Factors associated with french fry consumption among two year olds in the 2005 Oregon PRAMS-2 cohort

By
Patrick G. Hudson

A Thesis

Presented to the Department of Public Health and Preventive Medicine
and the Oregon Health & Science University
School of Medicine
in partial fulfillment
of the requirements for the degree
Master of Public Health

July 2010

Department of Public Health and Preventive Medicine
School of Medicine
Oregon Health & Science University

CERTIFICATE OF APPROVAL

This is to certify that the Master's thesis of
Patrick G. Hudson
has been approved

William Lambert, PhD, Chair

Kenneth Rosenberg, MD, MPH

Rochelle Fu, PhD

Contents

Abstract **vi**

1 Introduction **1**
1.1 Background and Significance 1
1.2 Preliminary Studies 12
1.3 Research Question and Specific Aims 14

2 Methods **16**
2.1 PRAMS 16
2.2 Study Data Management and Analysis 20

3 Results **28**
3.1 Distribution of French Fry Consumption 28
3.2 Sample Characteristics 29
3.3 Univariate Associations 29
3.4 Multivariate Model 36

4 Discussion **38**
4.1 Summary of Findings 38
4.2 Comparisons to Previous Work 39
4.3 Implications 42
4.4 Strengths and Limitations: Causality, Bias, Chance, and Confounding . . . 43
4.5 Future Research 47
4.6 Public Health Practice 48

5 Summary and Conclusions **50**

A Sample Statistical Commands **58**

B PRAMS and PRAMS-2 Surveys **59**
B.1 PRAMS 59
B.2 PRAMS-2 68

List of Tables

2.1 Measurement and Coding of Variables 23

3.1 Selected Characteristics 29
3.2 Univariate Associations 31
3.3 Multivariate Logistic Model 37

Acknowledgments

I would like to acknowledge my thesis committee for their assistance, patience, and encouragement: Drs. Kenneth Rosenberg, Rochelle Fu, and William Lambert. Dr. Rosenberg suggested the topic and provided access to the data. Alfredo Sandoval provided the data files and advice on weighting. PRAMS is a project of the Oregon Public Health Division and Centers for Disease Control and Prevention.

My studies as a MPH student were generously supported by the David Family scholarship, the Franz Stenzel M.D. and Kathryn Stenzel scholarship, and the Community Health Partnership's Laurence R. Foster Memorial scholarship.

Abbreviations

AI/AN, American Indian or Alaskan Native

Asian/PI, Asian or Pacific Islander

BC, Birth Certificate

BMI, Body Mass Index

CBPR, Community-based Participatory Research

CI, Confidence Interval

C-section, Cesarean Section

DP, Dietary Pattern

FPL, Federal Poverty Level

HDP, Healthy Dietary Pattern

NH, Non-Hispanic

OR, Odds Ratio

aOR, Adjusted Odds Ratio

PDB, Prudent Dietary Pattern

PRAMS, Pregnancy Risk Assessment Monitoring System

PRAMS-2; PR-2, Pregnancy Risk Assessment Monitoring System Two Year Old Survey

SES, Socioeconomic Status

SSBs, Sugar Sweetened Beverages

Sxs, Symptoms

VBAC, Vaginal Birth After Cesarean

WDP, Western Dietary Pattern

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

Wks, Weeks

Abstract

Background

French fries ("fries," "french-fried potatoes," or *pommes frites*) are the most common vegetable fed to 15 to 24 month olds in the United States, yet are energy dense and a fat-laden food. French fries are part of a socioeconomic pattern of poor diets, inactivity and obesity. The prevalence of french fry consumption will be estimated and risk factors evaluated.

Methods

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a population level surveillance project and PRAMS-2 is its longitudinal follow-back survey. The Oregon birth year cohort of 2005 is used (n=1046). Weighted analyses were conducted to estimate the prevalence of french fry consumption and to identify significant risk factors, and then create a multivariate model.

Results

Overall, 67% of 2 year olds in Oregon in 2007 consumed french fries in a typical week at least once. French fry consumption varied among maternal race/ethnicity groups ($p<0.01$). Markers of low socioeconomic status were significantly associated with consumption of french fries. In a multivariate model, consumption of french fries was associated with no breastfeeding at 10 weeks of age (adjusted OR=1.95 95% CI: 1.16–3.41), non-normal maternal BMI ($p=0.02$), unintended pregnancy (aOR=1.72, 95% CI: 1.00–2.93), and partner-related stress (aOR=2.06 95% CI: 1.16–3.65).

Conclusions

French fry consumption is very common in two year olds, and is related to maternal BMI, maternal partner-related stress, lack of breastfeeding, and pregnancy intention. French fry consumption may be part of a larger socioeconomic context and dietary pattern that is associated with increased BMI, and increased risk of morbidity and mortality. This thesis is notable for its longitudinal nature and representative sampling method, but is limited by potential unmeasured and residual confounding. Traditional maternal health programs should continue to intervene in the prevention of unhealthy maternal weights and of unintended pregnancy, and should continue efforts at encouraging breastfeeding. Potential policy responses include limiting marketing to children, in addition to encouraging providers to educate parents about age appropriate healthy diets.

Chapter 1

Introduction

1.1 Background and Significance

Between the ages of 15 to 24 months, french fries ("fries," "french-fried potatoes," or *pommes frites*) are the most common vegetable fed to young children in the US [1] during an era of a childhood obesity epidemic [2, 3]. French fries are within the top 15 food items contributing to fat and calorie intake in the American adult diet [4]. Parents influence their child's tastes through many mechanisms [5]. For example, parents directly provide food to the children, serve as role models for eating behaviors, and contribute to the environment around their child. The development of dietary habits is likely influenced by social, cultural, and biological factors as children grow. Dietary patterns fit into a larger sociological paradigm of class and health.

1.1.1 Obesity

Childhood obesity is especially harmful, compared to adult onset obesity, because of its long-term and cumulative negative health consequences [6]. It increases the risk of many conditions in childhood and these risks continue as an adult. Currently, medical treatments are generally ineffective as a "cure" for obesity, even childhood obesity. Thus, childhood obesity is likely best solved through environmental modification and other public health measures such promotion of smaller and healthier diets and of increased physical activity [6].

Childhood obesity is reaching epidemic proportions, perhaps even pandemic [2, 7]. In the US alone, there are nine million overweight six year old children. This burden falls disproportionately upon minorities in the US, with the overall burden quickly growing [3]. Some frame the childhood obesity epidemic as part of a larger societal shift with parents spending more time working outside of the home, and children's screen time in front of computers, video games, and TV increased [7]. This trend has been seen in Oregon as well, with 16.7% two-year olds spending two hours or more per day watching TV or videos [8]. TV and video screen time is associated with higher BMI, and greater consumption of fried foods among adolescents [9].

Obesity is harmful to health and well being. It is estimated that 65% of adults in the US are overweight or obese today. Obesity in adults is defined as a body mass index (BMI) $\geq$30 kg/m^2 and overweight as a BMI between 25 and 30 for adults [3]. For children, there are various measurements of obesity, but a generally accepted measure is a BMI at 95^{th} age and sex specific percentile or higher.

Obesity is a large contributing factor to excess mortality today in the US. It increases the risk of cardiovascular disease, type 2 diabetes mellitus, osteoarthritis, some cancers, and many other medical conditions [10]. Childhood obesity in particular taxes psychosocial well-being as well [3]. There is limited understanding of the natural history of obesity and its progression throughout the lifespan, but it is thought that obesity can be prevented at the societal level with sound public policy that is given priority as a national goal [2].

The risk factors for childhood obesity start in the womb. For example in one study, a maternal BMI in the obese category during the first trimester of pregnancy increased the child's risk of obesity throughout early childhood, including at 2 years old (aOR: 2.28 compared to normal BMI) and up through age 4 at the end of the follow-up period [11]. Obesity appears to have a genetic component and is highly heritable [12]. In a more sociological paradigm, in the US, obesity is often associated with poverty [13]. Thus the risk factors for obesity appear to be related to both social and biological factors.

Total energy consumption may not be as important as fat content in predicting weight gain from dietary behavior [14]. This suggests that the relationship between food intake and body mass is complex, and research may need to examine items with more specificity than

macro-nutrients. French fries, for example, as a specific food item are the tenth largest contributor to calories for the diets of US adults and are the 12^{th} largest contributor to total fat intake, as previously described [4]. Consumption of french fries specifically were associated with weight gain among adult women but not men in one prospective cohort study, which controlled for many SES and other dietary factors [14]. This finding illustrates the complex and sometimes paradoxical relationship between food intake and obesity.

1.1.2 Energy Density

Foods that are relatively high in calories per unit of mass are considered energy dense [13]. Energy density (often measured in MJ/kg) is inversely related to energy cost (e.g., $/MJ) so that energy dense foods with refined grains, added sugar, and added fats are often the lowest cost option. Furthermore, consumption of energy dense foods is associated with a higher absolute energy intake. Finally, poverty and food insecurity is related to small food budgets, low fresh fruit and vegetable consumption, and generally low quality diets [15]. It is hypothesized that this cost property of energy density mediates the positive association between poverty and obesity. French fries are a starchy vegetable, and fall into this category of an energy dense food item [16]. While frying potatoes may not contribute to nutritional losses, it does increase the energy density of the potatoes.

In a recent nationally representative sample conducted in 1998, 24.6% of 4 to 8 year olds (the youngest age group in the study) had eaten at a fast food restaurant on a typical day [17]. Compared to those children who did not eat fast food, fast food eaters had eaten more total calories, more energy per gram (i.e., more energy dense food), more sugar-sweetened beverages, and fewer fruits and non-starchy vegetables. When comparing days fast food was eaten to when it was not, the same children ate more total calories on which they had fast food. Similar patterns have been demonstrated in adults [18].

1.1.3 Breastfeeding

Breastfeeding is a great action for a mother to take for many reasons and is the natural form of nutrition for an infant [3, 19, 20]. Breastfeeding reduces the risk of many diseases including acute otitis media, gastroenteritis, lower respiratory tract infections, asthma (in

young children), obesity, type 1 and 2 diabetes, childhood leukemia, and sudden infant death syndrome [20]. Breastfeeding is associated with a lesser risk of childhood obesity [19, 20]. Many prospective, large cohort studies have shown the protective nature of breastfeeding against obesity, even into adulthood [21–23]. After adjusting for confounders, breastfeeding reduced the risk of childhood obesity by 25% and there was an apparent dose-response effect with duration of breastfeeding [19].

Breastfeeding practices may be improved by education and support, but there are still many barriers today to breastfeeding [3]. These barriers include lack of familial and medical support, including anti-breastfeeding hospital policies, such as the promotion of formula and the separation of mother and newborn [3, 24]. In Oregon, mothers least likely to breastfeed for greater than 10 weeks are those who are unmarried, earn $30,000 or less per year, and who *had* any insurance at the time of delivery [25]. Persistent smoking mothers are also more likely to stop breastfeeding sooner [26]. Non-smokers had the lowest probability of weaning too soon compared to all types of smokers, including those who quit during pregnancy and light smokers.

The optimal duration of breastfeeding has been debated, but current recommendations of the American Academy of Pediatrics call for exclusive breastfeeding for the first six months of life of an infant [23]. Breastfeeding an infant may be medically contraindicated by the mother's health status, such as having HIV, using street drugs, or other conditions. Smoking is not a contraindication for recommending breastfeeding. Pre-term, low-birth weight and infants with hematologic disorders should receive iron supplementation in addition to breast milk. However, some infants may want solid food as early as four months in individual cases. While exclusive breast feeding for at least six months is recommended, there is not a recommended age of cessation [27].

Oregon has an exceptionally high rate of breastfeeding initiation and duration among US states. Kogan et al. [28] analyzed data from the National Survey of Children's Health in 2003 and 2004; when adjusted for SES, smoking, and other factors, 84.2% of mothers in Oregon initiated breastfeeding and 54.0% breast-fed for at least six months. Compared to other regions, the Western US has the highest rate of breastfeeding. An extreme example is that a child in Louisiana has 4.50 times the odds (adjusted) of not breastfeeding at six

months compared to a child in Oregon (95% CI: 3.30–6.16).

From an early age, breastfeeding influences infant food tastes, in that infants who were breastfed are more likely to try novel foods in general, and to also be more accepting of fruit when their mother also had eaten fruit [29]. After being weaned, infants continue to eat more of the foods that they were exposed to, demonstrating the robustness of this effect. This suggests that breastfeeding has a long-term impact upon the formation of dietary preferences, similar to its long-term impact upon the reduction of many diseases [20].

1.1.4 Unintended Pregnancy

Right before becoming pregnant, a mother may have desired to become pregnant, or may not have for a variety of reasons. This concept of pregnancy intention is a long used measure for public health researchers to measure the psychological, cultural, and social environment that the infant is born into [30].

Most commonly, pregnancy intention is assessed retrospectively and is often classified dichotomously as 'intended' or 'unintended'. Intended means that the pregnancy was wanted when it occurred or was desired sooner than that. Conversely, unintended means that the pregnancy was unwanted entirely, or occurred sooner than desired. More recently, another classification scheme has been used that further separates out intention into three categories [31]. Under this schema, an 'intended' pregnancy was wanted when it occurred, a 'mistimed' pregnancy was too late or soon, and an 'unwanted' pregnancy was not desired now, nor in the future.

Pregnancy intention has been linked to important health outcomes and some demographic features. From a compilation of PRAMS surveys from multiply states, risky maternal behaviors were most associated with unwanted pregnancy status, followed by mistimed, relative to intended [32]. Infants born to mothers who described the pregnancy as unwanted or mistimed are more likely to have compromised health, and infants from unwanted pregnancies are less likely to have had any breastfeeding, as well [33].

Nelson-Munson [31] found the odds of non-exclusive breastfeeding for eight weeks or more were significantly greater for mistimed pregnancies compared to unwanted pregnancies (adjusted OR=1.99, 95% CI: 1.00–3.96) and for intended pregnancies versus unwanted

pregnancies (adjusted OR=2.45, 95% CI: 1.27–4.72), using the same 2005 Oregon PRAMS survey data as this current thesis. ORs were adjusted for maternal age, marital status, rurality, smoking and postpartum depressive symptoms.

1.1.5 Food Insecurity

Food insecurity began as a macro-level concept, but more recently has been used to capture the family- or individual-level effects of food provision and access [34]. In this paradigm, there is an emphasis on local disparities within communities relating to food insecurity, and an emphasis on the difference between food needs as compared to food choice, and how this relates to household and individual coping mechanisms. At a practical level, food insecurity means not having enough food to eat, within some time period. This fear of hunger or lack of food may be an acute biological phenomena in addition to being a social state, in extreme cases.

