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Melody Wu Date

Educational Level and Self- Reported Breastfeeding Duration among Primiparas in the National Survey of Family Growth (NSFG) 2011 - 2013

BY

Melody Wu
Degree to be awarded: M.P.H
Executive MPH

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BY

Melody Wu
M.P.H., Emory University, 2016
D.V.M Universidad Peruana Cayetano Heredia, 2013

Thesis Committee Chair: Vijaya Kancherla, Ph.D

An abstract of
a Thesis Submitted to the Faculty of
The Rollins School of Public Health of Emory University in partial
Fulfillment of the requirements of the degree of
Master in Public Health
In the Executive MPH program
2016

Abstract

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BY
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BACKGROUND: Breastfeeding is vital for providing young infants with the nutrients they need for healthy growth and development; however, there are several socio-economic and health determinants that predict whether or not mothers are able to initiate and maintain it for the recommended duration. With changing demographics among first time mothers, we examined the current association between maternal education and self-reported breastfeeding duration in the U.S.

METHODS: Utilizing national and population-based cross-sectional data from the 2011-2013 National Survey of Family Growth (NSFG), we examined the association between maternal education and self-reported breastfeeding duration among primiparas aged 15-44 years. Breastfeeding duration was examined as an ordinal variable. We estimated adjusted odds ratios and 95% confidence intervals using a multivariable ordinal logistic regression, while controlling for several potential confounders.

RESULTS: Of the 2069 participants who were eligible for our analysis, 66.2% of first time mothers breastfed. 27.1% of them breastfed for less than a week to 8 weeks, 46.01% breastfed for 9 to 52 weeks and 15.12% breastfed for more than one-year-old and were still breastfeeding at the time of interview. Maternal education was an independent risk factor for the duration of breastfeeding among primiparas in our study sample), after controlling for age, race and ethnicity, marital status, religious beliefs, employment status and federal poverty level. Women with a college education and above were less likely to not breastfeed and to have shorter breastfeeding duration times. (aOR=0.59 CI= 0.47, 0.74) compared to women with lower education. In addition, women with less than high school education, even though it was not statistically significant, also were less likely to not breastfeed and to have shorter breastfeeding duration times (aOR=0.75 CI= 0.40, 1.35).

CONCLUSIONS: Our study points to an association between maternal education and breastfeeding duration after controlling for some important socio-demographic factors. Future studies should further explore how education, taken as a proxy for knowledge processing, is associated with breastfeeding, in a prospective analysis.

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Lastly, I certainly would not have been able to complete my graduate studies without the support of my family and friends. Special thanks to my husband, John Ballis, who supported me not only financially but emotionally, generously providing me the opportunity to be able to develop my professional goals and aspirations.

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The authors declare no competing financial interests.

ABSTRACT

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CONCLUSIONS: Our study points to an association between maternal education and breastfeeding duration after controlling for some important socio-demographic factors. Future studies should further explore how education, taken as a proxy for knowledge processing, is associated with breastfeeding, in a prospective analysis.

EXPANDED INTRODUCTION

According to the World Health Organization (WHO), "Breastfeeding is the normal way of providing young infants with the nutrients they need for healthy growth and development". (World Health Organization, 2002). The WHO and the Centers for Disease Control and Prevention recommend that breastfeeding should be initiated in newborns within an hour of birth and later followed by exclusive breastfeeding for the first six months; and at least 12 months of breastfeeding as optimal (CDC, 2007). Breastfeeding is most effective when mothers do so exclusively for the first six months (Ip et al., 2007), and later complemented with additional food sources that would satisfy nutritional needs for proper physical and cognitive development of the baby (WHO, 2003; CDC, 2015). The goal of Healthy People 2020, is to achieve 82% initiation of breastfeeding for newborns with at least 60% of those babies to continue breastfeeding up to six months and 34% for one whole year. (U.S. Department of Health and Human Services, 2014).

