables quantified the weighted proportion of subjects in each weight retention category, using the Survey Data Analysis function in STATA and a pre-defined sample weight. Mean weights for subjects as reported on PRAMS and PRAMS-2 and mean amount of weight retentions were estimated using summary statistics.

Simple frequency statistics were used to estimate the prevalence of having a CSHCN in this sample. The frequency of each need and the frequency of needing any special health care service was measured using un-weighted one way frequency tables. Weighted one way frequency tables were used to estimate the proportion of subjects with each specific need. Subjects were then dichotomously categorized into those having a child with no special health care needs and those having a child with any special health care needs.

The other independent variables of interest were also quantified using one way frequency tables, with weighted analysis for estimating proportions. The distributions of these variables based on CSHCN status were compared using chi-squared tests to compare proportions.

Linear regression models estimated the association between the number of kilograms of weight retained at two years postpartum and CSHCN status. A simple linear regression model quantified the association between the dependent variable and main independent variable, CSHCN status. The multiple variable model was adjusted for parity, maternal age, pregravid BMI, and maternal race/ethnicity.

Logistic Regression Model

The odds of experiencing high PPWR were estimated for subjects with CSHCN, compared to those without CSHCN, using bivariate and multivariate logistic regression modeling. The crude bivariate logistic regression model included high PPWR as the dependent variable and CSHCN status as the main independent variable. A pool of predictors of interest was identified based on the literature describing CSHCN and PPWR.

The predictor variables were evaluated for multicollinearity using the variable inflation factors (VIF) method. This identified predictor variables that were too strongly correlated with one another to include together in the multivariate model. The VIF values were computed by hand based on the inverse of the tolerance (1 – R-squared) for each set of predictor variables. The tolerance values were estimated with linear regression modeling of the predictor variable of interest set as the dependent variable and the other predictor variables as independent variables. Variables with VIF values of greater than 20 were considered to have high multicollinearity and would be excluded from the final multivariate model.

A bivariate model assessed the relationship between the predictor variables of parity, maternal age, pregravid BMI status, and maternal race/ethnicity and the dependent variable of high PPWR. Each variable was incorporated into the multivariate model one at a time to evaluate for confounding. The estimated coefficient for CSHCN from the logit regression model was compared to that from the crude bivariate model describing the association between CSHCN and PPWR, and variables with values that differed by over 10% were considered important confounders, as described in Hosmer and Lemeshow's *Applied Logistic Regression*.[67]

Candidate predictor variables were considered for the full model based on this statistical evaluation for confounding, as well as clinical importance, and Wald test statistic results. The threshold for inclusion in the model based on the Wald test results was a $p < 0.20$. In the case of variables with categorical outcomes (race/ethnicity, pregravid BMI), if one Wald test met the criteria, all categories were included in the final model. An evaluation for interaction between CSHCN status and pregravid BMI status did not identify significant interaction between these predictors. The variable of BMI status remained in the model, despite not meeting the Wald test statistic criteria because of the strong association between BMI status and gestational weight distribution patterns and PPWR, documented in previous literature.[1,3,19]

The final multivariate logistic regression model was adjusted for the predictor variables of parity, maternal age, pregravid BMI status, and maternal race/ethnicity. The Hosmer-Lemeshow goodness-of-fit test for weighted data was used to assess the final multivariate model's overall fit with the data.[68]

The other predictors of interest were conceptualized as mediators in the relationship between having a CSHCN and experiencing PPWR. These mediators were breastfeeding, physical activity, income status, food security, and maternal depression. I assessed these mediators by adding the variables to the final multivariate logistic regression model.

Results

In this investigation, 11.4% of subjects reported having a two-year-old child with at least one special health care need and 41.3% experienced weight retention of over 4.5 kg at two years postpartum. Table 3 describes the dichotomous categorization of CSHCN and Table 4 describes the distribution of the specific needs. One hundred twenty-four subjects (11.4%) met criteria for having a CSHCN. Of these subjects, 6.0% had a child with only one need, while 5.4% of subjects with CSHCN had two or more special health care needs. The most common ongoing needs were medications and specialty health care (Table 4). All analyses were weighted to reflect the sampling technique.

Table 3. Proportion of subjects reporting ongoing special health care needs for their two-year-old children

Number of special health care needs	n (weighted %)
0	825 (88.6)
1 or more	124 (11.4)

Table 4. Proportion of subjects reporting specific special health care needs for their two-year-old children

Specific type of special health care need	n (weighted %)
Specialty health care	44 (4.37)
Behavioral or mental health care	5 (0.45)
Physical therapy	24 (1.19)
Occupational therapy	16 (0.47)
Speech services	28 (1.43)
Medication	65 (6.44)
Home health services	15 (1.17)
Special diet	29 (2.06)
Use of assistive devices	15 (1.30)
Durable medical equipment	22 (2.19)

Tables 5 and 6 describe the maternal weight change patterns. The majority of women retained some weight at Time 2 (60.6%), while 41.3% retained a high amount of weight, over 4.5 kg (9.9 pounds). For all subjects, the mean weight retained at Time 2 was 3.49 kg. Having a CSHCN was associated with a PPWR of 4.06 kg in the simple linear

regression model (95% CI: 0.602 – 7.51). After adjustment for maternal age, parity, pregravid BMI status, and maternal race/ethnicity, this association was 4.13 kg (95% CI: 0.875 – 7.39).

Table 5. Self-reported maternal weight, Oregon PRAMS, 2005 births	
Maternal weight (in kg)	mean (SD) in kg
Time 1: pregravid weight (PRAMS)	68.3 (17.6)
Time 2: postpartum weight (PRAMS-2)	71.8 (17.4)
Weight retained between Time 1 and Time 2	3.49 (8.83)

Table 6. Postpartum weight retention, Oregon PRAMS, 2005 births	
Retention of over 4.5 kg at Time 2	n (weighted %)
No	568 (58.7)
Yes	410 (41.3)

Table 7 describes the distribution of demographic characteristics of the subjects based on CSHCN status. In the CSHCN group, there was a statistically significantly higher proportion of subjects reporting food insecurity and depressive symptoms at Time 2, compared to those without CSHCN ($p = 0.025$, $p = 0.021$). For other predictor variables, the distribution of the predictor variable proportions was not statistically significantly different between subjects who did and did not have a CSHCN.

Table 7. Characteristics for subjects with and without children with special health care needs (CSHCN), Oregon PRAMS, 2005 births				
	Total n (weighted %)	With CSHCN n (weighted %)	Without CSHCN	P[a]
Parity				0.91
Primiparous	410 (44.0)	55 (44.8)	355 (43.9)	
Multiparous	539 (56.0)	60 (55.2)	470 (56.1)	
Pregravid BMI Category				0.14
Underweight	104 (10.4)	18 (17.3)	86 (9.54)	
Normal weight	457 (54.6)	59 (54.6)	398 (54.1)	
Overweight	132 (14.1)	16 (6.76)	116 (15.1)	
Obese	203 (20.8)	28 (17.1)	175 (21.3)	
Maternal age				0.18
24 or younger	268 (25.0)	37 (17.9)	231 (25.9)	
25 or older	680 (75.0)	87 (82.1)	593 (74.1)	
Maternal race/ethnicity				0.91
Non-Hispanic African-	92 (1.42)	13 (1.75)	79 (1.38)	
Non-Hispanic American	119 (1.24)	16 (1.45)	103 (1.21)	
Non-Hispanic	137 (4.17)	14 (3.90)	123 (4.20)	
Hispanic	179 (14.2)	19 (13.5)	160 (14.3)	
Non-Hispanic White	418 (78.9)	61 (79.5)	357 (78.9)	
Breastfeeding				0.41
No breastfeeding	161 (15.7)	19 (19.7)	142 (15.2)	
Any breastfeeding	778 (84.2)	105 (80.3)	673 (84.8)	
Physical activity				0.78
No physical activity	214 (19.4)	29 (18.1)	185 (19.6)	
Any physical activity	730 (80.6)	94 (81.9)	636 (80.4)	
Income				0.67
Above 100% FPL	656 (79.8)	90 (81.9)	566 (79.4)	
At or below 100% FPL	234 (20.3)	29 (18.1)	205 (20.5)	
Household food security				0.025
Food secure	851 (91.1)	102 (82.1)	749 (92.3)	
Food insecure	98 (8.90)	22 (17.9)	76 (7.74)	
Maternal depressive				0.021
No symptoms	718 (65.1)	80 (65.1)	638 (79.8)	
Any symptoms	215 (34.9)	44 (34.9)	171 (20.2)	

[a]Chi-square test of proportions

[b]$p < 0.05$

The predictor variables for the logistic regression model were assessed for multicollinearity using the variable inflation factor. As none of the VIF values were above 20, there was not important multicollinearity among the predictor variables, based on the VIF criteria (See Appendix C).

Table 8 presents the results of bivariate logistic regression models of the association between having a CSHCN and high PPWR of over 4.5 kg and bivariate associations with other predictors of PPWR.

In bivariate analysis, there is a positive, statistically significant association between having a CSHCN and experiencing high PPWR (OR: 1.85 95% CI: 1.01 – 3.39). There is a positive, statistically significant bivariate association between high PPWR and Non-Hispanic African-American/Black race (OR: 1.63 95% CI: 1.01 – 2.63). There is also a positive, statistically significant bivariate association between high PPWR and Non-Hispanic American Indian/Alaskan Native race (OR: 1.57 95% CI: 1.02 – 2.42). Multiparty is negatively associated with high weight retention (OR: 0.467 95% CI: 0.314 – 0.696). Older maternal age is also negatively associated with high PPWR (OR: 0.546 95% CI: 0.351 – 0.850). There was a negative association between having secure access to food at Time 2 and high PPWR (OR: 0.489 95% CI: 0.253 – 0.945). There were not statistically significant associations between pregravid BMI category and high PPWR.

Table 8. Predictors of postpartum weight retention > 4.5 kg, Oregon PRAMS, 2005 births n = 978				
	n[a]	Experiencing high PPWR[b]	Bivariate OR (95% CI)	P[c]
Child's health care needs				
CSHCN	124	54.6	1.85 (1.01 – 3.39)	0.046
No CSHCN	825	39.4	referent	
Parity				
Primiparous	423	51.5	referent	
Multiparous	555	33.2	0.467 (0.314 – 0.696)	<0.01
Pregravid BMI Category				
Underweight	107	44.5	1.15 (0.676 – 1.96)	0.60
Normal weight	468	42.5	referent	
Overweight	133	48.1	1.15 (0.901 – 1.47)	0.26
Obese	212	31.2	0.641 (0.408 – 1.01)	0.054
Maternal age				
24 or younger	278	52.5	referent	
25 or older	699	37.7	0.546 (0.351 – 0.850)	0.007
Maternal race/ethnicity				
Non-Hispanic African-	94	52.9	1.63 (1.01 – 2.63)	0.046
Non-Hispanic	124	51.9	1.57 (1.02 – 2.42)	0.040
Non-Hispanic	143	30.9	0.648 (0.418 – 1.00)	0.052
Hispanic	189	42.1	1.06 (0.723 – 1.54)	0.76
Non-Hispanic White	424	40.8	referent	
Breastfeeding				
No breastfeeding	163	48.6	referent	
Any breastfeeding	795	39.7	0.695 (0.416 – 1.16)	0.17
Physical activity				
No physical activity	222	49.6	referent	
Any physical activity	751	39.1	0.653 (0.409 – 1.04)	0.074
Income				
Above 100% FPL	671	39.7	0.789 (0.498 – 1.25)	0.31
At or below 100% FPL	247	45.4	referent	
Household food security				
Food secure	870	39.7	0.489 (0.253 – 0.945)	0.033
Food insecure	107	57.3	referent	
Maternal depressive				
No symptoms	737	39.3	referent	
Any symptoms	221	44.9	1.26 (0.787 – 2.02)	0.335

[a]unweighted number of respondents, [b]weighted percentage, [c]Wald Test

The assessment for important confounders did not yield confounders that altered the estimate of the OR for PPWR by greater than 10% (See Appendix D).