Obesity is inversely associated with food security in the US today [35]. Those in poverty in the US are eating too many or the "wrong" (low nutrient) type of calories, as opposed to eating insufficient calories overall (as is the case with acute hunger). This modern obesity–food insecurity relationship is likely mediated by energy dense foods, which are low cost [15]. Consumption of energy dense foods, such as french fries, thus maybe related back to both obesity and food insecurity [36].

Fifteen percent of American households experienced food insecurity in 2008 [37]. One third of those households experienced 'very low food security' where there were reductions in food intake and changes in eating patterns. Food insecurity is a specific form of household poverty, since both are a lack of economic resources, yet they are not entirely overlapping. For example, among households above 185% of the Federal Poverty Level (FPL), 10% still experienced food insecurity in 2008. In Oregon, averaged between 2003 and 2005, 11.9% of households were food insecure [37]. Between the 2003-05 and 2006-08 sampling frames, Oregon had the second highest increase in food insecurity (2.7%) among states. The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is one attempt to increase food security for mothers and their children, perinatally and in early childhood. Among households participating in the WIC program, 46% were still food insecure even with

this food benefit counted [37]. Both food insecurity and WIC participation are measured in the current thesis.

Among the current cohort used in this thesis (2005 Oregon PRAMS), Yates [38] demonstrated that food insecurity was associated with poverty status, WIC participation, ruralness of county, intimate partner violence and other stressful life events in a multivariate model. Specifically, Yates [38] found that WIC participation during pregnancy was associated with 2.98 times (95% CI: 1.20–6.74) increased odds of food insecurity while controlling for all significant predictors. Earlier, Wales-Tillotson [39] found that, among Hispanic mothers in Oregon, mothers not enrolled in WIC had 1.84 times the odds of non-exclusive breastfeeding at 10 weeks compared to those enrolled in WIC (2000 and 2001 PRAMS data, OR adjusted for acculturation, maternal age and smoking). Thus, among Hispanic mothers, WIC enrollment was associated with a decreased duration of breastfeeding.

1.1.6 Perinatal Stressors

Health is shaped by the social environment in which groups and individuals reside [40]. Dietary and exercise behaviors at the individual level, for example, are more proximate causes of disease than social factors. These distal social factors may be conceptualized as a cause of the disease state. However, the 'modern' school of epidemiology may still consider social conditions proxy measures for the true causal agent of disease. Risk factors at the individual-level should at a minimum be placed in context of the social environment, even if the social factors are the fundamental cause.

Low socioeconomic status (SES) in itself is related to many poor health outcomes, but stressful life events in themselves are also associated with poor health [40]. Stressful life events are taxing to the individual in a number of ways, including the biologic stress response, and furthermore the probability of experiencing a negative consequence as a result of the stressful event increase with decreased SES. Conversely, social support is a buffer between negative events and negative consequences.

There are many stressful life events that may occur in life, including during pregnancy. The PRAMS questionnaire asks about the occurrence of 13 stressful events, and these may then be classified into four conceptually unique constructs [41]. These constructs were

created using principal component analysis, a method where axes are created quantitatively, and the variables are tested for 'loading' on these axes. Multiple stressful life events may be interrelated, and stressful life events may affect a women's decision to engage in risky health behavior, such as smoking. More speculatively, stressful life events may affect dietary decisions as well, directly or indirectly.

1.1.7 Psychosocial Environment

The group level social environment is distinct from the psychological at the individual level [40]. Prenatal depression is a prevalent condition within the psychosocial aspects of motherhood, affecting an estimated 25% of women [42]. Pregnancies to depressed mothers are at an increased risk for a number of birth complications including placental abnormalities, preeclampsia, spontaneous abortion, and prematurity. Later on, infants born to depressed mothers are more likely to express a negative affect, and be at risk of delayed social and emotional development as toddlers.

Postpartum depressive symptoms are also prevalent, ranging from an 80% prevalence of mild 'baby blues' to 13% for depression [43]. A biological mechanism for postpartum depression is not suspected (as is the case for prenatal depression). Rather a socialization mechanism is thought to occur. Psychosocial factors are the largest predictors for postpartum depression with social support being protective, and stressful life events being especially harmful.

However, in the previously described study by Yates [38] who also analyzed the 2005 Oregon PRAMS cohort, food insecurity was associated with poverty status, WIC participation, ruralness of county, intimate partner violence and other stressful life events in a multivariate model. Maternal depression and food insecurity were not significantly associated in the multivariate model.

1.1.8 Racial and Ethnic Disparities in Maternal and Child Health

The biological and genetic differences among races in the US fail to account for the sizable differences in health outcomes among the groups [44]. Thus, social factors are thought to be more distal causes of this racial disparities. There are racial disparities at many stages

of life; for example, the infant mortality rate for African Americans is twice that for Whites [44]. Yet, race itself is not a very meaningful risk factor in the absence of the social context of race, including SES [40]. Educational attainment and income are correlated and together explain some of the differences in health status among the racial and ethnic groups [44].

SES is a construct of absolute and relative wealth in both economic and social terms [45]. SES is a complex status and any specific construct may fail to capture the variation of interest, especially in how it relates to the health outcome of interest. Household income and maternal education in combination, common measures among health data, are acceptable but still incomplete, measures of SES in the US among populations with racial/ethnic diversity [45].

1.1.9 French Fries

French fries are a specific food item, unique from other forms of potatoes and qualitatively different from most vegetables in how it is prepared and how it is eaten, and french fries may serve as a proxy measure for certain lifestyle or socioeconomic context. The Western Dietary Pattern (WDP) has emerged from exploratory factor analyses of food frequencies as a pattern filled with processed foods, meat, refined grains, often french fries, and a lack of fresh fruits and vegetables [46–48]. Each study or cohort may have a different definition of the WDP, but those items appear often as common themes. The WDP in turn is related to higher calories intake, lower income, lower physical activity, and increased screen time [46]. Some studies have also related it to higher BMI [49].

A cohort in Australia, followed from birth, at 14 years old showed two patterns of eating ('Healthy' dietary pattern [WDP] versus WDP) via factor analysis using a food frequency questionnaire [46]. Those whose food frequency results showed HDP had high fruit and vegetable intake, as well as frequent consumption of whole grains, legumes and fish. In contrast, the WDP contained many refined grains, fatty and processed foods, and frequent consumption of french fries, soft-drinks, and take-away food. The WDP, in turn was significantly associated with television and video watching, being in a single-parent household, lower income, a smoking parent, and a increased calorie intake while adjusting for all of the variables in the model including BMI for age, physical activity, and maternal

education. Low income, low education households are more likely to follow a pattern of french fry consumption along with other high-fat, processed foods and lack of physical activity.

Paradis et al. [49] observed similar dietary patterns in a cross-sectional study of adults in Quebec, Canada. Here, the WDP was characterized by greater consumption of french fries, red meats, refined grains, and soft-drinks, among other foods. In contrast to the WDP, the 'Prudent' pattern (analogous to the HDP) was associated with vegetables, fish, eggs, coffee, and wine among other items. Obese participants were more likely to follow the WDP even when adjusted for age, gender and energy intake. The WDP participants were on average younger than the 'Prudent' eaters. Within the WDP, those with higher scores for the WDP had a greater BMI, waist girth, waist-to-hip ratio and fat mass than those with lower scores. Unlike the study with Australian adolescents, the Canadian study was cross-sectional and temporal directions cannot be established.

In an analysis of the Nurses Health Study cohort data, Heidemann et al. [48] found that a WDP which included french fries was associated with increased mortality. French fries loaded strongly onto the WDP as compared to the Prudent dietary pattern, and in turn, the WDP was independently associated with significantly increased risk of cardiovascular, cancer, and all-cause mortality as this WDP score increased. Mortality was 21% higher in the highest quintile of the WDP was compared with the lowest quintile (95% CI: 12% to 32%). In this study, the first food frequency questionnaire was administered in 1984 and the last one in 1998.

The WDP is associated with morbidity from specific diseases, in addition to simply mortality. Men with a WDP were at an increased risk for chronic obstructive pulmonary disease (COPD) in a prospective cohort [50]. In this study among health professionals starting in 1986, factor analysis revealed a WDP that included grains, cured and red meats, desserts, and french fries. Multivariate models for risk that were adjusted for age, energy intake, smoking status and pack-years, race/ethnicity, physician visits, US region, BMI, physical activity and multivitamin use, showed that the highest versus the lowest quintile for the Western score had 4.56 times the risk of developing COPD (95% CI: 1.95–10.69). Like the other studies of DP, the Prudent pattern was inversely associated the risk of

COPD incidence. In women, a nested case-control study found that adult breast cancer cases were more likely to have had consumed french fries when they were 3 year old children than controls [51]. Another analysis from the the Nurses Health Study found that french fry consumption was associated with an increased risk of developing type 2 diabetes after adjustment for BMI, other dietary factors and intake, and for family history [47].

In younger children, the relationship of french fry consumption to BMI is less clear. A prospective cohort study in Sweden, french fry and fried potato consumption at 2.5 years old (30 months) was significantly associated with a *lower* BMI at age 5 years old [52]. French fry and fried potato consumption of 1–2 times per week was associated crudely with 0.77 times the odds of overweight or obese BMI compared to less than once per week consumption (95 % CI: 0.64-0.92). In a model adjusted for others foods and for maternal and paternal education level, and maternal and paternal BMI, french fry and fried potato consumption of 1–2 times per week was still negatively associated with overweight or obese BMI at age 5 years (adjusted OR=0.75, 95% CI: 0.62-0.92). Yet in contrast still, a cross-sectional study in a Canadian First Nations school found that 8–13 year olds who were overweighed consumed a significantly greater mass of french fries per daily than normal weight children [53]. This trend was observed using data from 1994, 1998, and 2002.

Batty et al. [54] examined possible long term correlates of french fry consumption; verbal reasoning ability at 10 years of age was inversely associated with french fry intake in adulthood, even after adjustment for SES. That is, children with higher mental ability scores ate french fries less frequently as an adult. These mental ability scores were also associated with physical activity.

From a more traditional macro-nutritent perspective, trans-fats (unsaturated trans-isomer fatty acids) have been measured in large quantities in french fries from US McDonald's fast food restaurants [55]. French fries are often fried in partially hydrogenated vegetable oils, which contain about 25% trans fat. A large serving of french fries in the 2004 or 2005 sampling period contained between 5 and 10 grams of trans fatty acids. Daily intake of 5 grams of trans-fats is associated with a 25% increased risk of ischemic heart disease, among other adverse health risks [55]. Since this study was been done, some US cities and states have banned the use of trans-fats by restaurants [56]. This legislative action had been

successful at reducing the potential for trans-fats exposure. In New York City, the prevalence of restaurants using trans-fats has fallen from 50% to less than 2%, and restaurants have not replaced trans-fats with saturated fats [57]. Specifically, total saturated fat plus trans-fat in french fries has decreased by more than half since the legislation in New York City, a powerful demonstration of the impact of public health policy.

Additionally, french fries contain acrylamide, a probable human carcinogen [58]. Acrylamide is formed in starchy foods when they are fried or baked. This reaction appears to be temperature and duration dependent. Increased risks of ovarian, endometrial, renal cell, estrogen receptor-postive breast cancer have been associated with dietary acrylamide intake. In a sample of adolescents in Brazil, french fries were the top contributor of dietary acrylamide, contributing 60% of total acrylamide exposure [59].

1.2 Preliminary Studies

Among many studies using data from the Oregon PRAMS survey, only four have used the PRAMS-2 follow-back survey data [60–63]. Among the four, the analyses of sugary drink consumption and of screen time closely parallels the proposed study. The four PRAMS-2 analyses examine:

- The complex relationship of maternal smoking and relapse [60],
- Heightened food insecurity in mothers of children with special health care needs [61],
- The consumption of sugary beverages associated with low income and eating out [62], and
- Screen time exposure of two-year olds and its associations [63].

In the analysis by Raveche and Rosenberg [62], 50.8% of 25 month olds were found to drink sugary drinks at least once per week . Consumption of sugar sweetened beverages (SSBs) was defined as drinking either fruit drink/Kool-Aid or soda at least one day in a typical week. SSBs were measure in the same question group as french fry consumption in the PRAMS-2 survey. Potential risk factors included variables measured in both PRAMS and PRAMS-2, in addition to the birth certificate variables. In a multivariate model controlling for maternal education level and breastfeeding at 10 weeks, the significant predictors of

child SSB consumption were: Hispanicity (vs. NH White), household income of 185% FPL or less, maternal age at birth of 25 of younger, obese or overweight maternal pre-pregnancy BMI (vs. normal/underweight), child TV watching time of two hours per week or greater, eating out including at fast food, and rural county of residence.

The analysis by Rosenberg, Sandoval, Hedberg, Cadwell, and Oh [63] found 19.6% of two year olds had two or more hours of viewing time in a typical day, using the birth year cohorts of 2004 and 2005. In a multivariable model, greater screen time was associated with having a television in the child's bedroom, NH black maternal race/ethnicity (vs. NH white), going on fewer than four outings per week with the child, and was inversely associated with placement in a child care center (vs. no child care). The multivariate model adjusted for maternal age, maternal education, frequency of books and stories read to child.

The prevalence of french fry consumption in young children has also been examined recently in an even younger age group. In a community based sample of employed mothers in North Carolina, 22.2% reported their eight month old infant consumed french fries in the past 7 days [64]. In this prospective cohort study, french fry consumption by the 8 month olds was significantly associated with Black maternal race/ethnicity, maternal education less than college, non-married or non-partnered status, household poverty, and various employment characteristics in simple logistic regression. In a multivariate model where age, maternal ethnicity, maternal education, maternal marital/partner status, household poverty, and employment characteristics where tested for inclusion, less than a college education leveland non-married or non-partnered statuswhere the only two significant predictors of french fry consumption. Breastfeeding history and maternal BMI were not included as potential predictors.

In the Swedish cohort study, 68.8% of 2.5 year olds (30 month olds) had consumed "Fried potatoes/french fries" at least once a week. This definition of fried potatoes/french fries included pan-cooked potatoes, but apparently excluded potato chips and other forms of potatoes [52].