Human milk is the natural food source for babies and provides all the required nutrients and immunological protection from their mothers, providing the newborn with beneficial immunoglobulins from the mother (Lawrence et al., 2010; Office of The Surgeon General, 2011). Furthermore, mothers' decision to breastfeed or not will likely affect newborn health and outcomes for the child (Jenkins et al., 2014; McPeak et al., 2015). Breastfeeding has a positive impact on mother-child bonding (Bai et al., 2009). Additionally, breastfeeding has been associated with reduction in child mortality rates (WHO, 2002). Breastfed infants have statistically significant lower risk of asthma, sudden infant death syndrome (SIDS), obesity, non-specific gastrointestinal issues (e.g., diarrhea), and improved cognitive and sensory functions

(WHO, 2003; Office of The Surgeon General, 2011). Furthermore, infants exclusively formula fed during the first six months are 100% more at risk of suffering otitis media than their breastfed counterparts (Ip et al, 2007; Office of The Surgeon General, 2011). Health benefits also contribute not only to immediate benefits but evidence has proven that adolescents and adults who were breastfed as babies are less likely to be overweight or obese (Office of The Surgeon General, 2011). For mothers, breastfeeding is associated with a reduced risk for type 2 diabetes and breast and ovarian cancer, better recovery time and in general breastfeeding practice and duration are associated with better maternal outcomes (Bernier et al., 2000; Chung et al., 2008).

The economic impact of breastfeeding has been associated with lower health care costs-for children and less missed days at work for parents, moreover, several well-researched studies have concluded that promoting longer duration of breastfeeding exclusivity may be cost-effective (Ball, 2001; United States Breastfeeding Committee, 2002; WHO, 2002). A meta-analysis by Bartick et al. (2010) estimated that if 90% of families could comply with exclusive breastfeeding for 6 months, the U.S. could save $13 billion dollars per year and prevent an excess of 911 infant deaths per year. State level cost-effectiveness analysis of breastfeeding in the State of Louisiana showed a cost saving of approximately $216 million in healthcare associated costs and 18 infant deaths prevented if 90% of mothers breastfed exclusively for six months in the aforementioned State (Bartick, 2010; Ma, 2013).

The 2013 Breastfeeding Report Card by the CDC (using the National Immunization Survey's landline sampling frame (NIS) for 2010 births) showed that three-quarters of new mother's initiate breastfeeding right after birth, but only 16.4% exclusively continue breastfeeding at 6 months, 49% continue breastfeeding and provide another source of food, and 27% breastfeed their child up to one year of age (CDC, 2013). Most recent data from the 2015

National Immunization Survey (NIS) for the 2012 births cohorts showed an improvement in breastfeeding prevalence with up to 80% of infants having been ever breastfed, 21.9% exclusively breastfed up to six months, 51% at six months with addition of other food source, and 29.2% of infants breastfed up to twelve months of age (CDC, 2015). Even though U.S. breastfeeding practices seem to show an improvement, we still lag in meeting national objectives with gaps and disparities in breastfeeding rates.

There is extensive research showing variations in breastfeeding practices by socio-demographic factors. Race and ethnicity, socio-economic status, employment status, geographic location, religion beliefs, marital status, and educational level are important predictors of breastfeeding practices in the U.S. (Mitka, 2001; Li, 2002; CDC, 2007; Chapman, 2009; Gill, 2009; Perez-Escamilla, 2009; McGuire, 2011; Bai 2011; Jones, 2015; CDC, 2015; U.S. Department of Health and Human Services, 2016). African American women have a lower likelihood of breastfeeding, as well as continuing breastfeeding after six months, if they ever initiated breastfeeding practice in comparison to other race and ethnic groups (Jones, 2015; U.S. Department of Health and Human Services, 2016). Social, economic, cultural, political, and immigrant status have been identified as potential barriers to breastfeeding among African Americans (Bai 2011; McGuire, 2011; Jones, 2015). On the contrary, Hispanic women have higher breastfeeding rates in the U.S.; however, they vary by country of origin, geographic location, and acculturation, showing the longer Hispanic women live in the U.S., the less likely they are to breastfeed (CDC, 2007; Gill et al., 2009; Jones et al., 2015). In addition, breastfeeding rates vary by ethnic groups. Mexican American mothers are more likely to breastfeed than their Puerto Rican counterparts (Perez-Escamilla et al., 2009).

Mothers in lower income settings and those who receive Women, infants and children (WIC) benefits acknowledge the benefits of breastfeeding, but face too many barriers to incorporate this practice. For example, mothers of infants six months of age, who were not enrolled in the WIC program, were more than twice as likely to breastfeed at 6 months of age than mothers who participated in the WIC program (Ryan et al., 2006). In addition, mothers usually have jobs that do not support extended periods of absence or that are covered under the Family and Medical Leave Act, imposing another barrier to exercise exclusive breastfeeding and have lower rates compared to their mothers who are financially more stable. For example, a Maternity Leave less or equal to six weeks was associated with a fourfold and twofold higher odds of failure to establish a breastfeeding practice and an increased probability of breastfeeding cessation compared to women not returning to work so soon after delivery (Walker et al., 2002; Ahluwalia et al., 2005; Galtry et al., 2005; Guendelman et al.,2009; Colen et al., 2014).