Table 9 displays the results of the final logistic regression model of the association between having a CSHCN and experiencing high weight retention (of over 4.5 kg) at Time 2. Subjects with a CSHCN are 1.99 times more likely to report high postpartum weight retention than subjects without CSHCN, after adjustment for parity, pregravid BMI, maternal age, and maternal race/ethnicity (OR: 1.99 95% CI: 1.09 – 3.65). This model fit was supported by the Hosmer-Lemeshow goodness-of-fit test for survey data ($p = 0.91$).

Table 9. Maternal high weight retention by children with special health care needs (CSHCN) status, Oregon PRAMS, 2005 births n = 944		
	Multivariate OR (95% CI)[b]	P[a]
Child's health care needs		
CSHCN	1.99 (1.09 – 3.65)	0.027
No CSHCN	referent	
Parity		
Primiparous	referent	
Multiparous	0.558 (0.362 – 0.860)	0.008
Maternal age		
24 or younger	referent	
25 or older	0.619 (0.385 – 0.996)	0.048
Maternal race/ethnicity		
Non-Hispanic African-American/Black	1.55 (0.921 – 2.62)	0.099
Non-Hispanic American Indian/Alaskan Native	1.60 (0.994 – 2.59)	0.053
Non-Hispanic Asian/Pacific Islander	0.686 (0.429 – 1.10)	0.12
Hispanic	1.04 (0.661 – 1.63)	0.87
Non-Hispanic White	referent	
Pregravid BMI Category		
Underweight	1.21 (0.694 – 2.10)	0.51
Normal weight	referent	
Overweight	1.13 (0.877 – 1.48)	0.33
Obese	0.776 (0.470 – 1.28)	0.32

[a]Wald test

[b]Adjusted for parity, maternal age, pregravid BMI status, and maternal race/ethnicity

Table 10. Mediators of maternal high weight retention in children with special health care needs (CSHCN), Oregon PRAMS, 2005 births n = 860		
	Multivariate OR (95% CI)[b]	P[a]
Child's health care needs (*PRAMS-2)*		
CSHCN	1.98 (1.07 – 3.66)	0.029
No CSHCN	referent	
Parity *PRAMS*		
Primiparous	referent	
Multiparous	0.537 (0.336 – 0.856)	0.009
Maternal age (*BIRTH CERT.)*		
24 or younger	referent	
25 or older	0.549 (0.319 – 0.944)	0.030
Maternal race/ethnicity (*BIRTH CERT.)*		
Non-Hispanic African-American/Black	1.48 (0.802 – 2.76)	0.21
Non-Hispanic American	1.53 (0.909 – 2.60)	0.11
Non-Hispanic Asian/Pacific Islander	0.628 (0.368 – 1.07)	0.089
Hispanic	0.897 (0.517 – 1.56)	0.70
Non-Hispanic White	referent	
Pregravid BMI Category (*PRAMS)*		
Underweight	1.27 (0.693 – 2.32)	0.44
Normal weight	referent	
Overweight	1.15 (0.851 – 1.55)	0.37
Obese	0.680 (0.400 – 1.16)	0.15
Breastfeeding (*PRAMS-2)*		
No breastfeeding	referent	
Any breastfeeding	0.854 (0.483 – 1.55)	0.59
Physical activity (*PRAMS-2)*		
No physical activity	referent	
Any physical activity	0.542 (0.314 – 0.937)	0.028
Income (*PRAMS-2)*		
Above 100% FPL	referent	
At or below 100% FPL	1.09 (0.580 – 2.05)	0.79
Household food security status at Time 2 *(PRAMS-2)*		
Food secure	0.386 (0.174 – 0.858)	0.019
Food insecure	referent	
Maternal depressive symptoms (*PRAMS-2)*		
No symptoms	referent	
Any symptoms	0.878 (0.505 – 1.53)	0.64

[a]Wald test

[b]Adjusted for parity, maternal age, pregravid BMI status, maternal race/ethnicity, breastfeeding, physical activity, household income, food security status, and maternal depression

Table 10 displays the results of the mediator analysis. After adjustment for confounder and mediator variables, a positive association between having a CSHCN and experiencing PPWR remains (OR: 1.98 95% CI 1.07 – 3.66). Food security status is still negatively associated with PPWR, after adjustment for confounders and other mediators (OR: 0.386 95% CI 0.174 – 0.858). Physical activity is also negatively associated with PPWR after adjustment (OR: 0.542 95% CI 0.314 – 0.937).

Discussion

In this investigation, I observed a positive association between having a child with a special health care needs and experiencing high postpartum weight retention. When the outcome of interest—postpartum weight retention—was evaluated as a continuous and categorical variable, I observed a positive association between high postpartum weight retention and having a CSHCN. This association is important because it identifies a risk factor for PPWR. This represents a connection between this particular maternal and child health pattern and the obesity epidemic occurring throughout the United States. Identification of risk factors and vulnerable populations is one of the first steps in primary prevention of obesity.

In this investigation, I observed that the odds of experiencing PPWR were nearly two times higher in mothers of CSHCN, compared to mothers whose child did not have special health care needs. The lower bounds of the 95% confidence intervals approached 1.0, which is consistent with a possibly mild association overall. However, even a mild association is important on a population level for these predictors and outcomes. With a prevalence of CSHCN of over 10% in this sample and nearly 15% in the children of all ages in the United States, having a CSHCN is a relatively common experience for families. The association I observed is likely to impact many women, children, and families in Oregon.

The findings related to food insecurity and physical activity suggest that diet and exercise, understandably, explain some of the relationship between PPWR and having a CSHCN. As noted in Tables 8 and 10, secure access to food and physical activity are negatively associated with PPWR. Table 7 illustrates that food insecurity at two years

postpartum was more prevalent in families with CSHCN than in families whose child did not have a special health care need. In the United States, many processed, calorie-dense, nutrient-poor foods are less expensive than whole grains, fruits, and vegetables. One common coping mechanism in situations of food insecurity is to sacrifice diet quality in order to provide food for the household.[69] With families with CSHCN reporting more financial difficulties, this coping strategy may be more common and could lead to more PPWR.

Physical activity's negative association with PPWR makes logical sense, as exercise burns calories and facilitates postpartum weight loss. This investigation used a dichotomous definition of physical activity that categorized women with just a few hours of exercise a week as physically active. These findings add to the large body of evidence that any exercise, even modest amounts, can have a positive impact on health. Overall, these findings highlight the need to support women and families in making healthy choices for diet and exercise. On the community level, they show that in designing programs and policies to encourage healthy and active lifestyles, policymakers should consider the unique needs of families with CSHCN.

Consistency with other investigations

These observations are consistent with those observed in populations of women and infants from North Carolina in the United States and in Brazil.[34,37] Both of these investigations observed positive associations between infant hospitalization—one type of special health care need—and maternal PPWR, although their categorization of weight retention and time at follow-up differed from ours. The most similar patterns emerged in the comparison with the investigation by Siega-Riz et al.[34] They found that the risk of

having PPWR of over 10 lb was two times higher in women whose infant was hospitalized, compared to those with an infant who was not hospitalized (RR: 2.0 95% CI: 1.3 – 2.9).[34]

The findings I observed were also consistent with respect to pregravid BMI status and PPWR, although I did not observe any associations that reached statistical significance. Siega-Riz et al. also observed a positive association between pregravid underweight status and PPWR of 1-10 lb (RR: 2.0 95% CI: 1.6 – 2.7). Pregravid obesity was also negatively associated with PPWR of 1-10 lb (RR: 0.7 95% CI: 0.4 – 1.0). Siega-Riz et al. also observed a positive association between Non-Hispanic African-American/Black race and PPWR of over 10 lb (RR: 1.8 95% CI: 1.1 – 2.7).[34] Overall, these findings were also consistent with those in the 2009 IOM report of the latest guidelines and an investigation exploring adherence to those guidelines. The authors describe higher weight retention in women who were underweight in the pregravid period and lower weight retention in women who were overweight or obese in the pregravid period, as compared to women with normal BMIs.[1,19]

Strengths

A primary strength of this investigation is the sampling technique used to gather study participants. By using birth certificates, this study was not biased towards sampling mothers in particular populations, such as those who gave birth in certain geographic regions or at tertiary care facilities. The Oregon PRAMS sample is representative of the demographic characteristics of the state and the weighting technique accurately accounts for under-represented racial and ethnic groups. The study design of PRAMS and PRAMS-2 allows for longitudinal research questions in a large cohort of participants.

The longitudinal study design allows investigators to explore causal relationships better than purely cross-sectional studies. For example, in this investigation I examined a change in weight over time.

Strengths of this investigation in particular relate to the questions asked in PRAMS-2. The definition of CSHCN, as outlined above, captures a diverse group of children. This incorporates children who need many services from the medical system and those who may need a few ongoing services like speech language or behavioral therapy. The high sensitivity of this definition captures children with various needs, instead of focusing only on specific needs provided by hospitals or pharmacies. The timing component of the question is specific for children with long-term care needs, so children with acute care needs that do not demand ongoing use of resources are not included.

Weaknesses

This investigation has three main limitations. The limitation of recall bias arises from the survey methods and timing. Postpartum mothers are retrospectively questioned about behaviors and experiences that may have occurred many months prior to survey administration. This limitation may not be as significant for the special health care needs assessment, as those needs are ongoing for six months or more by definition and as such, they may be easier to remember. Recall bias may be more threatening to validity of self-reported weight on the PRAMS surveys. However, pregravid weight, as asked on PRAMS, is a relatively static number for many women, compared to the weekly weight changes of pregnancy. Additionally, on PRAMS-2, women are asked to report their current weight, which is subject to less recall bias. Recall bias may threaten the estimates

of other predictor variables, as the questions on the survey refer to times that occurred months or years prior to survey administration.

A second limitation relates to the timing of diagnosing special health care needs. Based on the categorization of CSHCN and those without special health care needs, I will be categorizing children as CSHCN who have only had special health care needs for a few weeks and others who have had special health care needs for years. This has the potential to decrease the measured effect size because the exposure to having special health care needs may or may not be equal among all participants categorized as CSHCN. The definition of CSHCN in this investigation does not match that of MCHB exactly, as their screening question includes another facet. They ask "Is your child limited or prevented in any way in his or her ability to do the things most children of the same age can do?".[62] The screener used in PRAMS-2 does not specifically ask about these limitations, so fewer children may be classified as CSHCN, even if those children have limited abilities. This decreases the sensitivity of identifying CSHCN, but would lead to a non-differential bias as the decreased sensitivity would be applied to both outcome groups equally.