Rather than frequency of food intake, food consumption can be measured more specifically as volume or mass per day. In a cross-sectional study in the US using data from 1999–2002, 2–5 year olds had a daily mean consumption of 0.11 cups of french fries per day

(s.d= 0.01) [65]. French fries were also the largest source of vegetables (for the entire 2–18 year old age group), accounting for 28% of total vegetable intake.

1.2.1 Summary and Study Significance

As previously described, starchy and energy dense french fries are the most common vegetable fed to children aged 15 to 24 months in the US [1]. Mothers influence their child's tastes by directly providing food to them, serving as role models, and contributing to the social and physical environment around them [5]. Dietary habits are developed by social, cultural, and biological means as children grow. Specifically, breast-feeding has be shown to have long term impact upon the formation of dietary preferences both by social and biological means [20, 29]. Separately, breastfeeding has been linked to the prevention of obesity, among many other positive outcomes [21–23]. Breastfeeding behavior of the mother-infant dyad is predicted by many factors including SES, pregnancy intention, and food insecurity [3, 31, 39].

This study will assess the prevalence of french fry consumption of two year olds and investigate the associations between french fries and childhood SES environment, breastfeeding, and the influence of a range of maternal factors from a sample representative of the Oregon population using the PRAMS and PRAMS-2 surveys. If breastfeeding is shown to be negatively associated with french fry consumption, this study will add to the reasons to encourage breastfeeding, a modifiable behavior, a with a large impact. This specific hypothesis of breastfeeding being independently associated with a consumption of a specific unhealthy food up to two years later is novel in two ways: 1) the length of time between the breastfeeding and the consumption of the food, and 2) in the specificity of french fries as a food item.

1.3 Research Question and Specific Aims

A preliminary analysis of the PRAMS-2 cohorts at the the Oregon Division of Public Health indicated that a large proportion of two-year olds were consuming french fries in a typical week. Given the potential for french fries to represent an unhealthful dietary intake, this

thesis will identify associations with french fry consumption. Specifically, from this preliminary finding and a review of the literature, a research question emerged: are infants who were breastfed less likely to be fed french fries when they are two years old? And more broadly, what are the other significant associations with french fry consumption?

The specific aims of this study are to:

1. Estimate the prevalence of french fries consumption in two year olds;

2. Characterize the association of french fries consumption at age two with measures of maternal and child characteristics.

3. Using these variables, create a multivariate model to test the hypothesis that mother-child dyads who breastfed during infancy are less likely than non-breastfed ones to consume french fries when the child is two years old.

Chapter 2

Methods

2.1 PRAMS

2.1.1 Overview

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a population level surveillance project designed to monitor and reduce infant morbidity and mortality nationwide, supported by the Centers for Disease Control and Prevention (CDC) and run by individual states. It was started after the rate of decline in infant mortality plateaued [66]. In Oregon, the Office of Family Health, within the Division of Public Health, carries out the ongoing surveying of postpartum women. The survey includes both questions that are standardized nationwide and questions unique to the state. For this study, the birth cohorts of 2004 and 2005 were followed and re-interviewed at around 24 months. This follow-up forms the PRAMS-2 cohorts. PRAMS-2 includes questions about eating habits, among many topics. The PRAMS database is linked to state issued birth certificates for live births. Details of this system have previously been described [67, 68] and will be briefly reviewed here. In this thesis, only the 2005 birth year cohort is included.

Mothers in Oregon are surveyed two to six months after birth (mean: 106.5 days) [69]. A stratified random sample is drawn from the birth certificates which includes oversampling of mothers who are Hispanic, non-Hispanic (NH) American Indian/Alaska Native, NH Asian/Pacific Islander and NH Black/African American, and also NH White mothers

of low birth weight infants. Surveys are then sent by mail to the mothers. Non-responders are followed-up with a second mailing and telephone calls. Responses are then linked to birth certificates, and deduplicated. Surveys are administered in both English and Spanish.

In 2006 and 2007, the PRAMS-2 survey was sent to all mothers who had responded to the first PRAMS questionnaire when their child turned 24 months old. It excluded those mothers whose babies had died or those who requested not to be followed-up.

For the 2005 birth year cohort used in this thesis, 2,806 mothers were sampled in PRAMS (creating the sampling frame), 1,915 returned he survey and were then in the PRAMS-2 sampling frame, and 1,046 of those were respondents to PRAMS-2 (all unweighted). This yields a weighted response rate of 62.5% where the denominator is the PRAMS sampling frame and when the final weight has been applied [60, 70].[1] The weighting methodology is discussed later in Section 2.1.3.

The 63% response rate is lower than previous PRAMS studies [66, 68] due to the addition of PRAMS-2 and the additional attrition caused by this two year long follow-up period. Usually, the CDC considers a weighted response to PRAMS of 70% acceptable. Acceptable levels of response from PRAMS-2 have not been established, but they would be lower given the repeated sampling design.

2.1.2 Study Design

All women who gave birth to a live infant in Oregon were eligible to be sampled by a stratified, random sample each month. This forms the PRAMS sampling frame. All mothers are identified and contacted, based on information form the birth certificates. The four maternal non-white racial/ethnic groups and White NH low birth weight infants are over sampled to include sufficient numbers of mother-infant dyads in the statistical analysis in order to draw inferences based on these factors. Birth weight and maternal race/ethnicity are included on the birth certificate and form the basis for the over-sampling [67, 71]. Exclusion criteria for sampling include: out-of-state births to Oregon residents, delayed processing of birth certificates, and birth certificates without a mother recorded. For twins

[1] The unweighted response rate is 54.6% when the PRAMS-2 sample is the denominator, and 37.3% when the PRAMS sample is the denominator, also unweighted.

and triplets, one infant is selected at random for inclusion in sampling.

After being identified through the birth certificates, mothers are sent an introductory letter explaining that they have been selected to participate in PRAMS and explaining the purpose of PRAMS. Soon after, the questionnaire is sent to them in the mail with a follow-up letter. In Oregon, consent is assumed when the questionnaire is completed and returned. The questionnaire is sent in both English and Spanish to mothers who are recorded as Hispanic on the birth certificate.

Non-responders are followed up by a reminder letter and then a second copy of the questionnaire. After 10 days without the return of the second questionnaire, names and contact information of the non-respondents are given to a phone survey contractor; the mothers are then telephoned and asked to complete the survey over the phone. Verbal consent is obtained. The questions on the phone questionnaire are the same as on the self-administered written one. Women are called a maximum of 15 times to complete the survey.

When children turn 24 months old, PRAMS-2 is sent to all mothers who responded to PRAMS, except for those who infants had died or mothers who asked not to be contacted again (mean child age at time of maternal response: 25.0 months). Similar to PRAMS, PRAMS-2 is first sent by mail (with two reminders) and non-responders are followed up with a telephone interview. The questionnaire was sent to the mother in English if the first questionnaire was returned in English, and in Spanish if it was completed in Spanish.

The birth certificates, PRAMS survey, and PRAMS-2 survey are linked to the individual mother. Identifying variables were removed prior to sending the data to this researcher for use in this thesis.

2.1.3 Sampling, Weighting, and Inference

There are three weighting factors for over-sampling, non-response, and non-coverage. The over-sampling weight is created by the survey design. As previously described, there are six strata: NH White normal birth weight, NH White low birth weight, Hispanic, NH American Indian/Alaska Native, NH Asian/Pacific Islander and NH Black/African American. Five strata are over-sampled relative to the NH White normal birth weight stratum.

The second weight is for non-response. Probability of participation the PRAMS survey is related to some maternal characteristics, so a non-response weight is created to attempt to adjust for this potential source of selection bias. Non-response weights are created after the completion of the PRAMS survey by comparing demographic traits of responders versus sampled non-responders identified through the birth certificate. For example, mothers with low education and those who are unmarried are less likely to participate [71]. This non-response weighting is done on a yearly basis. Non-response weights, and subsequent adjustments, assumes that non-respondents with similar characteristics as respondents would have provided similar answers to the respondents. PRAMS-2 added another dimension to the non-response weights by also adjusting for lost to follow-up, opting out, and non-response to PRAMS-2. This aspect of non-response was added and is included in the weighting. The over-sampling and non-coverage weights are not affected by the addition of PRAMS-2.

The third weight is for non-coverage. Births are identified through the birth certificates and there are various factors that could change the probability of having a birth certificate within the sampling frame. For example, a certain hospital could systematically complete birth certificates late so mothers who gave birth at that hospital would be missed within the sampling time frame. These mothers omitted from the sampling frame are identified at the end of the year by comparing the PRAMS sampling frame to all births recorded within the state. Mothers who were sampled twice are also identified and only one response is included.

The final weight is calculated by multiplying the over-sampling, non-response, and non-coverage weights. This forms a probability weight which is then used in all of the weight analyses.

The over-sampling of infants from non-white NH racial/ethical strata and from the low-weight White NH stratum (compared to NH White normal birth weight infants) allows for inferences to be made from the sample to these sub-populations [68]. The inferences can be made with statistical reliability after controlling the design features of the study via weighting that adjusts for over-sampling. The estimates of variables from these subpopulations allows for comparisons among this strata. Yet, the weighting perseveres the nature of the

population from which the sample (with its subpopulations) is from. Reliable inferences can be drawn from the sampled participants to the entire population and among the strata themselves.

2.1.4 Human Participant Protections

This study is a secondary analysis using data that has already been deidentified of most identifiers. Still, maintaining confidentiality and anonymity of the data set was a priority. Oregon Department of Human Services' "10 and 50" rule was followed to prevent identification of participants by over-stratification of variables:

> In general, release of a health statistic should only occur if the denominator of the health statistic is more than fifty when the denominator is a population (a group of people with certain age, race, and sex characteristics who live in a particular place) or more than ten when the denominator is a cohort (a group of people whose membership is defined by the occurrence of some event) and the numerator is more than 10...

The confidentiality of the data was maintained, in accordance with ORS 432.060(1), by physically and virtually securing the electronic data file and then destroying the data after the analysis and writing when it is complete. Data was stored on one computer that required a login and that is locked to a table. Backups were password protected on a separate disk.

The Oregon Public Health Division research review board approved the PRAMS-2 study. This particular thesis was approved by the Oregon PRAMS research team and a PRAMS Data Sharing Agreement was signed.

This study protocol was submitted to the Oregon Health and Science University's Institutional Review Board for exemption (IRB #: IRB00006066). The OHSU IRB determined that the study is not human subject research under 45 CFR 46.102(f).

2.2 Study Data Management and Analysis

2.2.1 Data Management

The data-set was provided to the researcher complete, in two data files (one for PRAMS already merged with birth certificate variables, and one for PRAMS-2) via secure electronic mail. The two files were merged in STATA and were matched by an identification number

for the mother. Final weights had already been computed.

The Oregon Public Health Division was responsible for all aspects of data collection, verification, and data cleaning. The CDC calculated the weighting. Data files were shared with the CDC by the state, as per protocol, to allow for interstate comparisons of maternal and child health.

2.2.2 Measurement

Most variables are self-reported by the participant mothers in the surveys (PRAMS and PRAMS-2), while maternal race, age, and education (among others) are abstracted from the birth certificate. Details of measurement and subsequent coding are reported in Table 2.1. Some variables such as age and BMI were coded multiple ways and then significance was compared after univariate analysis.

The complete written questionnaires for PRAMS and PRAMS-2 (from which most variables are derived) are included in Appendix B.

Outcome

The dependent variable in this study is french fry consumption. It was assessed by the answer to the following question asked in PRAMS-2:

> How many days in a typical week does your two-year-old eat each of the foods listed below?
> Circle the number of days.
> ...
> French Fries 0 1 2 3 4 5 6 7 days

As shown in Table 2.1, zero days per typical week was classified as 'none' and responses of 1–7 days per typical week were classified as 'any' french fry consumption.

Any french fry consumption (i.e., $\geq$1 day/week) was chosen as the categorical outcome for the analysis because it is closest to an even 50%-50% split, giving the analysis the greatest statistical power, and is a meaningful conceptual split (i.e., any versus none). Originally in a preliminary analysis, all of the associations were examined with greater or equal to two days per week versus one or less days per week; however, then only 33% of the outcomes were positive for french fry consumption, thus giving it less statistical power. Furthermore,

there are not any clearly established guidelines for what constitutes a healthy quantity of french fries for two year olds, so the any versus none categorization schema is likely the most robust.

Variables

All variables are described in Table 2.1, including the source (Birth Certificate, PRAMS, and PRAMS-2 along with the question number when relevant for the surveys). The possible responses are the range of answers from the original medium, and the coding shows how the variable was classified for the statistical analysis. Variables were chosen by a review of the literature, past reports from PRAMS, and/or by an expressed interest from the Oregon PRAMS Project Director.

Child height and weight were queried in the PRAMS-2 survey, but many mothers skipped one, or both, questions so that BMI could only be calculated for 594 of 1046 PRAMS-2 respondents. Child BMI was therefore not used in this analysis. Non-response weights, as described previously, only adjust for non-response to the entire survey and not for non-response to individual questions. Thus, given the poor response rate to this question and limited data, this variable was not included in the analysis.

Table 2.1: Measurement and Coding of Variables. The first variable is the french fry consumption (which is the outcome) and all others are potential predictors or co-variates. The source is from where the variable was obtained, along with the particular question number for the surveys. The possible responses are the range of answers from the original survey or birth certificate. The final column shows how these responses were coded for inclusion within the analysis. Some identical variables were coded in differing methods in order to attempt to capture the best classification of it.