Breastfeeding rates vary greatly by geographic location. Western States of the U.S. have higher rates of breastfeeding than their counterparts located on the North or South in the country (Ryan et al., 2002; Kogan et al., 2008). State's law and support regarding breastfeeding practices appeared to increase breastfeeding rates (Hawkins et al., 2013).

Marital status and partner support plays an important role and it is associated with positive effects in the decision of initiating and continuing breastfeeding (Persad & Mensinger, 2007). Scott et al (2006) reported found that women in Australia who perceived their partner had a positive attitude towards breastfeeding were more likely to breastfeed compared to their counterparts without partner support (Scott,2006). Religious beliefs are part of a complexity of multi-dimensional factors that affect breastfeeding perception and its practice. In Laroia et al.'s (2006) study among Hindu, religious beliefs were important predictors of breastfeeding;

however, women from the same religious background when moved to U.S., demonstrated different breastfeeding practices.

Lower maternal education has been associated as a significant predictor for not breastfeeding in the past (Grummer et al., 2009). Mothers with a college education were most likely to have ever been breastfed compared mothers with a high school degree or less (U.S. Department of Health and Human Services, 2011). Even though maternal education is a usual predictor of breastfeeding practice, few studies have analyzed it as an independent contributing factor for breastfeeding. Kelly & Watt's Millennium Cohort Study on a sample of over 18,000 infants in four countries, including the United Kingdom, reported that maternal education can be associated with higher income and better paying jobs that may influence their decision and ability to breastfeed (Kelly &Watt, 2005).

Our literature review noticed a gap in the current understanding of the association between maternal education and breastfeeding duration in the U.S. As an increasing number of women are choosing to have children at later ages, and pursuing higher education to meet the current socio-economic demands, it is important to investigate the modern association between maternal educational status and breastfeeding initiation and duration among women in the U.S. Our objective was to examine the association between maternal educational level and self-reported breastfeeding duration among primiparas aged 15-44 years old in a population-based, nationally-representative sample of women in the U.S. We used latest data from the National Survey of Family Growth (NSFG) 2011-2013, a maternal and child health focused, national cross-sectional survey that determines reproductive intention, fertility and maternal behaviors. We opine that our findings will contribute to ongoing efforts to promote breastfeeding among women by addressing challenges based on maternal education.

INTRODUCTION FOR PUBLICATION

According to the World Health Organization (WHO), "Breastfeeding is the normal way of providing young infants with the nutrients they need for healthy growth and development". (World Health Organization, 2002). The WHO and the Centers for Disease Control and Prevention recommend that breastfeeding should be initiated in newborns within an hour of birth and later followed by exclusive breastfeeding for the first six months; and at least 12 months of breastfeeding as optimal (CDC, 2007). Breastfeeding is most effective when mothers do so exclusively for the first six months (Ip et al., 2007), and later complemented with additional food sources that would satisfy nutritional needs for proper physical and cognitive development of the baby (WHO, 2003; CDC, 2015). The goal of Healthy People 2020, is to achieve 82% initiation of breastfeeding for newborns with at least 60% of those babies to continue breastfeeding up to six months and 34% for one whole year. (U.S. Department of Health and Human Services, 2014).

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METHODS

The National Survey of Family Growth (NSFG) is an ongoing, nationally representative cross-sectional survey conducted by the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS). Since its creation, the NSFG has completed six cycles, with the first cycle between 1976 and 2002, and beginning in 2006 data collection was conducted continuously with a minimum of two data years for analysis. Trained female interviewers collect data using computer-assisted personal interviews (CAPI). Data on sensitive topics were collected using an audio computer-assisted self-interviewing (ACASI). The NSFG was originally designed to be the national fertility survey of the U.S. and covers data elements that include sexual activity, marriage, divorce, contraception, breastfeeding, birth weight, sterilization, pregnancy, medical care for family planning and fertility. The standardized questionnaire's main focus is based on factors that help explain trends and group differences in birth rates, such as contraception, infertility, sexual activity, and marriage. To produce national estimates, all data are inflated by the reciprocal of the probability of selection at each stage of sampling, adjusted and post stratified, with benchmark population values based on data from the U.S. Census Bureau (NCHS, 2009; healthypeople.gov, 2014)