A third limitation relates to the sensitive information gathered in PRAMS. Women are asked questions about sensitive issues in PRAMS and PRAMS-2 and may feel pressured by social stigmas to answer in a certain way. However, if this did introduce bias, the bias is likely non-differential, given the nature of the questions and the variety of responses and opinions. Study designers address this limitation by notifying participants that their participation is voluntary and their responses are made anonymous for research purposes. This anonymity is reaffirmed, because participants do not give their responses during in person interviews, but through phone and mail encounters.

A fourth limitation arises from the issue of intervening pregnancies. Women in this investigation may have been pregnant in between Time 1 and Time 2, but there is not clear information about the status of these pregnancies. Women may be currently pregnant, have completed a pregnancy, or have experienced a pregnancy loss within the timeframe of my investigation. Given the possibilities for these various outcomes and their differing impacts on maternal weight changes, I chose to include women regardless of their intervening pregnancy status and did not exclude women who became pregnant in between Time 1 and Time 2.

Implications for public health and medicine

The obesity epidemic in the United States is a complex public health problem. This investigation explores a small segment of the population at risk for obesity, but it is an important segment given the prevalence of obesity in mothers and children. This study's findings may suggest that focused interventions and programs to promote healthy lifestyles are important for families who have CSHCN.

These findings apply to maternal and child health on many levels. On an individual level, this study provides evidence for practicing clinicians regarding encouragement of healthy lifestyles for the whole family. In identifying this risk factor, I found a population of families—those with CSHCN—that need more focused plans and support for postpartum maternal health from individual health care providers, particularly obstetric care providers. These clinicians can connect families to community fitness programs and engage in the primary prevention of obesity in these children. These interventions will align with the goals of the medical home model, goals that focus on the provision whole-person care, not just the treatment of specific diseases. These results are

also important for pediatric care providers to be able to provide family-centered care, with attention to the connection between maternal health outcomes and child growth and development. These findings support the preventive aspect of the medical home model as well. If families are part of a medical home in which they are systematically screened for preventable experiences like food insecurity and sedentary lifestyles, providers can intervene early with advice and referrals to programs.

From a public health perspective, these results highlight areas for awareness raising and programmatic innovation. This finding is one of many that supports stronger community-based programs for preventive health care. Lifestyle changes, like those made to fitness patterns and diets, generally take place at home, work, and school—not inside a clinician's office. Community-based organizations that aim to support CSHCN and their families can use these findings to design programs. Organizations like the YMCA and other community fitness centers can ensure that their childcare services are accessible for families with CSHCN. Advocacy organizations, such as the National Down Syndrome Society and the Cystic Fibrosis Foundation, can use the results of this investigation to design awareness campaigns, support networks, and community activities to support healthy lifestyles.

On the state and national level, this investigation provides evidence that is useful in designing policies and programs to improve maternal and child health. Programs like the Special Supplemental Nutrition Program from Women, Infants, and Children (WIC) aim to support maternal and child health outcomes, and this investigation provides evidence of use to WIC policymakers and dieticians. A focused needs assessment of families with

CSHCN might highlight ways to improve access to WIC for these families, such as more financial and logistical support for in-home visits with dieticians.

As the healthcare system in the United States moves towards care that is more preventive and proactive, support of maternal and child health will be crucial. This investigation highlights the connections between maternal and child health outcomes that begin early in life and can shape health trajectories beyond the postpartum period. Overall, this investigation supports more family-centered health policies in the postpartum period, such as paid maternity leave. If women and families were supported by such policies, they could focus on caring for their new infant, as well as self-care and adoption of healthy habits while they are adjusting to new demands of parenthood. Policies that support health and prevention in the postpartum and early childhood time periods can pay off in saved healthcare costs over the lifetime of the mother and child.

Summary and Conclusion

In this sample of 2005 Oregon births, there is a positive association between having a CSHCN and experiencing PPWR of over 4.5 kg at two years postpartum. The odds of experiencing high PPWR were 1.98 times higher in these mothers, compared to women whose children did not have special health care needs. This association is statistically significant after adjustment for parity, pregravid BMI, maternal race/ethnicity, maternal age, breastfeeding, physical activity, food security status, household income, and maternal depression (OR: 1.98 95% CI: 1.07 – 3.66). These findings highlight more than one risk factor for PPWR and its sequelae of overweight and obesity. They also present areas for opportunity in designing community support networks for these families and health policies that support maternal and child health.

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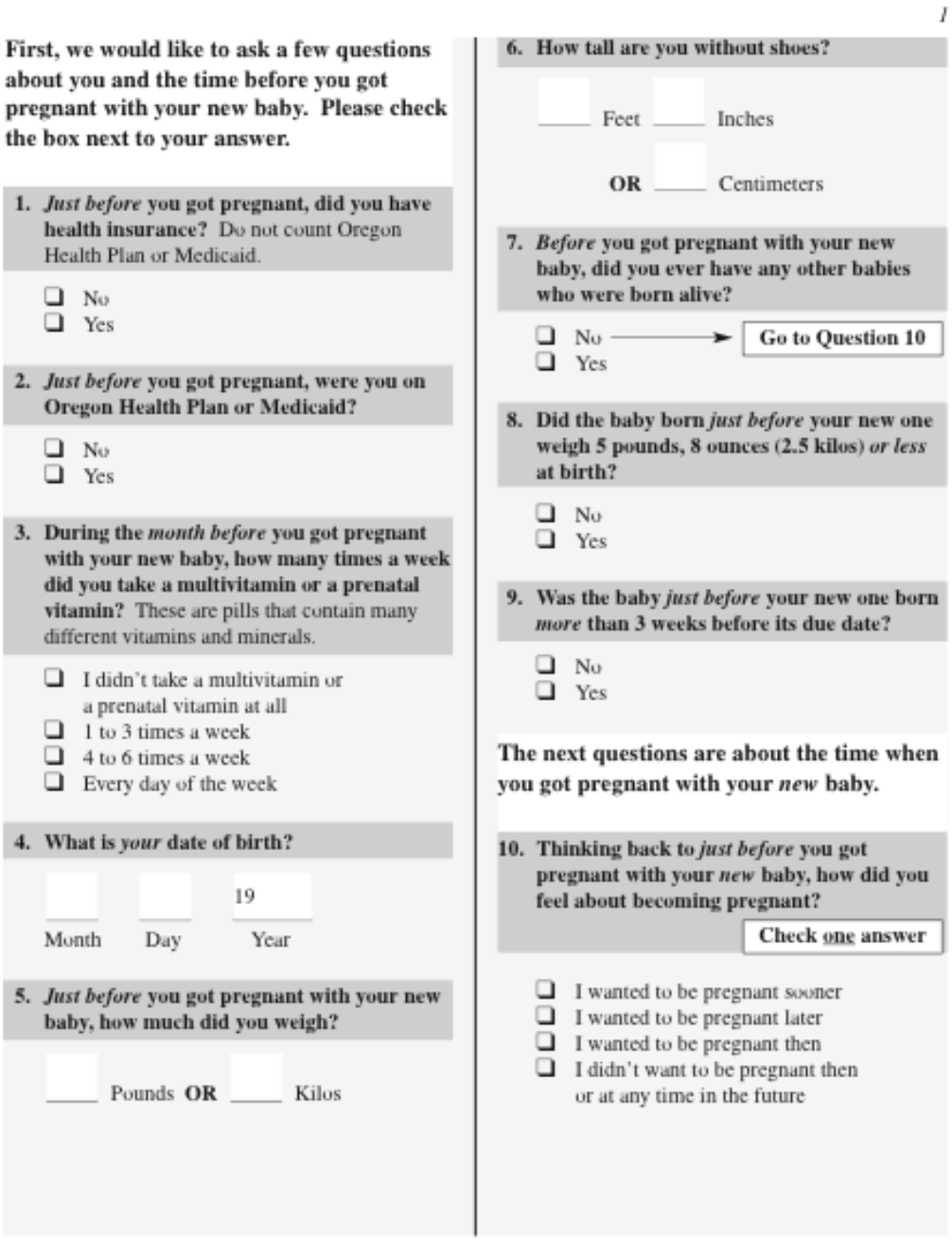
Appendicies

Appendix A. PRAMS survey for births in 2005



First, we would like to ask a few questions about you and the time before you got pregnant with your new baby. Please check the box next to your answer.

1. *Just before* you got pregnant, did you have health insurance? Do not count Oregon Health Plan or Medicaid.

- ❑ No
- ❑ Yes

2. *Just before* you got pregnant, were you on Oregon Health Plan or Medicaid?

- ❑ No
- ❑ Yes

3. During the *month before* you got pregnant with your new baby, how many times a week did you take a multivitamin or a prenatal vitamin? These are pills that contain many different vitamins and minerals.

- ❑ I didn't take a multivitamin or a prenatal vitamin at all
- ❑ 1 to 3 times a week
- ❑ 4 to 6 times a week
- ❑ Every day of the week

4. What is *your* date of birth?

Month ____ Day ____ 19 ____ Year

5. *Just before* you got pregnant with your new baby, how much did you weigh?

____ Pounds **OR** ____ Kilos

6. How tall are you without shoes?

____ Feet ____ Inches

OR ____ Centimeters

7. *Before* you got pregnant with your new baby, did you ever have any other babies who were born alive?

- ❑ No → **Go to Question 10**
- ❑ Yes

8. Did the baby born *just before* your new one weigh 5 pounds, 8 ounces (2.5 kilos) *or less* at birth?

- ❑ No
- ❑ Yes

9. Was the baby *just before* your new one born *more* than 3 weeks before its due date?

- ❑ No
- ❑ Yes

The next questions are about the time when you got pregnant with your *new* baby.

10. Thinking back to *just before* you got pregnant with your *new* baby, how did you feel about becoming pregnant?

Check one answer

- ❑ I wanted to be pregnant sooner
- ❑ I wanted to be pregnant later
- ❑ I wanted to be pregnant then
- ❑ I didn't want to be pregnant then or at any time in the future

11. When you got pregnant with your new baby, were you trying to get pregnant?

- ❑ No
- ❑ Yes → **Go to Question 15**

12. When you got pregnant with your new baby, were you or your husband or partner doing anything to keep from getting pregnant? (Some things people do to keep from getting pregnant include not having sex at certain times [rhythm] or withdrawal, and using birth control methods such as the pill, condoms, cervical ring, IUD, having their tubes tied, or their partner having a vasectomy.)

- ❑ No
- ❑ Yes → **Go to Question 14**

13. What were your or your husband's or partner's reasons for not doing anything to keep from getting pregnant?

Check all that apply

- ❑ I didn't mind if I got pregnant
- ❑ I thought I could not get pregnant at that time
- ❑ I had side effects from the birth control method I was using
- ❑ I had problems getting birth control when I needed it
- ❑ I thought my husband or partner or I was sterile (could not get pregnant at all)
- ❑ My husband or partner didn't want to use anything
- ❑ Other → Please tell us:

If you or your husband or partner was not doing anything to keep from getting pregnant, go to Question 15.

14. When you got pregnant with your new baby, what were you or your husband or partner doing to keep from getting pregnant?