Source	Variable	Possible Responses	Coding for Analysis
PRAMS-2 Q53	**French Fry Consumption** Days in a typical week that french fries are eaten	0-7 days (circled)	Any None
PRAMS Q64 Q65	**Household income** (3 levels) [a]	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	At or Below 100% FPL 101% to 185% FPL More than 185% FPL
PRAMS Q64 Q65	**Household income** (2 levels)	same as previous	At or Below 185% FPL More than 185% FPL
PRAMS Q75ab	**Postpartum Depression** (3 levels) Sine birth, depressive sxs or little interest in things.	Always Often Sometimes Rarely Never	Highly depressed (Often or Always for either) Moderately depressed (Sometimes for either) Not Depressed (Rarely or Never for both)
PRAMS Q75ab	**Postpartum Depression** (2 levels)	same as previous	Depressed (all else) Not Depressed (Rarely or Never for both)
PRAMS-2 Q22Bab	**Depression** (while child was 13-24 months) "Felt sad, blue or depressed for most of the day" "Lost interest or pleasure in most things you usually cared about or enjoyed."	Yes or No (to each)	Depressed (Any 'Yes') Not Depressed (all else)
PRAMS-2 Q22Aab	**Depression** (birth-12 months) "Felt sad, blue or depressed for most of the day" "Lost interest or pleasure in most things you usually cared about or enjoyed."	Yes or No (to each)	Depressed (Either 'Yes') Not Depressed (Both 'No')
PRAMS-2 Q27	**Maternal Social Support** (3 levels) Help with bills, help when sick, able to get a ride, someone to talk to, someone who shows you love and affection.	Yes or No (to each) One point per 'Yes'	Low (0-1) Moderate (2-3) High (4-5)
PRAMS-2 Q27	**Maternal Social Support** (2 levels)	same as previous	Low (0-1) Moderate or High (2-5)
PRAMS-2 Q50 Q48	**Age at Breastfeeding Cessation** "How old was your two-year-old when he/she completely stopped breastfeeding?	____ months old Still breastfeeding	Up to 1 month 1 to 5 months 6 to 12 months More than 12 months
PRAMS Q48 Q49 Q51	**Exclusive Breastfeeding at 8 weeks** Baby must be living with mother now, Mother must have ever breastfed or pumped, Mother must have done any breastfeeding for $\geq$8 wks, AND		Yes (Yes to all criteria) No (Any criterion false)

[a] Midpoint of range of annual household income year before birth as percent of the Federal Poverty Level for that year. e.g., FPL 2004 %= (100*Household income)/(9310 + (dependents - 1)*3180)

continued from previous page

Q53	Age of baby first time fed anything except breastmilk ≥8 wks.		
PRAMS	**Exclusive Breastfeeding at 10 weeks**		
Q48	Baby living with mother now,	Yes or No	Yes (Yes to all criteria)
Q49	Mother must have ever breastfed or pumped,	Yes or No	No (Any criterion false)
Q51	Mother must have done any breastfeeding for ≥10 wks, AND	____ Weeks or ____ Months or "Less than 1 week"	
Q53	Age of baby first time fed anything except breastmilk ≥10 wks.	____ Weeks OR____ Months or Exclusive Breastfeeding only.	
PRAMS	**Any Breastfeeding at 10 weeks**		
Q51	Any breastfeeding for ≥10 wks.	____ Weeks OR ____ Months Less than 1 week	Yes (≥10 wks.) No (<10 wks.)
Birth Cert.	**Marital Status**		
		Married, Separated	Married (Married, Separated)
		Unmarried, Divorced, Annulled, Widowed	All else, father not on BC (All else, father's age not on BC)
			All else, father on BC (All else, father's age on BC)
PRAMS	**Pregnancy intention**		
Q10	Just before you got pregnant, how did you feel about becoming pregnant? "I wanted to be pregnant..."	sooner	Mistimed (sooner or later)
		later	Unwanted (not then or at any time in the future)
		then	Correctly timed (then)
		not then or at any time in the future	
PRAMS	**Pregnancy intention**		
Q10		same as previous	Unintended (later or not then or any time in the future)
			Intended (then or sooner)
Birth Cert.	**Tobacco use during pregnancy**		
	Did the mother smoke during pregnancy?	Yes	Yes
		No	No
Birth Cert.	**Insurance before preg**		
	Had private insurance, Oregon Health Plan, or other public insurance before pregnancy	Yes or No (to each)	None
			Any
Birth Cert.	**Maternal race/ethnicity**		
	Race	White (includes Mexican, Puerto Rican, Caucasian)	AI/AN (Indian, Non-Hispanic)
		Black, African American	African American (Black or African American, Non-Hispanic)
		Indian (North, Central, South American, Eskimo, Aleut)	Asian/PI (Chinese, Japanese, Hawaiian, Filipino, Other Asian or Pacific Islander, Non-Hispanic)
		Chinese	Hispanic (Any Hispanic)
		Japanese	White (White, Non-Hispanic)
		Hawaiian (includes part Hawaiian)	
		Filipino	
		Other Asian or Pacific Islander	
	Ethnicity	Non-Hispanic	
		Mexican, Puerto Rican, Cuban, Central or South American, or Other Hispanic	
PRAMS	**Maternal BMI** (kg/m^2)		
Q5	Self-reported height without shoes	____ Feet ____ Inches OR ____ cm	Underweight (< 18.5)
Q6	Self-reported mass just before pregnancy	____ Pounds OR ____ Kilos	Normal (≥18.5 to < 25.0)
			Overweight (≥25.0 to <30.0)
			Obese (≥ 30)
PRAMS	**Maternal BMI (2 levels)**		
		same as previous	Normal and Underweight
			Overweight and Obese
PRAMS	**Maternal BMI (2 levels)**		
		same as previous	Normal

continued from previous page

			Under-, Over-weight and Obese
PRAMS-2 Q61	**Perception of Child Weight** "What do you think about your two-year-olds weight?"	My child is underweight	My child is underweight
		My child is about the right weight	My child is about the right weight
		My child is overweight	My child is overweight
PRAMS Q37	**Food Insecurity during pregnancy** "During the 12 months before your new baby was born, did you ever eat less than you felt you should because there wasnt enough money to buy food?"	Yes	Yes
		No	No
PRAMS-2 Q35	**Food Insecurity (PR2)** "In the past 12 months, did you ever eat less than you felt you should because there wasn't enough money to buy food?"	Yes	Yes
		No	No
Birth Cert.	**County at time of birth** Maternal county of residence at time of birth	All Counties in Oregon	Urban (Benton, Clackamas, Columbia, Jackson, Lane, Marion, Multnomah, Polk, Washington, Yamhill) Rural (All others in Oregon)
Birth Cert.	**Parity**	Other live birth(s) now living	Multiparous
		Other live birth(s) now dead	Primipara
Birth Cert.	**Delivery method (3 levels)**	Vaginal	C-section (repeat and primary)
		VBAC	Vaginal
		Repeat C-section	VBAC
		First C-section	
Birth Cert.	**Delivery method (4 levels)**	same as previous	Vaginal
			VBAC
			Repeat C-section
			First C-section
PRAMS-2 Q59	**Child Ever on WIC**	Yes, but no longer on WIC	Yes, but no longer on WIC
		Yes, on WIC now	Yes, on WIC now
		No	No
Birth Cert.	**WIC Participation**	Months mother on WIC program	Yes (>0 months)
			No (0 months)
PRAMS	**Stressful Life Events** **Emotional**		
Q36A	Family members hospitalized	Yes or No (to each)	None
Q36M	Someone close died		Any
	Partner Related		
Q36B	Separated or divorced from husband or partner	Yes or No (to each)	None
Q36G	Argued with my husband or partner more than usual		Any
Q36H	Husband or partner said he didn't want me pregnant		
	Financial		
Q36C	Moved to a new address	Yes or No (to each)	None
Q36E	Husband or partner lost his job		Any
Q36F	Lost my job		
Q36I	Had a lot of bills I couldn't pay		
	Traumatic		
Q36D	Was homeless	Yes or No (to each)	None
Q36J	Was in a physical fight		Any
Q36K	My husband or partner or I went to jail		
Q36L	Someone close with alcohol or drug problem		
Birth Cert.	**Maternal Age (5 levels)**	Date of Birth	< 20 years
			20 to 24 years

continued from previous page

			25 to 29 years 30 to 34 years $\geq$ 35 years
Birth Cert.	**Maternal Age (2 levels)**	same as previous	$\leq$ 24 years $>$ 25 years
Birth Cert.	**Maternal Education**	Years of education (0-17)	$<$ 12 years 12 years $>$ 12 years
PRAMS-2 Q58	**Family Eats Meals Together** "Does your family eat meals together?"	Always Usually Sometimes Never	Always Usually Sometimes or never
PRAMS-2 Q86	**TV watching daily** "In a typical day, how much time does your two-year-old spend watching TV or videos?"	2 hours or more Less than 2 hours none	2 hours or more Less than 2 hours none

2.2.3 Statistical Analysis

All analyses were weighted for over-sampling, non-response, and non-coverage of sampling and included the strata for over-sampling. The prevalence of french fries feeding in two year olds (the main outcome) was examined both crudely, and then stratified by each level of maternal BMI, maternal age, and maternal education, among other potential predictors. Pair-wise univariate associations between the predictor variables, the covariates, and the outcome were examined using simple logistic regression.

A multivariate model was built to characterize the associations with the significant predictor variables using the Hosmer and Lemeshow method. Variables with a univariate p-value of ≤ 0.25 were then tested for inclusion in the multivariate model. During model building, each variable was considered for collinearity with other variables, sufficient cell size, significance in the model, and for sensical interaction [72]. For a group of variables complete model was constructed using the Hosmer and Lemeshow method of step-wise model building. Conceptually identical or similar variables were excluded by descending order of significance, so that each variable was unique and not collinear. In order establish temporality of the associations, all variables entered into the model for potential inclusion were from PRAMS or the Birth Certificate.

Using the Hosmer and Lemeshow method, variables were tested one-by-one in order of least statistical significance, until all variables had a significance < 0.05. Starting with

the interactions, the least statistically significant variable was tested and either removed (when $p>0.05$) or kept in the model (when $p\leq 0.05$). Once a preliminary main model was created, all eliminated variables were then added back into the model and checked for their significance one-by-one. The variables were considered on the basis of interaction, confounding, and significance. If a variable had an insignificance p-value (<0.05), was not suspected for interaction, or was not suspected as a confounder, it was removed. The model was then retested in this fashion until all variables had at least one inclusive trait.

True step-wise variable selection cannot and should not be used with complex survey design [73]. This limitation appears to be present in STATA and in SUDDAN (within SAS), and is inherent with the estimation methods of complex survey weights.

The classification characteristics of the model were evaluated using the Hosmer and Lemeshow goodness of fit test [72]. Usually, with logistic regression, Hosmer-Lemeshow good-of-fit is used, followed by sensitivity/specificity classification, and area under the ROC curve calculation [72]. However, post-estimation fit of complex survey models is limited [74, 75].

The Likelihood-ratio test cannot be used to directly compare the various models because the likelihood-ratio test is only for nested models, which these are not [72]. Furthermore, likelihood is not defined with for use with complex survey models, so the AIC (Akaike information criterion) and BIC (Bayesian information criterion) methods of model comparison cannot be computed for use either [76]. Additionally, the post-estimate computations of complex survey design cannot directly calculate sensitivity/specificity classification due to the use of probability weights by survey design.

Analyses were completed in STATA 10.1 [77], so that weighted survey analysis could be used. Sample statistical commands are shown in Appendix A.

Chapter 3

Results

3.1 Distribution of French Fry Consumption

Among two year olds in Oregon in 2007, 67% of the children consumed french fries in a typical week, as shown in Figure 3.1 and in Table 3.2. Thirty-three percent did not consume any french fries. Seventeen percent of children consumed french fries twice in a typical week, 3% three days in a typical week, 2% four days per typical week, and a total of 1% consumed french fries for five days or more in a typical week.

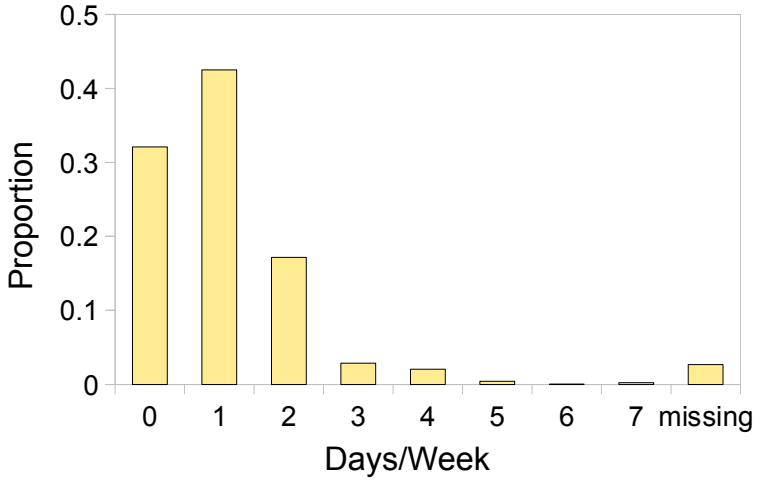

Figure 3.1: Proportion of children consuming french fries (days per typical week) from the 2005 Oregon PRAMS-2 birth cohort (weighted). In a typical week, 67% of children consumed french fries.

3.2 Sample Characteristics

Selected characteristics of the mother-child dyads are presented in Table 3.1.

Table 3.1: Selected characteristics of the 2005 Oregon PRAMS-2 cohort. Relative percentages are weighted. A detailed description of the variable coding is presented in Table 2.1.

	Relative Percent
Maternal Age	
< 20 years	6.2%
20 to 24 years	22.4%
25 to 29 years	32.5%
30 to 34 years	25.1%
≥ 35 years	13.7%
missing	0.2%
Maternal Education	
< 12 years	15.8%
12 years	30.2%
> 12 years	53.0%
missing	1.1%
Household Income year before birth	
At or Below 100% FPL	23.9%
101% to 185% FPL	18.8%
More than 185% FPL	51.3%
missing	6.0%
Maternal race/ethnicity	
AI/AN NH	1.4%
African American NH	1.5%
Asian/PI NH	4.4%
Hispanic	20.6%
White NH	71.7%
missing	0.4%
County at time of birth	
Rural	25.9%
Urban	74.1%
missing	0.0%

	Relative Percent
Pre-pregnancy Maternal BMI	
Underweight (< 18.5)	2.3%
Normal (≥18.5 to < 25.0)	49.2%
Overweight (≥25.0 to <30.0)	23.7%
Obese (≥ 30)	16.6%
missing	0.1%
Any Breastfeeding at 10 weeks	
No	26.6%
Yes	69.7%
missing	3.7%
Marital Status	
All else, father not on BC	7.0%
All else, father on BC	20.7%
Married	72.4%
missing	0.0%
Pregnancy intention	
Unintended	33.4%
Intended	65.0%
missing	1.7%
Tobacco use during pregnancy	
Yes	8.7%
No	91.0%
missing	0.3%

3.3 Univariate Associations

Univariate associations with any french fry consumption were computed for each predictor and covariate (Table 3.2). There were many significant associations at the $\alpha = 0.05$ level, including: low household income, postpartum depression, younger age at breastfeeding cessation, lack of breastfeeding at 10 weeks, not married marital status, unintended pregnancy, no health insurance, maternal race/ethnicity other than NH White or Asian/PI, non-normal

maternal BMI, food insecurity, WIC use, stressful life events, younger maternal age, and less maternal education. The only variable with a p-value >0.05 and ≤ 0.25 was tobacco use during pregnancy.