The 2011-2013 NSFG survey interviewed a national sample of 10,416 men and women aged 15-44 years living in households in the U.S., including 5,601 females and 4815 males. Interviews were conducted from September 2011 through September 2013. The response rate was 72.8% overall, including 73.4% for females and 72.1%t for males (CDC, 2015). The Institutional Review Board (IRB) at Emory University approved the current study.

Study population

Our study population is comprised of women aged 15-44 years with at least one live birth (primipara) and a completed the 2011 -2013 NSFG survey. From the total population of 5601 females, only those first time mothers with live births and self-reported breastfeeding duration were included in our final analytic sample (n=2,069). Women who were excluded (n=2992) were accounted for in our analysis under the domain variable, while maintaining the complex sampling strategy.

Exposure variable

Maternal educational was assessed from the question "Highest completed year of school degree". From the responses, we categorized and examined educational level as: Less than high school / High school graduate and College or greater.

Outcome variable

Women self-reported breastfeeding duration was obtained from the question: "Duration of breastfeeding in weeks?" Responses to this question included: never breastfed this child Less than a week / 1-4 weeks / 5-8 weeks / 9-26 weeks / 27-52 weeks / 53 weeks or longer / still breastfeeding this child. For our analysis, we pooled and re-categorized above responses in to four categories: Never breastfed this child / breastfed any time after birth for up to 8 weeks / breastfed 9-52 weeks / breastfed 53 weeks and over or still breastfeeding.

Co-variables

Following maternal variables were examined for potential confounding: age at time of the interview (in years) (under 20 / 21-24 / 25-29 / 30-44), race and ethnicity (Non-Hispanic Black / Non-Hispanic white / Hispanic / Non- Hispanic other), marital status (unmarried / married / other), place of residency (urban / rural), religion (no religion / catholic or protestant / other

religion), employment status (full time / other), federal poverty level income (0-99 / 100-299 / 300-499 / 500-1000).

Statistical analysis

We examined descriptive characteristics of women who based on selected categories of breastfeeding duration, and compared differences using Rao Scott Chi square tests. The association between self-reported breastfeeding and maternal education was examined using unadjusted and adjusted ordinal logistic regression. Crude and adjusted odds ratios and a 95% confidence interval (CIs) were calculated to assess proportional odds of breastfeeding duration. We examined potential interaction between maternal education and all selected co-variables and homogenienity was assessed using Breslow-Day test. Confounding was examined by maternal age at the time of interview, race and ethnicity, marital status, place of residency, religious beliefs, employment status, and federal poverty level. Confounding was established using the 10% change-in-estimate rule by comparing the odds ratios with and without the confounder in the model. Variables in the final model were selected based on backward selection procedure. All the statistical analysis was performed using complex survey procedures in SAS version 9.4 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Of the 5601 women participating in the 2011-2013 NSFG survey, we had complete information on main exposure (maternal education) and outcome (breastfeeding duration) and live births for 2069 women (Figure 1). These 2069 women (36.93% of the total number of women interviewed) were included in the final analytic sample for our study. Of the 2069 participants who were eligible for our analysis, 66.17% of first time mothers breastfed. 27.1% of them breastfed for less than a week to 8 weeks,46.01% breastfed for 9 – 52 weeks and finally, 15.12% of first time mother continue to breastfeed after infant turned one-year-old and still breastfeeding at the time of interview. Overall, of the 2069 women, 700 (33.8%) women self-reported that they have never breastfed, 371 (17.9%) breastfed for less than a week to eight weeks, 791 (38.2%) breastfed for nine to 52 weeks, and 207 (10.0%) were still breastfeeding their child after one year of giving birth and at the time of the interview.

We found significant differences in socio-demographics factors of women by their breast-feeding duration status (Table 1). Women who breastfed for more than a year were more likely to be higher educated ($P < 0.0001$). Breastfeeding duration also was significantly different based on age of the women, race and ethnicity, marital status, religious beliefs, employment status, and poverty level (all $P < 0.05$) (Table 1).