Check all that apply

- ❑ Tubes tied or closed (female sterilization)
- ❑ Vasectomy (male sterilization)
- ❑ Pill
- ❑ Condoms
- ❑ Shot once a month (Lunelle®)
- ❑ Shot once every 3 months (Depo-Provera®)
- ❑ Contraceptive patch (OrthoEvra®)
- ❑ Diaphragm, cervical cap, or sponge
- ❑ Cervical ring (NuvaRing® or others)
- ❑ IUD (including Mirena®)
- ❑ Rhythm method or natural family planning
- ❑ Withdrawal (pulling out)
- ❑ Not having sex (abstinence)
- ❑ Other → Please tell us:

The next questions are about the prenatal care you received during your most recent pregnancy. Prenatal care includes visits to a doctor, nurse, or other health care worker before your baby was born to get checkups and advice about pregnancy. (It may help to look at the calendar when you answer these questions.)

15. How many weeks or months pregnant were you when you were *sure* you were pregnant? (For example, you had a pregnancy test or a doctor or nurse said you were pregnant.)

____ Weeks **OR** ____ Months

- ❑ I don't remember

16. How many weeks or months pregnant were you when you had your first visit for prenatal care? Do not count a visit that was only for a pregnancy test or only for WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children).

_____ Weeks **OR** _____ Months

❑ I didn't go for prenatal care

17. Did you get prenatal care as early in your pregnancy as you wanted?

❑ No
❑ Yes
❑ I didn't want prenatal care → **Go to Page 4, Question 19**

18. Here is a list of problems some women can have getting prenatal care. For each item, circle **Y** (Yes) if it was a problem for you during your most recent pregnancy or circle **N** (No) if it was not a problem or did not apply to you.

		No	Yes
a.	I couldn't get an appointment when I wanted one	N	Y
b.	I didn't have enough money or insurance to pay for my visits	N	Y
c.	I had no way to get to the clinic or doctor's office	N	Y
d.	I couldn't take time off from work	N	Y
e.	The doctor or my health plan would not start care as early as I wanted	N	Y
f.	I didn't have my Oregon Health Plan or Medicaid card	N	Y
g.	I had no one to take care of my children	N	Y
h.	I had too many other things going on	N	Y
i.	I didn't want anyone to know I was pregnant	N	Y
j.	Other Please tell us:	N	Y

If you did not go for prenatal care, go to Question 25.

19. Where did you go *most of the time* for your prenatal visits? Do not include visits for WIC.

Check one answer

- ❑ Hospital clinic
- ❑ Health department clinic
- ❑ Private doctor's office or HMO clinic
- ❑ Midwife's office
- ❑ At home
- ❑ Other → Please tell us:

20. How was your prenatal care paid for?

Check all that apply

- ❑ Oregon Health Plan or Medicaid
- ❑ Personal income (cash, check, or credit card)
- ❑ Health insurance or HMO (including insurance from your work or your husband's work)
- ❑ Indian Health Service
- ❑ Other → Please tell us:

21. During any of your prenatal care visits, did a doctor, nurse, or other health care worker talk with you about any of the things listed below? Please count only discussions, not reading materials or videos. For each item, circle **Y** (Yes) if someone talked with you about it or circle **N** (No) if no one talked with you about it.

		No	Yes
a.	How smoking during pregnancy could affect my baby	N	Y
b.	Breastfeeding my baby	N	Y
c.	How drinking alcohol during pregnancy could affect my baby	N	Y
d.	Using a seat belt during my pregnancy	N	Y
e.	Birth control methods to use after my pregnancy	N	Y
f.	Medicines that are safe to take during my pregnancy	N	Y
g.	How using illegal drugs could affect my baby	N	Y
h.	Doing tests to screen for birth defects or diseases that run in my family	N	Y
i.	What to do if my labor starts early	N	Y
j.	Getting tested for HIV (the virus that causes AIDS)	N	Y
k.	Physical abuse to women by their husbands or partners	N	Y

22. During any of your prenatal care visits, did a doctor, nurse, or other health care worker ask if you were smoking cigarettes?

- ❑ No
- ❑ Yes

23. During any of your prenatal care visits, did a doctor, nurse, or other health care worker ask if you were drinking alcoholic beverages (beer, wine, wine cooler, or liquor)?

- ❑ No
- ❑ Yes

24. During any of your prenatal care visits, did a doctor, nurse, or other health care worker talk with you about how eating fish containing high levels of mercury could affect your baby?

- ❑ No
- ❑ Yes

25. At any time during your most recent pregnancy or delivery, did you have a test for HIV (the virus that causes AIDS)?

- ❑ No
- ❑ Yes
- ❑ I don't know

The next questions are about your most recent pregnancy and things that might have happened during your pregnancy.

26. During your most recent pregnancy, were you on WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children)?

- ❑ No
- ❑ Yes

27. Did you have any of these problems during your most recent pregnancy? For each item, circle **Y** (Yes) if you had the problem or circle **N** (No) if you did not.

		No	Yes
a.	High blood sugar (diabetes) that started *before* this pregnancy	N	Y
b.	High blood sugar (diabetes) that started *during* this pregnancy	N	Y
c.	Vaginal bleeding	N	Y
d.	Kidney or bladder (urinary tract) infection	N	Y
e.	Severe nausea, vomiting, or dehydration	N	Y
f.	Cervix had to be sewn shut (incompetent cervix)	N	Y
g.	High blood pressure, hypertension (including pregnancy-induced hypertension [PIH]), preeclampsia, or toxemia	N	Y
h.	Problems with the placenta (such as abruptio placentae or placenta previa)	N	Y
i.	Labor pains more than 3 weeks before my baby was due (preterm or early labor)	N	Y
j.	Water broke more than 3 weeks before my baby was due (premature rupture of membranes [PROM])	N	Y
k.	I had to have a blood transfusion	N	Y
l.	I was hurt in a car accident	N	Y

If you did not have any of these problems, go to Page 6, Question 29.

28. Did you do any of the following things because of these problems? For each item, circle **Y** (Yes) if you did that thing or circle **N** (No) if you did not.

		No	Yes
a.	I went to the hospital or emergency room and stayed less than 1 day	N	Y
b.	I went to the hospital and stayed 1 to 7 days	N	Y
c.	I went to the hospital and stayed more than 7 days	N	Y
d.	I stayed in bed at home more than 2 days because of my doctor's or nurse's advice	N	Y

The next questions are about smoking cigarettes and drinking alcohol.

29. Have you smoked at least 100 cigarettes in the *past 2 years?* (A pack has 20 cigarettes.)

- ❑ No → **Go to Question 33**
- ❑ Yes

30. In the *3 months before* you got pregnant, how many cigarettes did you smoke on an average day? (A pack has 20 cigarettes.)

- ❑ 41 cigarettes or more
- ❑ 21 to 40 cigarettes
- ❑ 11 to 20 cigarettes
- ❑ 6 to 10 cigarettes
- ❑ 1 to 5 cigarettes
- ❑ Less than 1 cigarette
- ❑ None (0 cigarettes)

31. In the *last 3 months* of your pregnancy, how many cigarettes did you smoke on an average day? (A pack has 20 cigarettes.)

- ❑ 41 cigarettes or more
- ❑ 21 to 40 cigarettes
- ❑ 11 to 20 cigarettes
- ❑ 6 to 10 cigarettes
- ❑ 1 to 5 cigarettes
- ❑ Less than 1 cigarette
- ❑ None (0 cigarettes)

32. How many cigarettes do you smoke on an average day *now?* (A pack has 20 cigarettes.)

- ❑ 41 cigarettes or more
- ❑ 21 to 40 cigarettes
- ❑ 11 to 20 cigarettes
- ❑ 6 to 10 cigarettes
- ❑ 1 to 5 cigarettes
- ❑ Less than 1 cigarette
- ❑ None (0 cigarettes)

33. Have you had any alcoholic drinks in the *past 2 years?* (A drink is 1 glass of wine, wine cooler, can or bottle of beer, shot of liquor, or mixed drink.)

- ❑ No → **Go to Question 36**
- ❑ Yes

34a. During the *3 months before* you got pregnant, how many alcoholic drinks did you have in an average week?

- ❑ 14 drinks or more a week
- ❑ 7 to 13 drinks a week
- ❑ 4 to 6 drinks a week
- ❑ 1 to 3 drinks a week
- ❑ Less than 1 drink a week
- ❑ I didn't drink then

34b. During the *3 months before* you got pregnant, how many times did you drink 5 alcoholic drinks or more in one sitting?

- ❑ 6 or more times
- ❑ 4 to 5 times
- ❑ 2 to 3 times
- ❑ 1 time
- ❑ I didn't have 5 drinks or more in 1 sitting
- ❑ I didn't drink then

35a. During the *last 3 months* of your pregnancy, how many alcoholic drinks did you have in an average week?

- ❑ 14 drinks or more a week
- ❑ 7 to 13 drinks a week
- ❑ 4 to 6 drinks a week
- ❑ 1 to 3 drinks a week
- ❑ Less than 1 drink a week
- ❑ I didn't drink then

35b. During the *last 3 months* of your pregnancy, how many times did you drink 5 alcoholic drinks or more in one sitting?

- ❑ 6 or more times
- ❑ 4 to 5 times
- ❑ 2 to 3 times
- ❑ 1 time
- ❑ I didn't have 5 drinks or more in 1 sitting
- ❑ I didn't drink then

Pregnancy can be a difficult time for some women. These next questions are about things that may have happened before and during your most recent pregnancy.

36. This question is about things that may have happened during the *12 months before* your new baby was born. For each item, circle **Y** (Yes) if it happened to you or circle **N** (No) if it did not. (It may help to use the calendar.)

		No	Yes
a.	A close family member was very sick and had to go into the hospital	N	Y
b.	I got separated or divorced from my husband or partner	N	Y
c.	I moved to a new address	N	Y
d.	I was homeless	N	Y
e.	My husband or partner lost his job	N	Y
f.	I lost my job even though I wanted to go on working	N	Y
g.	I argued with my husband or partner more than usual	N	Y
h.	My husband or partner said he didn't want me to be pregnant	N	Y
i.	I had a lot of bills I couldn't pay	N	Y
j.	I was in a physical fight	N	Y
k.	My husband or partner or I went to jail	N	Y
l.	Someone very close to me had a bad problem with drinking or drugs	N	Y
m.	Someone very close to me died	N	Y

37. During the *12 months before* your new baby was born, did you ever eat less than you felt you should because there wasn't enough money to buy food?

- ❑ No
- ❑ Yes

The next questions are about the time during the *12 months before* you got pregnant with your new baby.

38a. During the *12 months before* you got pregnant, did an ex-husband or ex-partner push, hit, slap, kick, choke, or physically hurt you in any other way?

- ❑ No
- ❑ Yes

38b. During the *12 months before* you got pregnant, were you physically hurt in any way by your husband or partner?

- ❑ No
- ❑ Yes

The next questions are about the time during your most recent pregnancy.

39a. During your most recent pregnancy, did an ex-husband or ex-partner push, hit, slap, kick, choke, or physically hurt you in any other way?

- ❑ No
- ❑ Yes

39b. During your most recent pregnancy, were you physically hurt in any way by your husband or partner?

- ❑ No
- ❑ Yes

The next questions are about your labor and delivery. (It may help to look at the calendar when you answer these questions.)