Table 3.2: Univariate risk factors for any french fry consumption (at least one day per typical week). Variables are from the Birth Certificate or PRAMS survey, unless noted to be from the PRAMS-2 survey ("PR2"). A detailed description of the variable coding is presented in Table 2.1. Additional clarification is given in this table when needed.

	Any French Fry Consumption					
	Unweighted		*Weighted*			
Variable	**n**	**Total**[a]	**Percent**[b]	**OR**	**95% CI**	**p-value**[c]
Overall						
BC and PRAMS		1915				
BC, PRAMS, and PRAMS-2	689	1046	67.0%			
Household income (3 levels)						<0.01
At or Below 100% FPL	212	263	79.8%	2.75	1.61–4.70	
101% to 185% FPL	132	190	72.1%	1.79	1.01–3.17	
More than 185% FPL	298	483	59.0%	Referent		
missing	47	65	70.9%			
Household income (2 levels)						<0.01
At or Below 185% FPL	344	453	76.4%	2.25	1.46–3.46	
More than 185% FPL	298	483	59.0%	Referent		
missing	47	65	70.9%			
Postpartum Depression (3 levels)						0.02
Highly depressed	89	114	79.0%	2.13	1.06–4.32	
Moderately depressed	105	137	77.4%	1.95	1.04–3.63	
Not Depressed	489	738	63.8%	Referent		
missing	9	12	66.1%			
Postpartum Depression (2 levels)						0.01
Depressed	191	251	78.1%	2.03	1.24–3.32	
Not Depressed	489	738	63.8%	Referent		
missing	9	12	66.1%			
Depression (PR2, 13-24 months)						0.92
Depressed	170	227	67.2%	1.02	0.63–1.67	
Not Depressed	506	756	66.6%	Referent		
missing	13	18	80.2%			
Depression (PR2, 0-12 months)						0.82
Not Depressed	453	671	67.4%	1.05	0.68–1.62	
Depressed	228	315	66.3%	Referent		
missing	8	15				
Maternal Social Support (3 levels)						0.58

[a]This denominator excludes those missing the outcome.

[b]Weighted percent excludes missing values

[c]P-value calculated from adjusted F-value of the variable in the simple logistic regression with weighting for complex survey design. It denotes the significant of variation between the levels of the variable.

continued from previous page

	Unweighted		*Weighted*			
	n	**Total**	**Percent**	**OR**	**95% CI**	**p-value**
Low (0-1)	29	33	82.5%	2.34	0.46–11.87	
Moderate (2-3)	88	126	68.5%	1.08	0.59–1.99	
High (4-5)	563	563	66.8%	Referent		
missing	9	20	55.0%			
Maternal Social Support (2 levels)						0.31
Low (0-1)	29	33	82.5%	2.32	0.46–11.74	
Moderate or High (2-5)	651	948	67.0%	Referent		
missing	9	20	55.0%			
Age at Breastfeeding Cessation (PR2)						0.02
Ever up to 1 month	25	37	80.9%	3.44	1.09–10.89	
1 to 5 months	133	180	74.7%	2.40	1.25–4.64	
6 to 12 months	247	352	67.0%	1.65	1.00–2.72	
More than 12 months	130	230	55.2%	Referent		
missing	154	202	74.2%			
Age at Breastfeeding Cessation (PR2)						<0.01
Never to 1 month	159	207	78.7%	3.00	1.62–5.55	
1 to 5 months	133	180	74.7%	2.40	1.25–4.63	
6 to 12 months	247	352	67.0%	1.65	1.00–2.72	
More than 12 months	130	230	55.2%	Referent		
missing	20	32	51.9%			
Exclusive Breastfeeding at 8 weeks among initiators						0.01
No	225	316	73.7%	1.82	1.13–2.95	
Yes	271	437	60.6%	Referent		
missing	193	240	73.4%			
Exclusive Breastfeeding at 8 weeks						<0.01
No (including non-initiators)	280	382	74.8%	1.93	1.23–3.04	
Yes	271	437	60.6%	Referent		
missing	138	182	70.6%			
Exclusive Breastfeeding at 10 weeks among initiators						0.03
No	251	353	72.3%	1.70	1.07–2.71	
Yes	245	400	60.5%	Referent		
missing	193	240	73.4%			
Exclusive Breastfeeding at 10 weeks						0.01
No (including non-initiators)	306	419	73.5%	1.81	1.16–2.82	
Yes	245	400	60.5%	Referent		
missing	138	182	70.6%			
Any Breastfeeding at 10 weeks						<0.01
No (including non-initiators)	231	294	80.0%	2.41	1.45–4.00	
Yes	423	663	62.3%	Referent		
missing	35	44	64.5%			

continued from previous page

	Unweighted		*Weighted*			
	n	**Total**	**Percent**	**OR**	**95% CI**	**p-value**
Marital Status						0.05
All else, father not on BC	57	72	83.6%	2.91	1.02–8.33	
All else, father on BC	172	221	73.2%	1.56	0.92–2.66	
Married	460	708	63.7%	Referent		
missing	0	0	n/a			
Pregnancy intention						0.07
Mistimed (too soon or too late)	345	471	72.2%	1.63	1.07–2.46	
Unwanted	48	68	68.4%	1.36	0.55–3.36	
Correctly timed	286	448	61.5%	Referent		
missing	10	14	78.0%			
Pregnancy intention						0.01
Unintended (too soon or unwanted)	276	355	76.5%	1.99	1.26–3.16	
Intended (too late or right time)	406	632	61.9%	Referent		
missing	10	14	78.0%			
Tobacco use during pregnancy						0.16
Yes	74	99	77.6%	1.77	0.79–4.00	
No	613	898	66.1%	Referent		
missing	2	4	40.0%			
Insurance before pregnancy						0.01
none	289	386	74.6%	1.73	1.12–2.65	
Any	398	613	63.0%	Referent		
missing	2	2	100.0%			
Maternal race/ethnicity						<0.01
AI/AN	98	129	74.8%	1.70	1.05–2.76	
African American	76	98	79.3%	2.19	1.26–3.78	
Asian/PI	83	137	61.8%	0.92	0.60–1.41	
Hispanic	156	197	80.3%	2.33	1.52–3.59	
White	275	436	63.6%	Referent		
missing	1	4	n/a			
Maternal Pre-pregnancy BMI (4 levels)						0.01
Underweight (< 18.5)	26	35	87.9%	5.00	1.69–14.81	
Normal (≥18.5 to < 25.0)	293	476	59.1%	Referent		
Overweight (≥25.0 to <30.0)	168	233	71.4%	1.72	1.04–2.85	
Obese (≥ 30)	137	181	74.9%	2.07	1.13–3.78	
missing	65	79	81.4%			
Maternal Pre-pregnancy BMI (2 levels)						0.01
Normal and Underweight	319	508	60.4%	Referent		
Overweight and Obese	305	414	72.8%	1.75	1.14–2.69	
missing	65	79	81.4%			

continued from previous page

	Unweighted		*Weighted*			
	n	**Total**	**Percent**	**OR**	**95% CI**	**p-value**
Maternal Pre-pregnancy BMI (2 levels)						<0.01
Normal	293	473	59.1%	Referent		
Under, Over-weight and Obese	331	449	73.7%	1.93	1.26–2.95	
missing	65	79	81.4%			
Perception of Child Weight (PR2)						0.38
My child is underweight	68	96	77.3%	1.75	0.78–3.89	
My child is about the right weight	602	879	66.1%	Referent		
My child is overweight	16	23	70.7%	1.24	0.34–4.47	
missing	1	1	n/a			
Food Insecurity during pregnancy						0.01
Yes	69	88	86.6%	3.51	1.40–8.79	
No	598	887	64.8%	Referent		
missing	22	26	91.9%			
Food Insecurity (PR2)						0.30
Yes	79	106	74.6%	1.50	0.70–3.20	
No	610	895	66.2%	Referent		
missing	0	0	-%			
County at time of birth						0.35
Rural	181	242	70.7%	1.26	0.78–2.02	
Urban	508	759	65.8%	Referent		
missing		0	-			
Parity						0.71
multiparous	398	440	67.8%	1.08	0.72–1.61	
primipara	291	560	66.1%	Referent		
missing	0	1	n/a			
Delivery method (3 levels)						0.43
C-section (repeat and primary)	208	303	68.5%	3.71	0.50–27.60	
vaginal (excluding VBAC)	477	690	66.8%	3.43	0.47–24.95	
VBAC	4	8	36.9%	Referent		
missing		0	-			
Delivery method (4 levels)						0.59
C-section, primary	136	201	70.2%	4.02	0.53–30.44	
vaginal (excluding VBAC)	477	690	66.8%	3.43	0.47–24.95	
C-section repeat	72	102	65.9%	3.30	0.42–26.00	
VBAC	4	8	36.9%	Referent		
missing		0	n/a			
Child ever on WIC (PR2)						<0.01
Yes, but no longer on WIC	157	203	80.7%	3.04	1.62–5.72	
Yes, on WIC now	247	335	73.1%	1.98	1.25–3.11	
No	280	456	57.9%	Referent		

continued from previous page

	Unweighted		*Weighted*			
	n	**Total**	**Percent**	**OR**	**95% CI**	**p-value**
missing	1	1	n/a			
WIC at birth						0.01
Yes	321	415	75.1%	1.85	1.20–2.84	
No	368	586	62.0%	Referent		
missing		0	-			
Stressful Life Events						
Emotional						0.75
none	468	689	67.9%	1.08	0.69–1.67	
Any	209	298	66.3%	Referent		
missing	12	14	97.5%			
Partner Related						<0.01
Any	198	256	80.6%	2.51	1.48–4.26	
none	478	731	62.4%	Referent		
missing	13	14	98.5%			
Financial						0.04
Any	389	546	71.4%	1.54	1.03–2.29	
none	287	439	61.9%	Referent		
missing	13	16	87.3%			
Traumatic						<0.01
Any	147	185	81.7%	2.58	1.38–4.80	
none	529	801	63.4%	Referent		
missing	13	15	97.8%			
Maternal Age (5 levels)						0.03
$<$ 20 years	55	67	75.8%	2.91	1.02–8.35	
20 to 24 years	170	228	75.5%	2.87	1.46–5.65	
25 to 29 years	190	281	66.0%	1.81	0.99-3.30	
30 to 34 years	179	260	67.4%	1.92	1.04–3.56	
$\geq$ 35 years	95	164	51.8%	Referent		
missing	0	1	n/a			
Maternal Age (2 levels)						0.01
$\leq$ 24 years	225	295	75.6%	1.93	1.19–3.13	
$>$ 25 years	422	650	61.6%	Referent		
missing	42	56	84.5%			
Maternal Education						<0.01
$<$ 12 years	130	162	80.1%	2.70	1.55–4.70	
12 years	209	277	74.4%	1.94	1.17-3.22	
$>$ 12 years	345	550	59.9%	Referent		
missing	5	12	43.8%			
Family Eats Meals Together (PR2)						0.69

continued from previous page

	Unweighted		*Weighted*			
	n	**Total**	**Percent**	**OR**	**95% CI**	**p-value**
Always	316	466	68.4%	1.31	0.70–2.46	
Usually	278	397	66.4%	1.19	0.63–2.28	
Sometimes or never	90	130	62.3%	Referent		
missing	5	8	81.9%			
TV watching daily (PR2)						<0.01
2 hours or more	155	200	86.5%	8.19	3.98–16.87	
Less than 2 hours	463	653	68.2%	2.74	1.62–4.62	
none	67	142	44.0%	Referent		
missing	1	1	n/a			

3.4 Multivariate Model

The model is presented in Table 3.3 and is without any *a priori* variables forced into the model selection process. Compared to none, having any partner related stress was associated with increased the odds of french fry consumption (OR=2.06 95% CI: 1.16–3.65, p=0.01). No breastfeeding at 10 weeks was associated with increased odds of french fry consumption relative to any breastfeeding (OR 1.95 95% CI: 1.16–3.41, p=0.01). Maternal BMI was associated with increased odds of french french consumption (p=0.02): compared to normal-weight mothers, children with underweight mothers had a largest increased odds of french fry consumption (OR=4.20, 95% CI: 1.37–12.92), followed by underweight mothers (OR=1.79, 95% CI: 1.04–3.08), and then obese mothers (OR=1.65, 95% CI: 0.88-3.09). In contrast to the previous model, this one also included pregnancy intention. Unintended pregnancy was associated with higher odds of french fry consumption as compared to intended pregnancy (OR=1.72, 95% CI: 1.00-2.93). Thus model provides a good fit of the data based on the goodness-of-fit testing for weighted analyses (F-adjusted= 0.834, p-value=0.59).

Table 3.3: Multivariate logistic model for any french fry consumption at two years of age. Model was built using the Hosmer and Lemeshow method. All variables other than the outcome are from PRAMS or the BC. The "Step 1" columns represent the first step of the model building and shows all potential variables. ORs for interactions not shown due to limited space. The p-value for maternal education was not calculated due to this variable being dropped because of collinearity with the interaction terms. All analyses were weighted and all ORs are adjusted.

	Step 1		**Final Model**		
	OR	*p-value*	**OR**	**95% CI**	*p-value*
Race/Ethnicity		*0.24*			
AI/AN (vs. white)	1.24				
African American (vs. white NH)	3.15				
Asian/PI (vs. white NH)	0.27				
Hispanic (vs. white NH)	24.73				
Maternal Education		*n/a*			
$<$ 12 years (vs.$>$12 yrs)	1.21				
12 years (vs $>$12 yrs)	1.79				
Partner Related Stress (vs. none)	1.62	*0.16*	2.06	1.16–3.65	*0.01*
No Breastfeeding at 10 wks (vs. any)	2.86	*0.02*	1.98	1.16–3.41	*0.01*
Maternal BMI					*0.02*
Underweight (vs. normal weight)	3.13	*0.05*	4.20	1.37–12.92	
Overweight (vs. normal weight)	1.99		1.79	1.04–3.08	
Obese (vs. normal weight)	1.76		1.65	0.88–3.09	
Unintended Pregnancy (vs. Intended)	1.41	*0.31*	1.72	1.00–2.93	*0.05*
WIC at birth (vs. not)	0.85	*0.71*			
Income $\leq$ 185% FPL (vs. $>185\%$**)**	1.27	*0.59*			
Marital Status		*0.56*			
All else, father not on BC (vs. married)	1.59				
All else, father on BC (vs. married)	0.73				
Maternal Age$\leq$ 24 years (vs. $>$25 yrs)	1.49	*0.26*			
Any Financial Stress (vs. none)	1.24	*0.44*			
Any Traumatic Stress (vs. none)	1.34	*0.49*			
Postpartum Depression (vs. none)	1.28	*0.45*			
Food Insecurity (vs. none)	1.71	*0.42*			
Smoking during pregnancy (vs. not)	0.97	*0.96*			
Race*Breastfeeding		*0.75*			
Race*Education		*0.71*			
Education*breastfeeding		*$<$0.01*			

Chapter 4

Discussion

4.1 Summary of Findings

This analysis was conducted to estimate the prevalence of french fries consumption in two year olds, and to identify maternal and child factors associated with french fry consumption, specifically testing the association with breastfeeding. Overall, 67% of two-year olds in Oregon in 2007 consumed french fries in a typical week at least once. Seventeen percent of children consumed french fries twice in a typical week, 3% three days in a typical week, 2% four days per typical week, and a total of 1% consumed french fries for five days or more in a typical week.