Multivariable analysis showed that maternal education was an independent risk factor for the duration of breastfeeding among primiparas in our study sample (Full Model: aOR=0.59 CI= 0.47, 0.74) after controlling for age, race and ethnicity, marital status, religious beliefs, employment status and federal poverty level. Women with a college education and above were less likely to not breastfeed and to have shorter breastfeeding duration times. (aOR=0.59 CI= 0.47, 0.74). In addition, women with less than high school education, even though it was not statistically

significant, also were less likely to not breastfeed and to have shorter breastfeeding duration times (aOR=0.75 CI= 0.40, 1.35).

On the final reduced model (Table 3) we kept age, race and ethnicity, marital status and religious form the previous fully adjusted model since they were the only ones that were statistically significant on our backward logistic regression model. We found similar results than the fully adjusted model, primiparas with a college education and above were less likely to not breastfeed and to have shorter breastfeeding duration times. (aOR=0.57 CI= 0.43, 0.74). In our final results younger mothers were more likely to never breastfeed or to have shorter breastfeeding periods than their older counterparts, concurring with previous literature. In addition, race and ethnicity, showed than black primiparas are less likely to engage or to continue breastfeeding practice (aOR= 1.56, CI= 1.06, 2.31), on the other hand their Hispanic counterparts were more likely to engage and continue this practice (aOR=0.44, CI= 0.28, 0.70).

EXPANDED DISCUSSION

To our knowledge, our analysis is the first to examine at a national-level the association between maternal education and self-reported breastfeeding duration among primiparas in the U.S. We found a significant association between maternal education and breastfeeding duration, after controlling for maternal age, race and ethnicity, marital status and religious beliefs concluding that maternal education in fact is an important predictor of the breastfeeding initiation and duration among primiparas in the US.

As previous studies using CDC data mentioned having a higher maternal educational in addition to other covariables are positively associated with continuing breastfeeding for longer periods. (Grummer et al, 2006). Our results are comparable to previous study by Jones et al 2015's study regarding mothers with lower breastfeeding rates are mothers are younger mothers, low income, unmarried, black and less educated (Jones et al, 2015). On CDC's 2012 data from the National Survey of Immunization, mother's that had higher levels of education were more likely to breastfeed and had higher percentages of breastfeeding after the baby turned one-year-old for example: Less than high school mothers that breastfed at 6 months was 40.3% compared to college graduate mothers than continue breastfeeding at six months 70.3% (NIS, 2015)

The validity of self-reported breastfeeding in the NSFG has been examined, even though the information obtained by self –reported data can be afflicted by biases and recall issues. However, several studies have validated maternal recall regarding breastfeeding when compared to health medical records (Launer, 1992; Vobecky, 1988). Li et al's (2005) examined 11 studies regarding maternal recall regarding breastfeeding and showed that maternal recall is a valid and reliable estimate of breastfeeding initiation and duration. (Li et al, 2005). Maternal recall appears to be accurate specially in short term periods, for example in Bland et al's study regarding

maternal recall in exclusive breastfeeding duration, seven-day recall accurately reflected the feeding practice compared with thrice weekly over the same time period (sensitivity 96%, specificity, 94%). (Bland et al, 2003).

We must also address some internal validity issues, in specific selection bias in this study, our final analytic sample counted for 2069 primiparas, we have to exclude 390 primiparas due to missing information on the outcome variable, breastfeeding duration. Table 1a. compares if there is any statistically significant difference between the included population (n=2069) and the excluded population (n=390) by socio-demographic characteristics.

Barriers that new mothers face regarding adopting this practice vary tremendously coming from cultural background and perception to socio-demographic barriers. Given the close link between maternal educational level and income, and therefore better work benefits, we can correlate this to maternity leave (Desai et al, 1998). For example, here in the U.S., even well intentioned mothers face the reality of having one of the worst maternity leaves for industrialized countries. Even though the 1993 Family Medical Leave Act (FMLA) provides 12 weeks of unpaid leave, only women that are in a better economic condition could use this benefit and this why many women cannot afford unpaid leave they will have to return to work sooner than 12 weeks affecting their breastfeeding intention and practice (Rubin, 2016).