40. When was your baby due?

Month Day Year

41. When did you go into the hospital to have your baby?

Month Day Year

- ❑ I didn't have my baby in a hospital

42. When was your baby born?

Month Day Year

43. When were you discharged from the hospital after your baby was born? (It may help to use the calendar.)

Month Day Year

- ❑ I didn't have my baby in a hospital

44. How was your delivery paid for?

Check all that apply

- ❑ Oregon Health Plan or Medicaid
- ❑ Personal income (cash, check, or credit card)
- ❑ Health insurance or HMO (including insurance from your work or your husband's work)
- ❑ Indian Health Service
- ❑ Other ⟶ Please tell us:

_____

The next questions are about the time since your new baby was born.

45. After your baby was born, was he or she put in an intensive care unit?

- ❑ No
- ❑ Yes
- ❑ I don't know

46. After your baby was born, how long did he or she stay in the hospital?

- ❑ Less than 24 hours (less than 1 day)
- ❑ 24 to 48 hours (1 to 2 days)
- ❑ 3 days
- ❑ 4 days
- ❑ 5 days
- ❑ 6 days or more
- ❑ My baby was not born in a hospital
- ❑ My baby is still in the hospital ⟶ **Go to Question 49**

47. Is your baby alive now?

- ❑ No ⟶ **Go to Page 11, Question 60**
- ❑ Yes

48. Is your baby living with you now?

- ❑ No ⟶ **Go to Page 11, Question 60**
- ❑ Yes

49. Did you ever breastfeed or pump breast milk to feed your new baby after delivery?

- ❑ No ⟶ **Go to Page 10, Question 54**
- ❑ Yes

50. Are you still breastfeeding or feeding pumped milk to your new baby?

- ❑ No
- ❑ Yes ⟶ **Go to Page 10, Question 53**

51. How many weeks or months did you breastfeed or pump milk to feed your baby?

_____ Weeks **OR** _____ Months

- ❑ Less than 1 week

52. What were your reasons for stopping breastfeeding?

Check all that apply

- ❑ My baby had difficulty nursing
- ❑ Breast milk alone did not satisfy my baby
- ❑ I thought my baby was not gaining enough weight
- ❑ My baby got sick and could not breastfeed
- ❑ My nipples were sore, cracked, or bleeding
- ❑ I thought I was not producing enough milk
- ❑ I had too many other household duties
- ❑ I felt it was the right time to stop breastfeeding
- ❑ I got sick and could not breastfeed
- ❑ I went back to work or school
- ❑ I wanted or needed someone else to feed the baby
- ❑ My baby was jaundiced (yellowing of the skin or whites of the eyes)
- ❑ Other ——➤ Please tell us:

53. How old was your baby the first time you fed him or her anything besides breast milk? Include formula, baby food, juice, cow's milk, water, sugar water, or anything else you fed your baby.

____ Weeks **OR** ____ Months

- ❑ My baby was less than 1 week old
- ❑ I have not fed my baby anything besides breast milk

If your baby was not born in a hospital, go to Question 55.

54. This question asks about things that may have happened at the hospital where your new baby was born. For each item, circle **Y** (Yes) if it happened or circle **N** (No) if it did not happen.

		No	Yes
a.	Hospital staff gave me information about breastfeeding	N	Y
b.	My baby stayed in the same room with me at the hospital	N	Y
c.	I breastfed my baby in the hospital	N	Y
d.	I breastfed my baby in the first hour after my baby was born	N	Y
e.	Hospital staff helped me learn how to breastfeed	N	Y
f.	My baby was fed only breast milk at the hospital	N	Y
g.	Hospital staff told me to breastfeed whenever my baby wanted	N	Y
h.	The hospital gave me a gift pack with formula	N	Y
i.	The hospital gave me a telephone number to call for help with breastfeeding	N	Y
j.	My baby used a pacifier in the hospital	N	Y

If your baby is still in the hospital, go to Question 60.

55. About how many hours a day, on average, is your new baby in the same room with someone who is smoking?

____ Hours

- ❑ Less than 1 hour a day
- ❑ My baby is never in the same room with someone who is smoking

56. How do you *most often* lay your baby down to sleep now?

Check one answer

- ❑ On his or her side
- ❑ On his or her back
- ❑ On his or her stomach

57. How often does your new baby sleep in the same bed with you or anyone else?

- ❑ Always
- ❑ Often
- ❑ Sometimes
- ❑ Rarely
- ❑ Never

58. Was your new baby seen by a doctor, nurse, or other health care worker during the first week after he or she left the hospital?

- ❑ No
- ❑ Yes

59. Has your new baby had a well-baby checkup? (A well-baby checkup is a regular health visit for your baby usually at 2, 4, or 6 months of age.)

- ❑ No
- ❑ Yes

60. Are you or your husband or partner doing anything *now* to keep from getting pregnant? (Some things people do to keep from getting pregnant include not having sex at certain times [rhythm] or withdrawal, and using birth control methods such as the pill, condoms, cervical ring, IUD, having their tubes tied, or their partner having a vasectomy.)

- ❑ No
- ❑ Yes → **Go to Question 62**

61. What are your or your husband's or partner's reasons for not doing anything to keep from getting pregnant *now?*

Check all that apply

- ❑ I am not having sex
- ❑ I want to get pregnant
- ❑ I don't want to use birth control
- ❑ My husband or partner doesn't want to use anything
- ❑ I don't think I can get pregnant (sterile)
- ❑ I can't pay for birth control
- ❑ I am pregnant now
- ❑ Other → Please tell us:

If you or your husband or partner is not doing anything to keep from getting pregnant *now*, go to Page 12, Question 63.

62. What kind of birth control are you or your husband or partner using *now* to keep from getting pregnant?

Check all that apply

- ❑ Tubes tied or closed (female sterilization)
- ❑ Vasectomy (male sterilization)
- ❑ Pill
- ❑ Condoms
- ❑ Shot once a month (Lunelle®)
- ❑ Shot once every 3 months (Depo-Provera®)
- ❑ Contraceptive patch (OrthoEvra®)
- ❑ Diaphragm, cervical cap, or sponge
- ❑ Cervical ring (NuvaRing® or others)
- ❑ IUD (including Mirena®)
- ❑ Rhythm method or natural family planning
- ❑ Withdrawal (pulling out)
- ❑ Not having sex (abstinence)
- ❑ Other → Please tell us:

The next few questions are about the time during the *12 months before* your new baby was born.

63. During the *12 months before* your new baby was born, what were the sources of your household's income?

Check all that apply

- ❑ Paycheck or money from a job
- ❑ Money from family or friends
- ❑ Money from a business, fees, dividends, or rental income
- ❑ Aid such as Temporary Assistance for Needy Families (TANF), welfare, WIC, public assistance, general assistance, food stamps, or Supplemental Security Income
- ❑ Unemployment benefits
- ❑ Child support or alimony
- ❑ Social security, workers' compensation, disability, veteran benefits, or pensions
- ❑ Other ⟶ Please tell us:

_____

64. During the *12 months before* your new baby was born, what was your total household income before taxes? Include your income, your husband's or partner's income, and any other income you may have used. (All information will be kept private and will not affect any services you are now getting.)

Check one answer

- ❑ Less than $10,000
- ❑ $10,000 to $14,999
- ❑ $15,000 to $19,999
- ❑ $20,000 to $24,999
- ❑ $25,000 to $34,999
- ❑ $35,000 to $49,999
- ❑ $50,000 or more

65. During the *12 months before* your new baby was born, how many people, including yourself, depended on this income?

_____ People

The remaining questions are on a variety of topics of importance to programs for Oregon mothers and babies. Remember that your answers should be about your *most recent* pregnancy with your new baby.

66. *Before* you got pregnant with your new baby, had you ever heard or read about emergency birth control (the "morning-after pill")? This combination of pills is used to prevent pregnancy up to 3 days after unprotected sex.

- ❑ No
- ❑ Yes

If you or your husband or partner was using birth control when you got pregnant with your new baby, go to Question 68a.

67. *When you got pregnant with your new baby,* would you have used a birth control method *if you had insurance that paid for it?*

- ❑ No
- ❑ Yes

68a. *While you were pregnant,* how often did you feel down, depressed, or hopeless?

- ❑ Always
- ❑ Often
- ❑ Sometimes
- ❑ Rarely
- ❑ Never

68b. *While you were pregnant,* how often did you have little interest or little pleasure in doing things?

- ❑ Always
- ❑ Often
- ❑ Sometimes
- ❑ Rarely
- ❑ Never

69. During your most recent pregnancy, did you *receive* any of the following services? For each one, circle **Y** (Yes) if you received the service or circle **N** (No) if you did not receive the service.

Did you *receive*—

		No	Yes
a.	Help with an alcohol or drug problem	N	Y
b.	Help to reduce violence in your home	N	Y
c.	Counseling information for family and personal problems	N	Y
d.	Help to quit smoking	N	Y

70. During any of your prenatal care visits or after your most recent delivery, did a doctor, nurse, or other health care worker ever advise you to quit smoking?

- ❑ Yes, during my prenatal care visits
- ❑ Yes, after my delivery
- ❑ Yes, both times
- ❑ No
- ❑ No, I did not smoke at that time

If your baby is no longer alive or is not living with you, go to Question 74.

71. During any of your prenatal care visits or after your most recent delivery, did a doctor, nurse, or other health care worker talk with you about how secondhand smoke could affect your baby after birth?

- ❑ Yes, during my prenatal care visits
- ❑ Yes, after my delivery
- ❑ Yes, both times
- ❑ No

72. After your new baby was born, did a doctor, nurse, or other health care worker talk with you about how to prevent your baby from getting tooth decay?

- ❑ No
- ❑ Yes

73a. Do you ever put your baby to bed with a bottle?

- ❑ No → **Go to Question 74**
- ❑ Yes

73b. What do you put in the bottles that your baby takes to bed?

Check all that apply

- ❑ Water
- ❑ Something other than water

74. In the *past month,* how many days a week did you get at least 30 minutes of physical activity or exercise? (For example, walking, dancing, yard work, or sweeping.)

- ❑ Less than 1 day per week
- ❑ 1 to 4 days per week
- ❑ 5 or more days per week

75a. ***Since your new baby was born,*** **how often have you felt down, depressed, or hopeless?**

- ❑ Always
- ❑ Often
- ❑ Sometimes
- ❑ Rarely
- ❑ Never

75b. ***Since your new baby was born,*** **how often have you had little interest or little pleasure in doing things?**

- ❑ Always
- ❑ Often
- ❑ Sometimes
- ❑ Rarely
- ❑ Never

76. This question is about the care of your teeth during your most recent pregnancy. For each item, circle **Y** (Yes) if it is true or circle **N** (No) if it is not true.