There were many significant univariate associations with any french fry consumption. Notably, french fry consumption varied significantly among maternal race/ethnicity groups. American Indian/Alaskan Natives (75%), African Americans (79%), and Hispanics (80%) had significantly greater consumption than non-Hispanic Whites (64%). Asian/Pacific Islanders (62%) did not significantly differ from NH Whites.

Maternal BMI was associated with increased french fry consumption in the children, as compared to children of normal BMI mothers (59%). This difference was most striking for children of underweight mothers (88%), and was greater for ones of obese mothers (75%) than those of overweight mothers (71%).

Markers of low SES were associated with great consumption of french fries. Specifically, children of younger mothers had greater french fry consumption, and so did mothers with

lower educational attainment. Stressful life events, which are possible mediators in a pathway with low SES, were also associated with greater french fry consumption. Specifically, the presence of partner-related stress, financial stress, and traumatic stress were all associated with significantly increased consumption. Food insecurity, a specific type of poverty, during pregnancy was associated with greater french fry consumption. Similarly, a greater proportion of children from income poor households consumed french fries.

For breastfeeding behavior in univariate analysis, significant differences were found by many constructs of breastfeeding. For instance, any breastfeeding at 10 weeks was associated with significantly decreased consumption of french fries. Most detailedly, a decreasing dose-response was observed with age at breastfeeding cessation. Those who breastfed up to 1 month had higher french fry consumption (at 81%), than those who stooped at 1-5 months (75%), and in turn than those who stopped at 6–12 months (67%), all compared to those who stopped after 12 months (55%).

In the multivariate model, no breastfeeding at 10 weeks was associated with increased consumption of french fry relative to any breastfeeding (OR adjusted=1.95 95% CI: 1.16–3.41), while adjusting for the other variables in the model. Maternal BMI was associated with increased french fry consumption (p=0.02): underweight mothers had a largest increased odds compared to normal weight mothers (OR adjusted=4.20, 95% CI: 1.37–12.92), followed by underweight mothers (OR adjusted=1.79, 95% CI: 1.04–3.08), and then obese mothers (OR adjusted=1.65, 95% CI: 0.88-3.09). Unintended pregnancy was associated with higher odds of french fry consumption pregnancy (OR adjusted=1.72, 95% CI: 1.00-2.93). Partner-related stress was associated with increased consumption of french fries (OR adjusted=2.06 95% CI: 1.16–3.65). No other variables were significant in the multivariate model. Thus, the specific hypothesis about decreased consumption of french fries in those who were breastfed was supported. However, this finding may not be unconfounded.

4.2 Comparisons to Previous Work

An analysis of the Feeding Infants and Toddlers Study, a stratified random sample of the US population surveyed in 2002, found that among the 9–11 month old age group, 9% consumed

french fries in the 24-hour food recall sampling period [78]. Thus, that would multiple to 63% per week, assuming an equal probability each day in a week. This proportion is similar to the 67% estimated in the current study in an older age group. A different analysis of the same survey also found 25.5% of 19–24 month olds were consuming french fries and other fried potatoes (excluding potato chips) at least once per day [1].

In a community-based sample of employed mothers in North Carolina, 22.2% reported their 8-month old consumed french fries in the past 7-days [64]. In this prospective cohort study, french fry consumption by 8-month olds was significantly associated with black maternal race/ethnicity (OR=3.35, 95% CI: 1.65–6.78, vs. all others), less than a college education level (OR=3.12, CI: 1.49–6.50), non-married or non-partnered status (OR=5.48, 95% CI: 2.60–11.53), household poverty (OR=5.40, CI: 1.88–15.50), and various employment characteristics in simple logistic regression. In a multivariate model where age, maternal ethnicity, maternal education, maternal marital/partner status, household poverty, and employment characteristics were tested for inclusion, less than college education level (adjusted OR=2.19, 95% CI: 1.00–4.82) and non-married or non-partnered status (adjusted OR=4.13, CI: 1.89–9.01) where the only significant predictors of french fry consumption. This study was limited by a small sample size (n=199), and employed mothers might not be directly comparable to all mothers. It is reasonable to expect that employment would be positively related to fast food consumption.

The Western Australian Pregnancy Cohort Study found that 14 year olds showed two patterns of eating, the HDP and the WDP [46]. As described earlier, those whose food frequency results showed HDP had high fruit and vegetable intake, as well as frequent consumption of whole grains, legumes and fish. In contrast, the WDP contained many refined grains, fatty and processed foods, and frequent consumption of french fries, soft-drinks, and take-away food. The WDP, in turn, was significantly associated with television and video watching, being in a single-parent household, being lower income, having a smoking parent, and calorie intake while adjusting for all of the variables in the model including BMI for age, physical activity, and maternal education. That is, low income, low education households were more likely to follow a pattern of french fry consumption along with other high-fat, processed foods.

In the Swedish cohort study, 68.8% of 2.5 year olds (30 month olds) had consumed "Fried potatoes/french fries" at least once a week. This definition of fried potatoes/french fries included pan-cooked potatoes, but apparently excluded potato chips in addition to other forms for potatoes [52]. Additionally, french fry consumption was negatively associated with later BMI increases.

In a recent nationally representative sample conducted in 1998, 24.6% of 4 to 8 year olds (the youngest age group in the study) had eaten at a fast food restaurant on a typical day [17]. Similarly, 42% of 2–9 year olds had consumed fast food in the previous 24 hours [79]. Frequent fast food consumption is associated with increased french fry consumption, TV screen time, and with unhealthy foods accessible in the home, among adolescents [80].

It does not appear that risk factors for french fry consumption specifically have been examined before in this age group. However, broadly speaking, french fry consumption is a "poor" health related behavior, or at least a health related behavior that is less than ideal, and the predictors of it follow the expected pattern, that is found often in child and maternal health research. That is, the outcome is worse for those who are not normal weight, experience partner-related stress, and whose pregnancies are unintended. And, conversely, the outcome is better for those who breastfed. Without adjusting for other factors, the outcome is worse for young mothers, poor households, and mothers with low educational attainment. The burden of french fry consumption appears to fall disproportionately upon non-Asian/PI minorities in Oregon, like many other health-related outcomes and behaviors.

There is also no consensus on whether french fries should be classified as a "vegetable" in dietary research and guidelines, since they contain a large quantity of fat and significantly differ in their nutritional content from other vegetables [81]. For example, the USDA's Food Guide Pyramid classifies french fries as a vegetable, while the National Cancer Institute "5-A-DAY for Better Health" program does not.

For two-year olds, the American Academy of Pediatrics recommends a modified food pyramid with 1 cup of fruit, 2 cups of vegetables, 3 ounces of grains, 2 ounces of meats and beans, 2 cups of diary, and 3 teaspoons of oil, for a total of 1,000 daily calories [82]. Consuming french fries contributes disproportionately to both calories and fat intake without proving other nutrients in large quantities like with other energy dense foods [17]. For

instance, a small serving (71 g) of french fries from McDonald's contains 23% of daily calorie intake for a two year old and 36% of daily intake of fat, while providing negligible amounts of vitamin A, calcium, and iron [83].

4.3 Implications

In this current thesis, french fry consumption was significantly associated with non-normal maternal BMI, lack of breastfeeding at 10 weeks of age, unintended pregnancy, and partner-related stress. It is established that an obese maternal BMI increases the risk of childhood obesity, at both 2 and 4 years old [11]. Similarly, obesity has a large degree of heritability [12] and there is high concordance between toddlers and their parents' food preferences [84]. Thus the finding of overweight and obese mothers having children consuming more french fries is not surprising. However, the finding that underweight mothers have the largest degree of association with french fry consumption is difficult to place into context of previous research.

Breastfeeding is known to be related to many positive maternal and child health outcomes, including having a protective effect against obesity into adulthood [3, 19, 20]. Breastfeeding also is associated with infants having a more adventurous palate, while french fries are a bland food item. Breastfed infants are more likely to try novel, complex tasting foods and be accepting of fruits when their mother also had eaten this food; this effect continues after being weaned [29]. It is also possible that breastfeeding represents the fact that some mothers may simply be more oriented towards a healthy diet, that excludes french fries. This could relate to the WDP versus the HDP; perhaps breastfeeding is part of the early formation of the HDP (analogous to the Prudent DP). Thus breastfeeding may represent a general interest in well-being rather than the specific action of breastfeeding.

Pregnancy intention is used to approximate the psychological, cultural, and social environment that the infant is born into [30]. Children from unintended pregnancies are known to have many worse health outcomes that children from intended pregnancies. French fry consumption may be avoided by vigilance on the part of the parents; parents of children from unintended pregnancies may be less vigilant in their dietary monitoring.

In this current study partner-related stress is defined as positive response to any one or more of this items: separated or divorced from husband or partner; argued with my husband or partner more than usual; and, husband or partner said he didn't want me pregnant, all within the "the 12 months before your baby was born" [41]. An event taking place at least two years before the outcome was positively associated with it. Likely, partner-related stress may be a marker conflict in the relationship, which may be a persistent occurrence, despite the limited sampling window of the question. Partner-related stress appears to be a similar construct to the family functioning variable in the Australian cohort [46]. In that study, low functioning responses to questions of the general function scale of the McMaster Family Assessment Device[1] [85] were positively associated with french fry consumption, even in a multivariate model. These findings hatch the idea that french fry consumption may in some way be a either a coping mechanism of sorts (such as a comfort food), or be related to poorer emotional regulation or family function.

4.4 Strengths and Limitations: Causality, Bias, Chance, and Confounding

This study's design is notable for its representative sample, degree of sampling the population, and longitudinal nature. As a secondary analysis of a prospective cohort, it is limited by the non-experimental design like all cohort studies and potential selection bias with respect to inclusion of and drop-out of participants. However the crude response rate (which could be a sign of potential response bias) is low partially due to oversampling by design; once adjusted, the response rate is higher. Given the population level nature of the study,

[1] 1. Planning family activities is difficult because we misunderstand each other.
2. In time of crisis we can turn to each other for support.
3. We cannot talk to each other about sadness we feel.
4. Individuals are accepted for what they are.
5. We avoid discussing our fears and concerns.
6. We can express feelings to each other.
7. There are lots of bad feelings in the family.
8. We feel accepted for what we are.
9. Making decisions is a problem for our family.
10. We are able to make decisions about how to solve problems.
11. We don't get along well together.
12. We confide in each other.

base-line demographics are known for all non-responders from the birth certificates so that a non-response adjustment can be made. Even if there is a limited response rate, it is not a large concern as long as both the risk factors and the outcome are not linked to the risk of non-response.

PRAMS-2 is a population level longitudinal follow-back survey from a surveillance project, which makes it distinct from a clinical prospective cohort. The sampling frame was all recent mothers in the state, rather than some sub-population for a particular research question. Inferences from the PRAMS-2 sample can be drawn directly to the entire state population due to the sampling design. This follow-back design is much stronger than a repeated cross-sectional design. Yet it is weaker in some respects than a clinical cohort due to fewer measurement points in time. Thus causality cannot be assessed well through the design of PRAMS-2.

Some questions contained a larger number of missing answers from participants. Missing data is not adjusted for by the weighting schemes. Non-repsonce and non-coverage only adjust for those who do not participate at all, rather than adjusting for those who partially participate. Those with missing data for a particular variable under examination were simply excluded from that particular analysis. Excluding missing data could raise concerns of a differential information bias if the probability of the data missing was related to the outcome.

Most measurements are self-reported by the mothers on a paper survey. While self-reports may not be entirely precise, it will not effect inferences from this study as long as self-report imprecision is uniform throughout the sample of mothers.

French fry consumption was assessed by asking, "How many days in a typical week does your two-year-old eat each of the foods listed below? Circle the number of days." While "typical" might lead to some imprecision in the estimation by the responding mothers, it would not likely be systematically an under- or over-estimate of the true frequency. Given that the age of the children is an average of 25 months old at the time of the survey, the sampling frame for "a typical week" should only in the past month, since the question asks specifically about "your two-year-old" (i.e., 24 month old), if the question is being read strictly.

However, this question format is not standardized, so degree of potential misclassification has not been systematically evaluated. The PRAMS-2 questionnaire was qualitatively field tested in both English and Spanish in an attempt to improve the accuracy and precision of the responses to the questions [70].

The measurement of the any self-reported variable always carries some degree of imprecision. However, there is no reason to suspect that this imprecision in the measurements of the predictors or the outcome creates a bias in some degree. The addition of imprecision would move the estimate of the effect towards the null. Thus a positive finding would not be created by non-systematic imprecision in measurement.

Since the observed association is positive (i.e., OR>1) among the predictors and french fry consumption, rather than an observed risk of unity (i.e., OR=1), the concern with bias is over differential bias. Non-differential bias would simply bias the relative risks towards the null, while differential bias has the ability to create an apparent positive association when there is none.

Confounding is a concern in this analysis. There is lack of full control for known potential confounders, such as SES. Yet, markers of SES (income and education) dropped out of the model building process as non-significant. Even with the included variables there is concern about residual and unknown confounding. That is, partner related stress, for example, may be incompletely capturing the construct that it is thought to measure. Furthermore, there may be unknown confounding from a construct that was not included as a potential predictor, yet is also associated with the predictors and the outcome.

Chance seems unlikely to explain the results of this thesis. The significant predictors in the univariate analyses generally had small p-values, many less than 0.01. Given the consistent pattern of lower SES being associated with french fry consumption, in a similar manner that other poor health related behaviors are, the consistent direction of the associations in combination with small p-values strength the validity of these findings. Similarly in multivariate modeling, the Hosmer and Lemeshow method for multivariate model building aims to include only significant predictive variables, and exclude serendipitous variables. Furthermore, goodness-of-fit testing reveals that the model provides a good fit of the data.

The outcome in this study is french fry consumption rather than childhood obesity

partially because preliminary analyses of PRAMS-2 found that mothers reported grossly inaccurate heights of their children and that many mothers left this questions blank, and partially due to the utility of measuring and contextualizing french fry consumption itself. Hence, PRAMS-2 does not have a reliable measure of the children's BMI (for obesity) at age two. However, it does include maternal BMI and the child's birthweight, so there are some biomarkers in addition to self-reported behavioral measures. This study is not attempting to make direct inferences from diet to obesity. Behaviors, such as eating habits, are better to study than biological outcomes since they are modifiable and thus preventable. Yet, there is some evidence that weight-gain is associated with french fry consumption specifically [14]. Thus, french fry consumption could be on a pathway towards obesity and poor health, so it is a worthy end-point in itself.

A prospective cohort study may be used to assert a degree of causality. The strength of the associations is strong (OR >1.5 and p-values>0.02) for maternal BMI, unintended pregnancy, and partner related stress. The direction of these associations is consistent with previous child and maternal health literature in general, but there are no other french fry consumption studies with risk factors to which to make direct comparisons. French fries are a highly specific food and is unlikely to be confused with any other food. The predictors are not as specific, but are similar in their construct and measurement to other studies in the field. A strength of this thesis is the temporal nature of PRAMS-2. All of the variables in the multivariate model occurred and were measured before the outcome was assessed. A dose-response relationship is observed in the associations with both maternal BMI and with breastfeeding duration. Obese mothers have children who consume more french fries than children of overweight mothers. However, this relationship is not linear, since underweight mothers have children with greater consumption of french fries than any other weight group. For breastfeeding, a more linear association is observed with age at breastfeeding cessation. The plausibility of a fatty food causing weight gain is consistent with current biologic thought. However, a casual association is not being promoted due to the degree of potential unmeasured and residual confounding.

4.5 Future Research

Many epidemiological studies have shown that breastfeeding leads to positive outcomes for children, but the exact mechanisms of this occurrence remain elusive. Breastfeeding as an infant leads to lower rates of obesity when they are children. Currently, the Oregon PRAMS data has been used to describe associations with breastfeeding, but only at a cross-sectional point in the lifespan. This thesis used the longitudinal PRAMS-2 data set which allowed for a long-term inference throughout the first two years of the life-span.

This thesis showed that breastfeeding (in addition to partner related stress, maternal BMI, and unintended pregnancy) influences childhood dietary habits, providing evidence for specific interventions to be designed. It also provides a stepping stone for future research to be able to link diet to obesity and related behavioral outcomes. Possible interventions might including having mothers with multiple risk factors for raising children with poor diets being provided a counseling session during a pre-natal visit, or at a well-baby exam, for example. Other research suggest that frequent french fry consumption may be a part of a lager SES paradigm relating to class and dietary habits.

Maternal and child health research has proposed a framework for addressing racial health disparities in children that incorporate principles of community-based participatory research (CBPR) [86]. CBPR views research as an activity that addresses the needs of a community (whether based upon SES, or geography), upholds respect for person-hood, and views participants as truly that. Specifically, this type of research should be high quality in its analytic methods, and be culturally and linguistically sensitive by including community collaboration. In regards to french fry consumption, a CBPR approach would address reducing french fry consumption in the groups who are over-represented in their consumption, these groups being either geographical or social. Such an approach would likely need to address the entire Western dietary pattern as a whole, of which french fries are part.

4.6 Public Health Practice

The results of this study can immediately be used by physicians and other care providers to remind parents about providing a healthy diet for two year olds. Many care providers will likely be surprised by the widespread prevalence of such unhealthy diets in very young children. Poor diets in children leading to childhood obesity is an expanding problem for our country and for our community, and a better understanding of its mechanism will allow for more targeted and effective interventions. However, that is the realm of medicine, rather than public health *per se*, and would be considered a form of secondary prevention.

Even if the predictors of french fry consumption in the multivariate model are not entirely unconfounded, existing programs that aim to decrease unintended pregnancies, increase breastfeeding initiation and duration, and encourage a healthy weight for women and their children should be encouraged. These interventions contribute to many improved outcomes for mothers and their children, and decreased french fry consumption could be one additional, small benefit.

A policy change could be considered a form of primary and secondary prevention. Children's food preferences are shaped in part by marketing. Children (ages 3.5–5.4 years old) rated french fries as significantly more tasty when wrapped in McDonald's packaging rather than plain packaging [87]. Some have drawn a parallel to fast food marketing from the efforts of tobacco companies' marketing towards children [88]. Many Americans feel that the assertion of direct causation of obesity by fast-food companies is not a concern of the regulation, yet many feel that the regulation marketing towards children is. This degree of *parens patriae* ("parent of the nation") towards a ban of fast-food advertising was proposed in Britain. Some policy advisers are advocating for a fast food marketing ban for campaigns aimed at children in the US. However in the US, the Fair Trade Commission (FTC) currently is prohibited by law to regulate "'non-misleading" advertising targeting children [88], despite the finding the children up to ten years of age are often unable to comprehend the intent of advertising [89].

Childhood obesity is a sizable concern among Pacific Northwest residents [90]. About 90% of residents thought that parents were the largest contributors to childhood obesity,

above advertisements for processed foods (at 80%). This thesis simply enumerates the prevalence of french fry consumption among young children in Oregon. There are many potential policy responses, but this thesis does not address how the high prevalence of french fry consumption should be addressed and does not attempt to demonstrate that it is directly related to a poor health outcome, other than the behavior itself. However, previous research has demonstrated the poor nutritional quality of french fries, and a paradigm is emerging from which to view the over-consumption of foods such as french fries.

Chapter 5

Summary and Conclusions

French fry consumption is highly prevalent among two-year olds in Oregon as reported by their mothers. Overall, 67% of two-year olds consumed french fries in a typical week in 2007. French fry consumption was higher for minority racial/ethnic groups as compared to NH Whites and NH Asian/Pacific Islander. French fry consumption was also higher among those of low SES, such as low household income and low maternal education attainment. Greater duration breastfeeding was negative associated with french fry consumption. Multivariate modeling included unintended pregnancy, non-normal maternal BMI, partner related stress and a lack of breastfeeding at 10 weeks as significant risk factors for any french fry consumption.

This thesis is notable for its longitudinal nature and representative sampling method. Children were followed at the individual mother-child dyad level for about two-years, and were selected by a random, stratified sampling method that later adjusts for the non-response and non-coverage. The thesis is limited by potential unmeasured and residual confounding in the variables, mainly breastfeeding.

The findings of this thesis indicate the traditional maternal health programs should continue to intervene in the prevention of unhealthy maternal weights and unintended pregnancy, and should continue efforts at encouraging breastfeeding initiation and duration. Public health practitioners may consider a community-based participatory research study to design an intervention to decrease french fry consumption, and other political-economic policy approaches.

Bibliography

[1] Mary Kay Fox, Susan Pac, Barbara Devaney, and Linda Jankowski. Feeding infants and toddlers study: What foods are infants and toddlers eating? *J Am Diet Assoc*, 104 (1 Suppl 1):s22–30, Jan 2004. ISSN 0002-8223 (Print). doi: 10.1016/j.jada.2003.10.026.

[2] Institute of Medicine, Committee on Prevention of Obesity in Children and Youth. *Preventing childhood obesity: health in the balance*. The National Academies Press, 2005.

[3] J Kotch. *Maternal and Child Health: Programs, Problems and Policy in Public Health*. Jones and Bartlett Publishers, 2005.

[4] G. Block, C.M. Dresser, A.M. Hartman, and M.D. Carroll. Nutrient sources in the American diet: quantitative data from the NHANES II survey: II. macronutrients and fats. *American journal of epidemiology*, 122(1):27, 1985.

[5] Jennifer S Savage, Jennifer Orlet Fisher, and Leann L Birch. Parental influence on eating behavior: conception to adolescence. *J Law Med Ethics*, 35(1):22–34, Spring 2007. ISSN 1073-1105 (Print). doi: 10.1111/j.1748-720X.2007.00111.x.

[6] C.Ebbeling, D.Pawlak, and D.Ludwig. Childhood obesity: public-health crisis, common sense cure. *The Lancet*, 360:473–482, 2002.

[7] Sue Y.S. Kimm and Eva Obarzanek. Childhood obesity: A new pandemic of the new millennium. *Pediatrics*, 110(5):1003–1007, 2002.

[8] Oregon Department of Human Services, Office of Family Health. Oregon child health 2010 data and resource guide. Webpage accessed July 11^{th}, 2010: www.oregon.gov/DHS/ph/ch/data_resources.shtml , 2010.

[9] J. Utter, D. Neumark-Sztainer, R. Jeffery, and M. Story. Couch potatoes or french fries: Are sedentary behaviors associated with body mass index, physical activity, and dietary behaviors among adolescents? *Journal of the American Dietetic Association*, 103(10):1298–1305, 2003.

[10] JoAnn E. Manson and Shari S. Bassuk. Obesity in the United States: A fresh look at its high toll. *JAMA*, 289:229–230, 2003.

[11] Robert C. Whitaker. Predicting preschooler obesity at birth: The role of maternal obesity in early pregnancy. *Pediatrics*, 114(1):e29–36, 7 2004.

[12] Andrew J. Walley, Julian E. Asher, and Philippe Froguel. The genetic contribution to non-syndromic human obesity. *Nat Rev Genet*, 10(7):431–442, 07 2009.

[13] Adam Drewnowski and SE Specter. Poverty and obesity: the role of energy density and energy cost. *American Journal of Clinical Nutrition*, 79(1):6–16, 2004.

[14] SA French, RW Jeffery, JL Forster, PG McGovern, SH Kelder, and JE Baxter. Predictors of weight change over two years among a population of working adults: the Healthy Worker Project. *International Journal of obesity and related metabolic disorders: Journal of the International Association for the Study of Obesity*, 18(3):145, 1994.

[15] Adam Drewnowski and SE Specter. Poverty and obesity: the role of energy density and energy costs. *Am J Clin Nutr*, 79(1):6–16, 2004.

[16] L Fillion and CJK Henry. Nutrient losses and gains during frying: a review. *International journal of food sciences and nutrition*, 1998.

[17] Shanthy A. Bowman, Steven L. Gortmaker, Cara B. Ebbeling, Mark A. Pereira, and David S. Ludwig. Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. *Pediatrics*, 113(1):112–118, 1 2004.

[18] SA French, L. Harnack, and RW Jeffery. Fast food restaurant use among women in the Pound of Prevention study: dietary, behavioral and demographic correlates. *International Journal of Obesity*, 24(10):1353–1359, 2000.

[19] Rüdiger von Kries and et al. Breast feeding and obesity: cross sectional study. *BMJ*, 319:147–150, 1999.

[20] Stanley Ip, Mei Chung, Gowri Raman, Priscilla Chew, Nombulelo Magula, Deirdre DeVine, Thomas Trikalinos, and Joseph Lau. Breastfeeding and maternal and infant health outcomes in developed countries. *Evid Rep Technol Assess (Full Rep)*, (153): 1–186, Apr 2007. ISSN 1530-4396 (Print).

[21] Alicja R. Rudnicka, Christopher G. Owen, and David P. Strachan. The effect of breastfeeding on cardiorespiratory risk factors in adult life. *Pediatrics*, 119(5):e1107–1115, 5 2007.

[22] Laurence M. Grummer-Strawn and Zuguo Mei. Does breastfeeding protect against pediatric overweight? analysis of longitudinal data from the centers for disease control and prevention pediatric nutrition surveillance system. *Pediatrics*, 113(2):e81–86, 2 2004.

[23] Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*, 115 (2):496–506, 2 2005.

[24] Kenneth D. Rosenberg, Carissa A. Eastham, Laurin J. Kasehagen, and Alfredo P. Sandoval. Marketing infant formula through hospitals: the impact of commercial hospital discharge packs on breastfeeding. *American Journal of Public Health*, 98(2):290–295, 2 2008.

[25] Kenneth D. Rosenberg, Zhiwei Yu, and Alfredo P. Sandoval. Risk factors for not breastfeeding at 10 weeks, Oregon, 1998-99. In *American Public Health Association 129th Annual Meeting*, October 22, 2001.

[26] Jihong Liu, Kenneth D. Rosenberg, and Alfredo P. Sandoval. Breastfeeding duration and perinatal cigarette smoking in a population-based cohort. *American Journal of Public Health*, 96(2):309–314, 2 2006.

[27] M.S. Kramer and R. Kakuma. Optimal duration of exclusive breastfeeding. *Cochrane Database of Systematic Reviews*, (1), 2002.

[28] Michael D. Kogan, Gopal K. Singh, Deborah L. Dee, Candice Belanoff, and Laurence M. Grummer-Strawn. Multivariate analysis of state variation in breastfeeding rates in the United States. *American Journal of Public Health*, 98(10):1872–1880, 10 2008.

[29] Catherine A Forestell and Julie A Mennella. Early determinants of fruit and vegetable acceptance. *Pediatrics*, 120(6):1247–1254, Dec 2007. ISSN 1098-4275 (Electronic). doi: 10.1542/peds.2007-0858.

[30] J. Santelli, R. Rochat, K. Hatfield-Timajchy, B.C. Gilbert, K. Curtis, R. Cabral, J.S. Hirsch, L. Schieve, and Unintended Pregnancy Working Group. The measurement and meaning of unintended pregnancy. *Perspectives on Sexual and Reproductive Health*, pages 94–101, 2003.

[31] Kaaren Nelson-Munson. Pregnancy intention and breast feeding duration : an analysis of the Oregon PRAMS 2005 dataset. Master's thesis, Oregon Health & Science University, 2009.

[32] D.V. D'Angelo, B.C. Gilbert, R.W. Rochat, J.S. Santelli, and J.M. Herold. Differences between mistimed and unwanted pregnancies among women who have live births. *Perspectives on sexual and reproductive health*, 36(5):192–197, 2004.

[33] K Kost, D J Landry, and J E Darroch. The effects of pregnancy planning status on birth outcomes and infant care. *Fam Plann Perspect*, 30(5):223–230, 1998 Sep-Oct. ISSN 0014-7354 (Print); 0014-7354 (Linking).

[34] S.C. Lonergan. *Environmental change, adaptation, and security*. Kluwer Academic Pub, 1999.