		No	Yes
a.	I needed to see a dentist for a problem	N	Y
b.	I went to a dentist or dental clinic	N	Y
c.	A dental or other health care worker talked with me about how to care for my teeth and gums	N	Y

77. How long has it been since you had your teeth cleaned by a dentist or a dental hygienist?

- ❑ Within the past year (less than 12 months)
- ❑ 1 to less than 2 years (12 to 23 months)
- ❑ 2 to less than 5 years (24 to 59 months)
- ❑ 5 or more years (60 or more months)
- ❑ Never

78. Not including yourself, is there anyone in your household who smokes cigarettes, cigars, or pipes?

- ❑ No
- ❑ Yes

79. Which of the following statements best describes the rules about smoking *inside* your home now?

Check one answer

- ❑ No one is allowed to smoke anywhere inside my home
- ❑ Smoking is allowed in some rooms or at some times
- ❑ Smoking is permitted anywhere inside my home

80. What is today's date?

Month ____ Day ____ Year ____

Appendix B. PRAMS-2 survey for births in 2005

In this first part of the survey, we would like to ask some questions about YOU. Please check the box next to your answer, fill in the blank, or circle as directed.

1. What is *your* date of birth?

_____ Month _____ Day 19_____ Year

2. What is the highest level of school you have completed?
Check one answer.

- ❑ Less than 12th grade
- ❑ 12th grade or GED
- ❑ More than 12th grade

3a. What is your current marital status?
Check one answer.

- ❑ Never married
- ❑ Married
- ❑ Widowed
- ❑ Divorced
- ❑ Separated

3b. Are you living with ……?
Check all that apply.

- ❑ Your spouse or partner
- ❑ Other adult (not spouse or partner)
- ❑ No other adult(s)

4a. Have you lived in the United States all your life?

- ❑ No
- ❑ Yes → **Go to Question 5**

4b. For how many years have you lived in the United States?

- ❑ 0 to 3 years
- ❑ 4 to 6 years
- ❑ 7 to 13 years
- ❑ 14 to 20 years
- ❑ More than 20 years

5. Are you employed?
Check one answer.

- ❑ Yes, full time
- ❑ Yes, part time
- ❑ No, but I am looking for work
- ❑ No, I am not looking for work

6. Is your spouse or partner, who is living with you, employed?
Check one answer.

- ❑ Yes, full time
- ❑ Yes, part time
- ❑ No, but they are looking for work
- ❑ No, they are not looking for work
- ❑ I do not have a spouse or partner living with me

The next questions are about your health insurance and medical history.

7. What kind of health insurance do you have *right now*?
Check all that apply.

- ❑ I don't have insurance
- ❑ Oregon Health Plan (OHP), Medicaid or SCHIP
- ❑ Medicare
- ❑ Private Insurance
- ❑ Military/CHAMPUS
- ❑ Indian Health Service
- ❑ Other → Please tell us:

_____

8. During any of your health care visits *in the last 12 months*, did a doctor, nurse, or other health care worker talk with you about any of the things listed below? Please count only discussions, not reading materials or videos. For each item, circle **Y** (Yes) if someone talked with you about it, circle **N** (No) if no one talked with you about it or if it did not apply to you.

Did they….?		**No**	**Yes**
a.	Talk about physical abuse to women by their partners	N	Y
b.	Ask you if you smoked	N	Y
c.	Advise you to quit smoking	N	Y
d.	Offer you help on how to quit smoking	N	Y
e.	Talk about how drinking alcohol can affect you	N	Y

9. Have *you* ever been told by a doctor, nurse or other health care worker that you had *diabetes (sugar diabetes) during any of your pregnancies*?

❑ No
❑ Yes

10. Have *you* ever been told by a doctor, nurse or other health care worker that you had *diabetes (sugar diabetes) when you were not pregnant*?

❑ No
❑ Yes

11. Have any of your *family members* ever been told by a doctor, nurse or other health care worker that they had *diabetes (sugar diabetes)*? For each family member, circle **Y** (Yes) if they were told that they had diabetes, circle **N** (No) if they were not told, or circle **DK** (Don't Know) if you do not know.

		No	Yes	Don't Know
a.	Your two-year-old	N	Y	DK
b.	Your two-year-old's father	N	Y	DK
c.	Your two-year-old's brothers or sisters (including half brothers and sisters)	N	Y	DK
d.	Your mother	N	Y	DK
e.	Your father	N	Y	DK
f.	Your brothers or sisters	N	Y	DK

12. Have *you* ever been told by a doctor, nurse or other health care worker that you had *asthma*?

❑ No
❑ Yes

13. Have any of your *family members* ever been told by a doctor, nurse or other health care worker that they had *asthma*? For each family member, circle **Y** (Yes) if they were told that they had asthma, circle **N** (No) if they were not told, or circle **DK** (Don't Know) if you do not know.

		No	Yes	Don't Know
a.	Your two-year-old	N	Y	DK
b.	Your two-year-old's father	N	Y	DK
c.	Your two-year-old's brothers or sisters (including half brothers and sisters)	N	Y	DK
d.	Your mother	N	Y	DK
e.	Your father	N	Y	DK
f.	Your brothers or sisters	N	Y	DK

The next questions are about smoking cigarettes and drinking alcohol.

14. Have you smoked *at least 100* cigarettes in *your entire life*? (A pack has 20 cigarettes.)

❑ No → **Go to Question 16**
❑ Yes

15. How many cigarettes do you smoke on an average day *now*? (A pack has 20 cigarettes.)

❑ 41 cigarettes or more
❑ 21 to 40 cigarettes
❑ 11 to 20 cigarettes
❑ 6 to 10 cigarettes
❑ 1 to 5 cigarettes
❑ Less than 1 cigarette
❑ None (0 cigarettes)

16. Not including yourself, is there anyone in your household who smokes cigarettes, cigars, or pipes?

❑ No
❑ Yes

17. Which of the following statements best describes the rules about smoking *inside* your home *now*?

- ❑ No one is allowed to smoke anywhere inside my home
- ❑ Smoking is allowed in some rooms or at some times
- ❑ Smoking is permitted anywhere inside my home

18. In the *past 12 months*, how many alcoholic drinks did you have in an average week? (A drink is 1 glass of wine, wine cooler, can or bottle of beer, shot of liquor, or mixed drink.)

- ❑ 14 drinks or more a week
- ❑ 7 to 13 drinks a week
- ❑ 4 to 6 drinks a week
- ❑ 1 to 3 drinks a week
- ❑ Less than 1 drink a week
- ❑ I didn't drink then

19. In the *past 12 months*, how many times did you drink 4 alcoholic drinks or more in one sitting?

- ❑ 6 or more times
- ❑ 4 to 5 times
- ❑ 2 to 3 times
- ❑ 1 time
- ❑ I didn't have 4 drinks or more in 1 sitting
- ❑ I didn't drink then

20. *Since your two-year-old was born*, have you drunk more alcohol than you intended?

- ❑ No
- ❑ Yes

21. *In the past 12 months*, have you ever felt the need to cut down on drinking alcohol?

- ❑ No
- ❑ Yes

The next questions are about emotions and stress.

22a. During the *FIRST 12 months of your two-year-old's life*, was there a period of two or more weeks when almost every day you:

		No	Yes
a.	Felt sad, blue or depressed for most of the day	N	Y
b.	Lost interest or pleasure in most things you usually cared about or enjoyed	N	Y

22b. In the *PAST 12 months*, has there been period of two or more weeks when almost every day you:

		No	Yes
a.	Felt sad, blue or depressed for most of the day	N	Y
b.	Lost interest or pleasure in most things you usually cared about or enjoyed	N	Y

23. In the *past 12 months*, has a doctor, nurse, or other health care or mental health worker told you that you had:

		No	Yes
a.	Depression	N	Y
b.	Any other mental health condition	N	Y

24. In the *past 12 months*, have you taken prescription medications for:

		No	Yes
a.	Depression	N	Y
b.	Any other mental health condition	N	Y

25. This question is about things that may have happened to you in the *past 12 months*. For each item, circle **Y** (Yes) if it happened to you or circle **N** (No) if it did not.

		No	Yes
a.	A close family member was very sick and had to go into the hospital	N	Y
b.	I was very sick	N	Y
c.	I got separated or divorced from my spouse or partner	N	Y
d.	I moved to a new address	N	Y
e.	I was homeless	N	Y
f.	My spouse or partner lost his or her job	N	Y
g.	I lost my job even though I wanted to go on working	N	Y
h.	I argued with my spouse or partner more than usual	N	Y
i.	I had a lot of bills I couldn't pay	N	Y
j.	I was in a physical fight	N	Y
k.	My spouse or partner or I went to jail	N	Y
l.	Someone very close to me had a bad problem with drinking or drugs	N	Y
m.	Someone very close to me died	N	Y

26. In the *past 12 months*, did an intimate partner (current or former spouse, boyfriend, girlfriend, or date) do any of the following to you? For each item, circle Y (Yes) if it happened to you or circle N (No) if it did not.

		No	Yes
a.	Yelled and screamed at you, threatened you or made you feel unsafe	N	Y
b.	Tried to limit your contact with family or friends	N	Y
c.	Prevented you from knowing about or having access to your shared income, even when you asked	N	Y
d.	Pushed, hit, slapped, kicked, choked, or physically hurt you in any other way	N	Y
e.	Had sex with you against your will or without your consent	N	Y

27. For each of the following items, circle Y (Yes) if it describes your current situation or circle N (No) if it does not.

		No	Yes
a.	You have someone who would loan you money for food or bills if you needed it	N	Y
b.	You have someone who would help you if you were sick and needed to be in bed	N	Y
c.	You have someone who would take you to the clinic or doctor's office if you needed a ride	N	Y
d.	You have someone you can count on to listen to you when you need to talk	N	Y
e.	You have someone who shows you love and affection	N	Y

The next questions are about pregnancy and birth control.

28. Have you been pregnant *since your two-year-old was born*? (If you are currently pregnant, count this pregnancy too.)

- ❑ No → **Go to Question 30**
- ❑ Yes

29. Thinking back to *just before* your most recent pregnancy, how did you feel about becoming pregnant?
Check one answer.

- ❑ I wanted to be pregnant sooner
- ❑ I wanted to be pregnant later
- ❑ I wanted to be pregnant then
- ❑ I didn't want to be pregnant then or at any time in the future

30. Are you or your spouse or partner doing anything *now* to keep from getting pregnant? (Some things people do to keep from getting pregnant include having their tubes tied or their partner having a vasectomy, not having sex at certain times [rhythm] or withdrawal, and using birth control methods such as the pill, condoms, the patch, shots, or IUDs.)

- ❑ No
- ❑ Yes → **Go to Question 32**

31. What are you or your spouse's or partner's reasons for not doing anything to keep from getting pregnant *now*?
Check all that apply.

- ❑ I am not having sex
- ❑ I want to get pregnant
- ❑ I am pregnant now
- ❑ I am breastfeeding
- ❑ I don't want to use birth control
- ❑ My spouse or partner doesn't want to use birth control
- ❑ I don't think I can get pregnant (sterile)
- ❑ I can't pay for birth control
- ❑ Same-sex partner
- ❑ Other → Please tell us:

_____

If you or your spouse/partner are not doing anything to keep from getting pregnant now, go to Question 33.

32. What kind of birth control are you or your spouse/partner using *now* to keep from getting pregnant?
Check all that apply.

- ❑ Tubes tied or closed (female sterilization)
- ❑ Vasectomy (male sterilization)
- ❑ Pill
- ❑ Condoms
- ❑ Shot once every 3 months (Depo-Provera®)
- ❑ Contraceptive patch (OrthoEvra®)
- ❑ Diaphragm, cervical cap, or sponge
- ❑ Vaginal ring (NuvaRing®)
- ❑ IUD (including Mirena®)
- ❑ Rhythm method or natural family planning
- ❑ Withdrawal (pulling out)
- ❑ Not having sex (abstinence)
- ❑ Other → Please tell us:

_____

The next questions are about your current activities.

33. How many times *per week* do you take a multivitamin? These are pills that contain many different vitamins and minerals.

- ❑ I don't take a multivitamin at all
- ❑ 1 to 3 times a week
- ❑ 4 to 6 times a week
- ❑ Every day of the week

34. In the *past month*, how many days a week did you get at least 30 minutes of physical activity or exercise? (For example, walking, dancing, yard work, or sweeping.)

- ❑ Less than 1 day per week
- ❑ 1 to 4 days per week
- ❑ 5 or more days per week

35. In the *past 12 months*, did you ever eat less than you felt you should because there wasn't enough money to buy food?

- ❑ No
- ❑ Yes

36. Is the tap water in your home fluoridated?

- ❑ No
- ❑ Yes
- ❑ I don't know

37. How much do you weigh *now*?

_____ Pounds **OR** _____ Kilos

38. What do you think about your weight?
Check one answer.

- ❑ I am underweight
- ❑ I am about the right weight
- ❑ I am overweight

6

The next questions are general questions.

39. In the *past 12 months*, have you or your two-year-old needed or received any of the following?

		Didn't need it	Needed it, didn't get it	Needed it, got it
a.	WIC Services	DN	N	NG
b.	Food Stamps or money to buy food	DN	N	NG
c.	Other financial assistance (for example, AFDC, TANF, subsidized rent, etc.)	DN	N	NG
d.	Help with an alcohol or drug problem	DN	N	NG
e.	Help to stop smoking	DN	N	NG
f.	Help with transportation	DN	N	NG
g.	Help paying for education or job training	DN	N	NG
h.	Help with a family violence problem	DN	N	NG
i.	Help or counseling for other family or personal problems	DN	N	NG

40. What is your total *annual* household income before taxes? Include your income, your spouse's/partner's income, and any other income you may have. ***(All information will be kept private and will not affect any services you are now getting.) Check one answer.***

- ❑ Less than $10,000
- ❑ $10,000 to $14,999
- ❑ $15,000 to $19,999
- ❑ $20,000 to $24,999
- ❑ $25,000 to $29,999
- ❑ $30,000 to $34,999
- ❑ $35,000 to $49,999
- ❑ $50,000 or more

41. How many people, including yourself, depend on this income?

_____ People

In this last part of the survey are questions about your two-year-old-child.

42. What is your two-year-old's date of birth?

_____ Month _____ Day 20_____ Year

43. Is your two-year-old alive now?

- ❑ Yes → **Go to Question 44**
- ❑ No

If your child is no longer alive, we are truly sorry about your loss and extend our sympathy to you and your family. The answers you have given are especially important and could help us learn about ways to improve the health and safety of children in the future.

When did your child die?

_____ Month _____ Day 20_____ Year

If your child is no longer alive, thank you for answering these questions. Please provide today's date on page 14, Question 92.

44. Is your two-year-old living with you now?

- ❑ No
- ❑ Yes → **Go to Question 45a**

If your two-year-old is not living with you, thank you for answering these questions. Please provide today's date on page 14, Question 92.

45a. How much does your two-year-old weigh?

_____ Pounds **OR** _____ Kilos

45b. How do you know your child's weight?
Check one answer.

- ❑ Measured by health care provider (Approximate Date:_____)
- ❑ Measured by someone else (Approximate Date:_____)
- ❑ Estimated now
- ❑ Other → Please tell us:

_____

46a. How tall is your two-year-old?

_____ Feet _____ Inches

OR _____ Centimeters

46b. How do you know your child's height?
Check one answer.

- ❑ Measured by health care provider (Approximate Date:_____)
- ❑ Measured by someone else (Approximate Date:_____)
- ❑ Estimated now
- ❑ Other → Please tell us:

_____

47. How would you rate your two-year-old's health in general?
Check one answer.

- ❑ Excellent
- ❑ Very Good
- ❑ Good
- ❑ Fair
- ❑ Poor

The next questions are about breastfeeding.

48. Did you *ever* breastfeed or pump breast milk to feed your child, who is now two-year's-old?

- ❑ No → **Go to Page 8, Question 52**
- ❑ Yes

49. During the *first 12 months*, which of the following helped you to continue breastfeeding your two-year-old for as long as you did?
Check all that apply.

- ❑ Support from friends and family
- ❑ Support from my employer
- ❑ Support from a health care provider
- ❑ Convenience to me
- ❑ Cost savings
- ❑ Benefits to my child
- ❑ Benefits for myself
- ❑ My own commitment to breastfeed
- ❑ My baby was not ready to stop breastfeeding
- ❑ Other → Please tell us:

_____

50. How old was your two-year-old when he/she completely stopped breastfeeding?

_____ months old

- ❑ Still breastfeeding → **Go to Page 8, Question 52**

51. What were your reasons for stopping breastfeeding?
Check all that apply.

- ❑ I felt it was the right time to stop breastfeeding
- ❑ I went back to work or school
- ❑ There was no place to pump or feed my child at work/school
- ❑ My child weaned himself/herself
- ❑ My child became sick and could not breastfeed
- ❑ I wanted or needed someone else to feed my child
- ❑ My child's teeth came in
- ❑ My child seemed too old to breastfeed
- ❑ I became sick and could not breastfeed
- ❑ I thought my child was not gaining enough weight
- ❑ I thought I wasn't producing enough milk
- ❑ I had too many other responsibilities
- ❑ Family or friends suggested that I stop breastfeeding
- ❑ My doctor suggested that I stop breastfeeding
- ❑ I believed that my milk became less nutritious as my child got older
- ❑ Other → Please tell us:

_____

The next questions are about your two-year-old's eating habits <u>now</u>.

52. What do you think about the amount your two-year-old eats?
Check <u>one</u> answer.

- ❑ My child does not eat enough
- ❑ My child eats the right amount
- ❑ My child eats too much

53. How many days in a *typical week* does your two-year-old eat each of the foods listed below?
Circle the number of days.

Vegetables other than potatoes	0	1	2	3	4	5	6	7 days
French Fries	0	1	2	3	4	5	6	7 days
Fresh or canned fruit	0	1	2	3	4	5	6	7 days
Candy or cookies	0	1	2	3	4	5	6	7 days

54. How many days in a *typical week* does your two-year-old drink the following drinks?
Circle the number of days.

Milk	0	1	2	3	4	5	6	7 days
Fruit juices	0	1	2	3	4	5	6	7 days
Fruit drinks & Kool-Aid	0	1	2	3	4	5	6	7 days
Soda pop	0	1	2	3	4	5	6	7 days
Plain water	0	1	2	3	4	5	6	7 days
Sports drinks (example: Gatorade, PowerAde)	0	1	2	3	4	5	6	7 days

55. In the *past week*, how many days did your two-year-old eat restaurant, fast food or take-out food?
Take-out food could be from a restaurant, supermarket or deli counter.
Circle the number of days.

0 1 2 3 4 5 6 7 days

56. Have you changed the amount or type of fish your child eats, due to advice you have read, seen or heard about mercury in fish?

- ❑ No
- ❑ Yes
- ❑ I am not aware of this advice

57a. Do you currently ever put your two-year-old to bed with a bottle?

- ❑ No → **Go to Question 58**
- ❑ Yes

57b. What do you put in the bottles that your two-year-old takes to bed?
Check <u>all</u> that apply.

- ❑ Water
- ❑ Something other than water

58. Does your family eat meals together?
Check <u>one</u> answer.

- ❑ Always
- ❑ Usually
- ❑ Sometimes
- ❑ Never

59. Has your two-year-old *ever* been on WIC (the Special Supplemental Nutrition Program for Women, Infants, and Children)?

- ❑ No
- ❑ Yes, on WIC now
- ❑ Yes, but no longer on WIC

60. What has a doctor, nurse or other health care worker told you about your two-year-old's weight?
Check <u>one</u> answer.

- ❑ That s/he is underweight
- ❑ That their weight is normal
- ❑ That s/he is overweight, but that you shouldn't worry about it
- ❑ That s/he is overweight, and that it is a problem
- ❑ Other → Please tell us: _____
- ❑ They have not talked to me about my child's weight

61. What do *you* think about your two-year-old's weight?
Check one answer.

- ❑ My child is underweight
- ❑ My child is about the right weight
- ❑ My child is overweight

The next questions are about your two-year-old's health insurance and health care.

62. What kind of health insurance did your two-year-old have *12 months ago* (at 1 year of age)?
Check all that apply.

- ❑ None
- ❑ Oregon Health Plan (OHP), Medicaid or SCHIP
- ❑ Medicare
- ❑ Private Insurance
- ❑ Military/CHAMPUS
- ❑ Indian Health Service
- ❑ Other → Please tell us:

_____

63. What kind of health insurance does your two-year-old have *now*?
Check all that apply.

- ❑ None
- ❑ Oregon Health Plan (OHP), Medicaid or SCHIP
- ❑ Medicare
- ❑ Private Insurance
- ❑ Military/CHAMPUS
- ❑ Indian Health Service
- ❑ Other → Please tell us:

_____

64. *Since he or she was born*, has there ever been a time when your two-year-old did not have medical insurance?

- ❑ No
- ❑ Yes

65. Does your two-year-old have a regular health care provider *now*?

- ❑ No
- ❑ Yes

66. *Since your two-year-old was 12 months old*, how many of his/her doctor or health care provider visits were for well-child care or immunizations? (Well-child care visits are **not** for sickness or injuries.)

_____ Visits

❑ My two-year-old has not had any well-child or immunization visits. → **Go to Page 10, Question 68**

67. What kind of health care provider does your two-year-old see *most of the time* for well-child care visits?
Check one answer.

- ❑ Family doctor (family practice or general practitioner)
- ❑ Pediatrician
- ❑ Physician's assistant
- ❑ Nurse practitioner (PNP, FNP)
- ❑ Naturopath, Homeopath
- ❑ Other → Please tell us:

_____

68. Here is a list of problems some people have getting health care for their children. For each item, circle **Y** (Yes) if it was a problem for you or circle **N** (No) if it was not a problem or did not apply to you.

		No	Yes
a.	I couldn't get an appointment when I wanted one	N	Y
b.	I didn't have enough money or insurance to pay for the visits	N	Y
c.	I had no way to get to the clinic or doctor's office	N	Y
d.	I couldn't take time off from work	N	Y
e.	My child didn't have a regular health care provider to go to	N	Y
f.	I couldn't find a provider who would take my child	N	Y
g.	The services my child needed weren't available in my community	N	Y
h.	I had no one to take care of my other children	N	Y
i.	My child's health care provider didn't think s/he needed services	N	Y
j.	I had too many other things going on	N	Y
k.	Other → Please tell us: _____	N	Y

69. During any of your two-year-old's health care visits, did a doctor, dentist, nurse, or other health care worker talk with you about any of the things listed below? Please count only discussions, not reading materials or videos. For each item, circle **Y** (Yes) if someone talked with you about it or circle **N** (No) if no one talked with you about it.