[35] J. Bhattacharya, J. Currie, and S. Haider. Poverty, food insecurity, and nutritional outcomes in children and adults. *Journal of Health Economics*, 23(4):839–862, 2004.

[36] D.M. Cutler, E.L. Glaeser, and J.M. Shapiro. Why have Americans become more obese? *Journal of Economic Perspectives*, 17(3):93–118, 2003.

[37] M. Nord, M. Andrews, and S. Carlson. Household Food Security in the United States, 2008. *Economic Research Report*, 83, 2009.

[38] Jacqueline T. Yates. Maternal depression and food insecurity during pregnancy among Oregon women. Master's thesis, Oregon Health & Science University, 2008.

[39] Carrie Jane Wales Tillotson. Acculturation and decreased breastfeeding among hispanic women : an analysis of data from the 2000-2001 Oregon Pregnancy Risk Assessment Monitoring System. Master's thesis, Oregon Health & Science University, 2007.

[40] B.G. Link and J. Phelan. Social conditions as fundamental causes of disease. *Journal of Health and Social Behavior*, 35:80–94, 1995.

[41] I.B. Ahluwalia, R. Merritt, L.F. Beck, and M. Rogers. Multiple lifestyle and psychosocial risks and delivery of small for gestational age infants. *Obstetrics & Gynecology*, 97 (5):649, 2001.

[42] T. Field, M. Diego, and M. Hernandez-Reif. Prenatal depression effects on the fetus and newborn: a review. *Infant Behavior and Development*, 29(3):445–455, 2006.

[43] CL Dennis and D. Creedy. Psychosocial and psychological interventions for preventing postpartum depression (Review). *Cochrane Database System Review*, 18(4), 2004.

[44] US Department of Health and Human Services. *Evidence of Trends, Risk Factors, and Intervention Strategies*. US Department of Health and Human Services, 2006.

[45] P. Braveman, C. Cubbin, K. Marchi, S. Egerter, and G. Chavez. Measuring socioeconomic status/position in studies of racial/ethnic disparities: maternal and infant health. *Public Health Reports*, 116(5):449, 2001.

[46] G.L. Ambrosini, W.H. Oddy, M. Robinson, T.A. OSullivan, B.P. Hands, N.H. De Klerk, S.R. Silburn, S.R. Zubrick, G.E. Kendall, F.J. Stanley, et al. Adolescent dietary patterns are associated with lifestyle and family psycho-social factors. *Public health nutrition*, 12(10):1807–1815, 2009.

[47] T.L. Halton, W.C. Willett, S. Liu, J.A.E. Manson, M.J. Stampfer, and F.B. Hu. Potato and french fry consumption and risk of type 2 diabetes in women. *American Journal of Clinical Nutrition*, 83(2):284, 2006.

[48] C. Heidemann, M.B. Schulze, O.H. Franco, R.M. van Dam, C.S. Mantzoros, and F.B. Hu. Dietary patterns and risk of mortality from cardiovascular disease, cancer, and all causes in a prospective cohort of women. *Circulation*, 118(3):230, 2008.

[49] AM Paradis, G. Godin, L. Pérusse, and MC Vohl. Associations between dietary patterns and obesity phenotypes. *International Journal of Obesity*, 33(12):1419–1426, 2009.

[50] Raphalle Varraso, Teresa T Fung, Frank B Hu, Walter Willett, and Carlos A Camargo. Prospective study of dietary patterns and chronic obstructive pulmonary disease among US men. *Thorax*, 62:786–791, 2007. doi: 10.1136/thx.2006.074534.

[51] K.B. Michels, B.A. Rosner, W.C. Chumlea, G.A. Colditz, and W.C. Willett. Preschool diet and adult risk of breast cancer. *International Journal of Cancer*, 118(3):749–754, 2006.

[52] K. Huus, H.K. Brekke, J.F. Ludvigsson, and J. Ludvigsson. Relationship of food frequencies as reported by parents to overweight and obesity at 5 years. *Acta Pædiatrica*, 98(1):139–143, 2009.

[53] O. Receveur, K. Morou, K. Gray-Donald, and A.C. Macaulay. Consumption of Key Food Items Is Associated with Excess Weight among Elementary-School–Aged Children in a Canadian First Nations Community. *Journal of the American Dietetic Association*, 108(2):362–366, 2008.

[54] G. David Batty, Ian J. Deary, Ingrid Schoon, and Catharine R. Gale. Childhood Mental Ability in Relation to Food Intake and Physical Activity in Adulthood: The 1970 British Cohort Study. *Pediatrics*, 119(1):e38–45, 2007. doi: 10.1542/peds.2006-1831.

[55] S. Stender, J. Dyerberg, and A. Astrup. High levels of industrially produced trans fat in popular fast foods. *New England Journal of Medicine*, 354(15):1650, 2006.

[56] D. Mozaffarian and M.J. Stampfer. Removing industrial trans fat from foods. *British Medical Journal*, 340(apr15 1):c1826, 2010.

[57] S.Y. Angell, L.D. Silver, G.P. Goldstein, C.M. Johnson, D.R. Deitcher, T.R. Frieden, and M.T. Bassett. Cholesterol control beyond the clinic: New York City's trans fat restriction. *Annals of internal medicine*, 151(2):129, 2009.

[58] J.G.F. Hogervorst, B.J. Baars, L.J. Schouten, E.J.M. Konings, R.A. Goldbohm, and P.A. van denBrandt. The carcinogenicity of dietary acrylamide intake: A comparative discussion of epidemiological and experimental animal research. *Critical Reviews in Toxicology*, (00):1–28, 2010.

[59] A.P. Arisseto, M.C. Toledo, Y. Govaert, and M. Degroodt. Determination of acrylamide levels in selected foods in Brazil. *Food Additives & Contaminants: Part A*, 24(3):236–241, 2007.

[60] Priya Srikanth. Women who quit smoking during pregnancy and relapsed in the first two years after pregnancy. Master's thesis, Oregon Health & Science University, 2009.

[61] Melissa Curan. Risk of food insecurity in mothers of children with special health care needs. Master's thesis, Oregon Health & Science University, 2009.

[62] B H Raveche and K D Rosenberg. Racial/ethnic disparities in consumption of soda and other sugar sweetened beverages among two year old children: Findings from a population-based survey. In *Oregon Public Health Association Annual Conference Presentations*, October 26, 2009.

[63] KD Rosenberg, AP Sandoval, K Hedberg, B Cadwell, and JY Oh. Television and Video Viewing Time Among Children Aged 2 Years—Oregon, 2006–2007. *Morbidity and Mortality Weekly Report*, 59(27):837–841, July 16, 2010.

[64] J.G. Grzywacz, J. Tucker, C.R. Clinch, and T.A. Arcury. Individual and Job-Related Variation in Infant Feeding Practices among Working Mothers. *American journal of health behavior*, 34(2):186, 2010.

[65] B.A. Lorson, H.R. Melgar-Quinonez, and C.A. Taylor. Correlates of fruit and vegetable intakes in US children. *Journal of the American Dietetic Association*, 109(3):474–478, 2009.

[66] Centers for Disease Control and Prevention. Pregnancy risk assessment monitoring system (PRAMS): Home. Webpage accessed May 17^{th}, 2010: http://cdc.gov/prams/, Nov. 2009.

[67] Centers for Disease Control and Prevention. Prams model protocol 2009 version. Downloaded May 17^{th}, 2010 from http://cdc.gov/prams/References/ModelProtocol50.zip , 2008.

[68] B.C. Gilbert, H.B. Shulman, L.A. Fischer, and M.M. Rogers. The Pregnancy Risk Assessment Monitoring System (PRAMS): methods and 1996 response rates from 11 states. *Maternal and Child Health Journal*, 3(4):199–209, 1999.

[69] Kenneth D. Rosenberg, Jill M. Gelow, and Alfredo P. Sandoval. Pregnancy intendedness and the use of periconceptional folic acid. *Pediatrics*, 111(5):1142–1145, 5 2003.

[70] Kenneth D. Rosenberg. Prams-2 response rates. personal communication, Feb 2010.

[71] Centers for Disease Control and Prevention. Pregnancy risk assessment monitoring system (PRAMS): Methodology. Webpage accessed May 17^{th}, 2010: http://www.cdc.gov/PRAMS/methodology.htm, Oct. 2009.

[72] David W Hosmer and Stanley Lemeshow. *Applied logistic regression.* Wiley, New York, N.Y., 2000. ISBN 0471356328 9780471356325.

[73] William Sribney. Stepwise regression with the *svy* commands. Webpage accessed May 17^{th}, 2010: http://www.stata.com/support/faqs/stat/stepsvy.html, 2010.

[74] K. J. Archer and S. Lemeshow. Goodness-of-fit test for a logistic regression model fitted using survey sample data. *Stata Journal*, 6(1):97–105, 2006.

[75] StataCorp LP. *Stata survey data reference manual : release 11.* StataCorp LP, College Station, Tex., 2009. ISBN 9781597180627 1597180629.

[76] William Sribney. Why should I not do a likelihood-ratio test after an ML estimation (e.g., logit, probit) with clustering or pweights? Webpage from STATA FAQs accessed May 2^{nd}, 2010: http://www.stata.com/support/faqs/stat/lrtest.html, 2005.

[77] StataCorp LP. *Stata Statistical Software: Release 10.* College Station, TX: StataCorp LP, 2007.

[78] Ronette R Briefel, Kathleen Reidy, Vatsala Karwe, and Barbara Devaney. Feeding infants and toddlers study: Improvements needed in meeting infant feeding recommendations. *J Am Diet Assoc*, 104(1 Suppl 1):s31–7, Jan 2004. ISSN 0002-8223 (Print). doi: 10.1016/j.jada.2003.10.020.

[79] S. Paeratakul, D.P. Ferdinand, C.M. Champagne, D.H. Ryan, and G.A. Bray. Fast-food consumption among US adults and children: dietary and nutrient intake profile. *Journal of the American Dietetic Association*, 103(10):1332–1338, 2003.

[80] SA French, M. Story, D. Neumark-Sztainer, JA Fulkerson, and P. Hannan. Fast food restaurant use among adolescents: associations with nutrient intake, food choices and behavioral and psychosocial variables. *Int J Obes Relat Metab Disord*, 25(12):1823, 2001.

[81] B.A. Dennison, H.L. Rockwell, and S.L. Baker. Fruit and vegetable intake in young children. *Journal of the American College of Nutrition*, 17(4):371, 1998.

[82] Tamekia Reece. Your child's nutritional needs change. *American Academy of Pediatrics: Healthy Children*, page 8, 2008.

[83] McDonald's. McDonald's USA nutrition facts for popular menu items. Webpage accessed August, 11^{th}, 2010: http://nutrition.mcdonalds.com/ nutritionexchange/nutritionfacts.pdf , January 2007.

[84] J. Skinner, B. Ruth Carruth, J. Moran III, K. Houck, J. Schmidhammer, A. Reed, F. Coletta, R. Cotter, and D. Ott. Toddlers' food preferences: Concordance with family members' preferences. *Journal of Nutrition Education*, 30(1):17–22, 1998.

[85] N.B. Epstein, L.M. Baldwin, and D.S. Bishop. The McMaster Family Assessment Device. *Journal of Marital and Family Therapy*, 9(2):171–180, 1983.

[86] Glenn Flores. Devising, implementing, and evaluating interventions to eliminate health care disparities in minority children. *Pediatrics*, 124(Supplement_3):S214–223, 11 2009.

[87] T.N. Robinson, D.L.G. Borzekowski, D.M. Matheson, and H.C. Kraemer. Effects of fast food branding on young children's taste preferences. *Archives of Pediatrics and Adolescent Medicine*, 161(8):792, 2007.

[88] L.J. Munger. Is Ronald McDonald the Next Joe Camel-Regulating Fast Food Advertisements Targeting Children in Light of the American Overweight and Obesity Epidemic. *Conn. Pub. Int. LJ*, 3:456, 2003.

[89] C. Oates, M. Blades, and B. Gunter. Children and television advertising: when do they understand persuasive intent? *Journal of Consumer Behaviour*, 1(3):238–245, 2002.

[90] Doug Nadvornick. Poll: Obesity seen as a growing problem. Oregon Public Broadcasting News, published June 23, 2010. Downloaded from http://news.opb.org/article/7697-poll-obesity-seen-growing-problem/, 2010.

Appendix A

Sample Statistical Commands

All weighted analyses were computed using the *svy* command within STATA. Goodness-of-fit testing occurred post-estimation using the *svylogitgof* Stata ado-command which is designed to work-within the *svy* environment [74].

Sample coding for the final model, Step 1 :

```
xi:  svy linearized : logistic eat_frys0  i.bcrace_mod i.educ3lvl i.fpl185  i.bcwic
i.str_part  i.bf10wks  i.str_trau  i.q75abs01 i.LV_NFOOD i.mat_age_24 i.bmigrp
 i.INSURE i.int_pr i.str_fin i.marstat_mod  i.MOMSMOKE i.bcrace_mod*bf10wks
 i.bcrace_mod*educ3lvl i.educ3lvl*bf10wks

test _IeduXbf10w_1 _IeduXbf10w_2
```

Appendix B

PRAMS and PRAMS-2 Surveys

B.1 PRAMS

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 ____

Please use this space for any additional comments you would like to make about the health of mothers and babies in Oregon.

Thanks for answering our questions!

Your answers will help us work to make Oregon mothers and babies healthier.

B.2 PRAMS-2

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?

_____ _____ 19_____
Month Day 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

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

	No	Yes	Don't

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?

_____ _____ 20_____
Month Day 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.

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 <u>one</u> 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**

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
a.	Need more time at doctor's visits than usual for children his/her age	N	Y
b.	Need more frequent office visits than usual for children his/her age	N	Y
c.	Need or use more medical or mental health services than usual for children his/her age	N	Y
d.	Currently need or use medicine (other than vitamins) prescribed by a doctor	N	Y
e.	Seem limited or prevented in any way in his or her ability to do the things most two-year-olds can do	N	Y
f.	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

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

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

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

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

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 <u>one</u> 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

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

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

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

<u>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.</u>

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

_____ Pounds **OR** _____ Kilos

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 <u>one</u> 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 <u>all</u> 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

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
g.	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

45b. How do you know your child's weight?
Check <u>one</u> 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 <u>one</u> 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 <u>one</u> 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 <u>all</u> 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 <u>all</u> 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 <u>one</u> 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 <u>all</u> 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 <u>all</u> 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 <u>one</u> answer.

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

_____