		No	Yes
a.	Your child's nutrition and feeding	N	Y
b.	Using a car seat	N	Y
c.	Your child's teeth and dental health	N	Y
d.	How your child is growing and developing	N	Y
e.	Your child's vision and hearing	N	Y
f.	Things you can do to help your child learn and grow	N	Y
a.	Your child's social and emotional health	N	Y
h.	Your child's behavior	N	Y
i.	Physical activity and exercise for your child	N	Y
j.	Places you could take your child for other services	N	Y
k.	Questions or concerns you have about your child	N	Y
l.	Immunizations (baby shots)	N	Y
m.	Sleeping and naptime behaviors	N	Y
n.	How secondhand smoke could affect your child's health	N	Y
o.	How eating fish containing high levels of mercury can affect your child	N	Y
p.	Preventing lead poisoning	N	Y
q.	Your child's weight	N	Y
r.	How to care for your two year-old's Teeth and gums	N	Y
s.	The use of fluoride drops or tablets in your home	N	Y
t.	Fluoride varnish application	N	Y
u.	Assisting your child in brushing his/her teeth	N	Y
v.	Fluoride in your tap water	N	Y

The next questions are about your two-year-old's immunizations or shots against childhood diseases.

70. Has your two-year-old *ever* been given any immunizations or baby shots?
Check one answer.

- ❑ Yes, all recommended shots
- ❑ Yes, some recommended shots
- ❑ No, none

71a. Have you ever received a reminder for your two-year-old's immunization shots? A reminder could include postcards, letters or phone calls.

- ❑ No → **Go to Question 72**
- ❑ Yes
- ❑ I don't know → **Go to Question 72**

71b. From whom did you receive the reminder?
Check all that apply.

- ❑ Doctor's office
- ❑ HMO, health plan or insurance
- ❑ County health department
- ❑ Oregon Immunization ALERT
- ❑ Other → Please tell us:

_____

- ❑ I don't remember

72. Here is a list of reasons people can have to delay or prevent them from getting their child's shots or immunizations. For each item, circle **Y** (Yes) if it was ever a reason you didn't get your two-year-old's shots or circle **N** (No) if it was not a reason or did not apply to you.

		No	Yes
a.	I didn't have childcare for other children	N	Y
b.	I couldn't get an appointment	N	Y
c.	I couldn't find doctor or clinic hours when I was able to go	N	Y
d.	I was referred to other health care providers or clinics for shots	N	Y
e	I couldn't afford a health care visit	N	Y
f.	I couldn't afford the cost of shots	N	Y
g.	I wanted to wait until my child was older for some shots	N	Y
h.	My child's health care provider told us to wait on some shots that were due	N	Y
i.	I thought my child was too sick to get shots	N	Y
j.	I didn't have transportation	N	Y
k.	I didn't know *when* the shots were due	N	Y
l.	I didn't know *where* to go for shots	N	Y
m.	I couldn't take time off from work or school	N	Y
n.	I didn't think about getting the shots	N	Y
o.	I didn't get around to getting the shots	N	Y
p.	Other → Please tell us:	N	Y

_____

73. Here is a list of concerns people may have with immunizations or shots recommended for their two-year-olds. For each item, circle **Y** (Yes) if it was a concern for you or circle **N** (No) if it was not a concern for you.

		No	Yes
a.	Some shots are given too early	N	Y
b.	Too many shots are given at a time	N	Y
c.	I do not feel some of the diseases will affect my child	N	Y
d.	Shots may weaken my child's immune system	N	Y
e.	Some of the shots do more harm than good	N	Y
f.	Getting some of the childhood diseases is natural	N	Y
g.	I have religious beliefs or concerns about SOME shots	N	Y
h.	I have religious beliefs or concerns about ALL shots	N	Y
i.	Other → Please tell us: _____	N	Y

74. The flu season in Oregon usually runs September thru March of each year. Has your two-year-old ever had a flu vaccination or shot anytime during:

		No	Yes	Don't Know
a.	This year's flu season (September thru March of *this* calendar year)	N	Y	DK
b.	Last year's flu season (September thru March of *last* calendar year)	N	Y	DK

75. Has a health care provider *ever* given an immunization or baby shot to your two-year-old during a sick or urgent care visit?

❑ No
❑ Yes

The next questions are about your two-year-old's dental care.

76. Has your two-year-old *ever* been to a dentist or dental clinic?

❑ No
❑ Yes → **Go to Question 78**

77. Here is a list of problems some people can have getting dental care for their children. For each item, circle **Y** (Yes) if it was a problem for you or circle **N** (No) if it was not a problem or did not apply to you.

		No	Yes
a.	I didn't have enough money to pay for the visit	N	Y
b.	I didn't have insurance to pay for the visit	N	Y
c.	I couldn't locate a dentist who would see my child	N	Y
d.	I couldn't get an appointment with a dentist	N	Y
e.	A health care or dental care provider told me my child was too young to see the dentist	N	Y
f.	I didn't think my child needed to go	N	Y
g.	I had no one to take care of my other children	N	Y
h.	I had too many other things going on	N	Y
i.	Other → Please tell us: _____	N	Y

78. Does your two-year-old receive fluoride drops or tablets *daily*?

❑ No
❑ Yes

The next questions are about your two-year-old's medical history.

79. Please circle Y (Yes) or N (No) for each of the following.

Does your two-year-old have . . . ?

a. A diagnosis of a chronic condition such as:

	No	Yes
(1) Asthma	N	Y
(2) Autism	N	Y
(3) Cleft palate	N	Y
(4) Down syndrome	N	Y
(5) Cerebral palsy	N	Y
(6) Other chronic condition	N	Y
Please tell us:_____		

b. An ongoing need (lasting six months or more) for:

(1) Specialty health care	N	Y
(2) Behavioral health or mental health services	N	Y
(3) Physical therapy	N	Y
(4) Occupational therapy	N	Y
(5) Speech services	N	Y

c. An ongoing need (lasting six months or more) for:

(1) Medication	N	Y
(2) Home health services	N	Y
(3) Special diet	N	Y
(4) Use of assistive devices	N	Y
(5) Durable medical equipment	N	Y

80. Please circle Y (Yes) or N (No) for each of the following.

Does your two-year-old.....?	**No**	**Yes**
b. Need more time at doctor's visits than usual for children his/her age	N	Y
c. Need more frequent office visits than usual for children his/her age	N	Y
d. Need or use more medical or mental health services than usual for children his/her age	N	Y
e. Currently need or use medicine (other than vitamins) prescribed by a doctor	N	Y
f. Seem limited or prevented in any way in his or her ability to do the things most two-year-olds can do	N	Y
g. Experience any kind of emotional, developmental or behavioral problem for which he/she needs treatment or counseling	N	Y

81. Early Intervention Services is a State program that offers free services to children age 3 and under who have developmental problems or delays. Has your two-year-old *ever*....?

	No	**Yes**
a. Been referred for Early Intervention Service	N	Y
b. Been screened or tested for Early Intervention services	N	Y
c. Been found eligible (qualified) for Early Intervention services	N	Y
d. Received Early Intervention services	N	Y

If your two-year-old has never been referred for Early Intervention, please go to Question 83.

82. Below are reasons why children who were referred for Early Intervention may not receive services. For each item, circle Y (Yes) if it was a reason for your two-year-old or circle N (No) if it was not.

	No	**Yes**
a. I don't think my child needs Early Intervention services	N	Y
b. My child is getting private services instead	N	Y
c. I don't know how to get my child tested	N	Y
d. The testing process is too confusing and complicated	N	Y
e. My child was tested but not found eligible	N	Y
f. My child was tested and is eligible. We have been waiting ____ months for services	N	Y
g. There are no openings right now	N	Y
h. I can't get time off to take my child	N	Y
i. I don't have childcare for my other kids and can't take them with us	N	Y
j. I don't have transportation	N	Y
k. We moved	N	Y
l. Other → Please tell us: _____	N	Y

The next questions are about your two-year-old's current activities.

83. Do you have regular childcare arrangements for your two-year-old *now*?

❑ No → **Go to Page 14, Question 86**
❑ Yes

84. What are your childcare arrangements?
Check all that apply.

- ❑ Childcare in non-relative's home
- ❑ Childcare center
- ❑ Paid care in your home
- ❑ Other older children
- ❑ Child's grandparent(s)
- ❑ Other relative(s)
- ❑ Baby-sitter/friend/neighbor
- ❑ Other → Please tell us:

_____

85. What is the average number of hours *per week* that your two-year-old stays in childcare?

- ❑ Less than 10 hours per week
- ❑ 10 to19 hours per week
- ❑ 20 to 29 hours per week
- ❑ 30 to 39 hours per week
- ❑ 40 hours or more per week

86. In a *typical day*, how much time does your two-year-old spend watching TV or videos?
Check one answer.

- ❑ None
- ❑ Less than 2 hours
- ❑ 2 hours or more

87. Are you concerned about the amount of TV your two-year-old watches?

- ❑ No
- ❑ Yes

88. In a *typical week*, how often do you, or someone else in your household, read a book or story to your two-year-old?
Check one answer.

- ❑ Every day
- ❑ At least three times a week
- ❑ Once a week
- ❑ Less than once a week
- ❑ Never

89. How many times in the *past week* have you or any family member taken your two-year-old on any kind of outing, such as to a park, playground, library or other children's program or activity?

- ❑ None
- ❑ 1 to 3 times
- ❑ 4 to 5 times
- ❑ 6 or more times

90. About how many hours a day, on average, is your two-year-old in the same room with someone who is smoking?

_____ Hours

- ❑ Less than 1 hour a day
- ❑ My two-year-old is never in the same room with someone who is smoking

91. Is there a TV in your two-year-old's bedroom?

- ❑ No
- ❑ Yes

92. What is today's date?

_____ Month _____ Day 20_____ Year

Thank you for taking the time to answer these questions. Your answers are important and could help us learn about ways to improve the health of children in the future.

Please use this space for any additional comments you would like to make about the health of mother's and their children in Oregon.

Appendix C. Multicollinearity assessment with variable inflation factors

Variable inflation factors for predictor variables		
	Tolerance R-squared	Variable inflation factor
Parity	0.0903	1.10
Pregravid BMI Category	0.0411	1.04
Maternal age	0.1281	1.15
Maternal race/ethnicity	0.0413	1.04
Breastfeeding	0.0226	1.02
Physical activity	0.0336	1.03
Income based on FPL	0.121	1.14
Household food security status at Time 2	0.0876	1.10
Maternal depressive symptoms	0.0932	1.10

Appendix D. Assessment for confounding

Assessment for Confounding: Associations between high weight retention and CSHCN status while controlling for one other predictor variable			
	OR (95% CI)	p	% change
Bivariate model Child's health care needs			
Outcome variable: PPWR Main predictor variable: CSHCN	1.85 (1.01 – 3.39)	0.046	referent
Model 1: CSHCN + Parity			
	1.88 (1.04 – 3.40)	0.037	1.6% increase
Model 2: CSHCN + Pregravid BMI category			
	1.81 (0.978 – 3.37)	0.059	2.16% decrease
Model 3: CSHCN + Maternal age			
	1.97 (1.07 – 3.62)	0.030	6.49% increase
Model 4: CSHCN + Maternal race/ethnicity			
	1.88 (1.03 – 3.45)	0.041	1.6% increase