Ample research has proven that community involvement and support would produce better breastfeeding duration outcomes (Perez–Escamilla et al., 2012). For that reason, several federal and hospital initiatives have been put in place. Additionally, support has been granted by First Lady Michelle Obama as a part of her campaign to fight against the childhood obesity epidemic in the U.S. and the U.S. Surgeon General's Call to Action to support Breastfeeding (U.S. Department of Health and Human Services, 2011). Several health organizations such as

Centers for Disease Control and Prevention (CDC), WHO and UNICEF, engage hospitals to participate in the breastfeeding initiative through a global program with The Baby Friendly Hospital Initiative (BFHI). In addition, to community support and federal initiatives regarding hospital care, maternal educational level, being a precursor to improve child health, should be as well taken into consideration, since based in our own analysis plays an important role on children outcome.

There are several strengths in our study. Our findings were derived from a population-based sample and are representative of primiparas in the US. The survey employed multi-probability answers and specific questions based on a reliable source, utilizing a questionnaire designed to capture maternal behavior, fertility, and overall reproductive intentions and health. The response rate in NSFG is high. The survey is valid and is based on standard data collection protocol employed by the CDC.

Our study also had limitations. The survey asked mothers to report about breastfeeding duration that has occurred in the past, which could lead to errors in recall. Additionally, some mothers may have altered their responses to present a more favorable breastfeeding duration, because breastfeeding is viewed as a beneficial habit. We had to exclude some eligible women from our analysis due to missing information on the main exposure and outcome of interest, as we mentioned above, affecting some internal validity (selection bias). Lastly, breastfeeding being a self-reported measure, there might have been some recall bias from mothers with older children as we mentioned above form previous studies. Finally, breastfeeding practice is influenced by a complexity of factors, that we couldn't account for this analysis, psychological factors, background, cultural differences, perception, country of origin, family support, access to healthcare, etc.

In conclusion, the results from this study give us as better understanding about the complexity of maternal behavior regarding breastfeeding. It is acknowledged that there are several different factors and social determinants of health have a decisive impact on maternal breastfeeding initiation and continuation. Our study points to an association between maternal education and breastfeeding duration after controlling for some important socio-demographic factors. Future studies should further explore this association in a prospective analysis with better data on all potential confounders and validated breastfeeding duration measures. There is a need to be addressed regarding maternal education and its strong link to other important variables that are proven to affect children outcome. Maternal education is linked to better income, better job and providing better access to care for women. Breastfeeding practice is strongly associated with child mortality, looking for options to improve child mortality should analyze precursors that influence mother behaviors and addressed barriers. As mentioned above future cohort prospective study should be recommended to further analyze maternal education controlling for socio- demographic and psychological factors.

DISCUSSION

To our knowledge, our analysis is the first to examine at a national-level the association between maternal education and self-reported breastfeeding duration among primiparas in the U.S. We found a significant association between maternal education and breastfeeding duration, after controlling for maternal age, race and ethnicity, marital status and religious beliefs concluding that maternal education in fact is an important predictor of the breastfeeding initiation and duration among primiparas in the US.

As previous studies using CDC data mentioned having a higher maternal educational in addition to other covariables are positively associated with continuing breastfeeding for longer periods. (Grummer et al, 2006). Our results are comparable to previous study by Jones et al 2015's study regarding mothers with lower breastfeeding rates are mothers are younger mothers, low income, unmarried, black and less educated (Jones et al, 2015). On CDC's 2012 data from the National Survey of Immunization, mother's that had higher levels of education were more likely to breastfeed and had higher percentages of breastfeeding after the baby turned one-year-old for example: Less than high school mothers that breastfed at 6 months was 40.3% compared to college graduate mothers than continue breastfeeding at six months 70.3% (NIS, 2015)

The validity of self-reported breastfeeding in the NSFG has been examined, even though the information obtained by self –reported data can be afflicted by biases and recall issues. However, several studies have validated maternal recall regarding breastfeeding when compared to health medical records (Launer, 1992; Vobecky, 1988). Li et al's (2005) examined 11 studies regarding maternal recall regarding breastfeeding and showed that maternal recall is a valid and reliable estimate of breastfeeding initiation and duration. (Li et al, 2005). Maternal recall appears to be accurate specially in short term periods, for example in Bland et al's study regarding

maternal recall in exclusive breastfeeding duration, seven-day recall accurately reflected the feeding practice compared with thrice weekly over the same time period (sensitivity 96%, specificity, 94%). (Bland et al, 2003).

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Figure 1. Subject selection criteria, National Survey of Family Growth 2011-2013

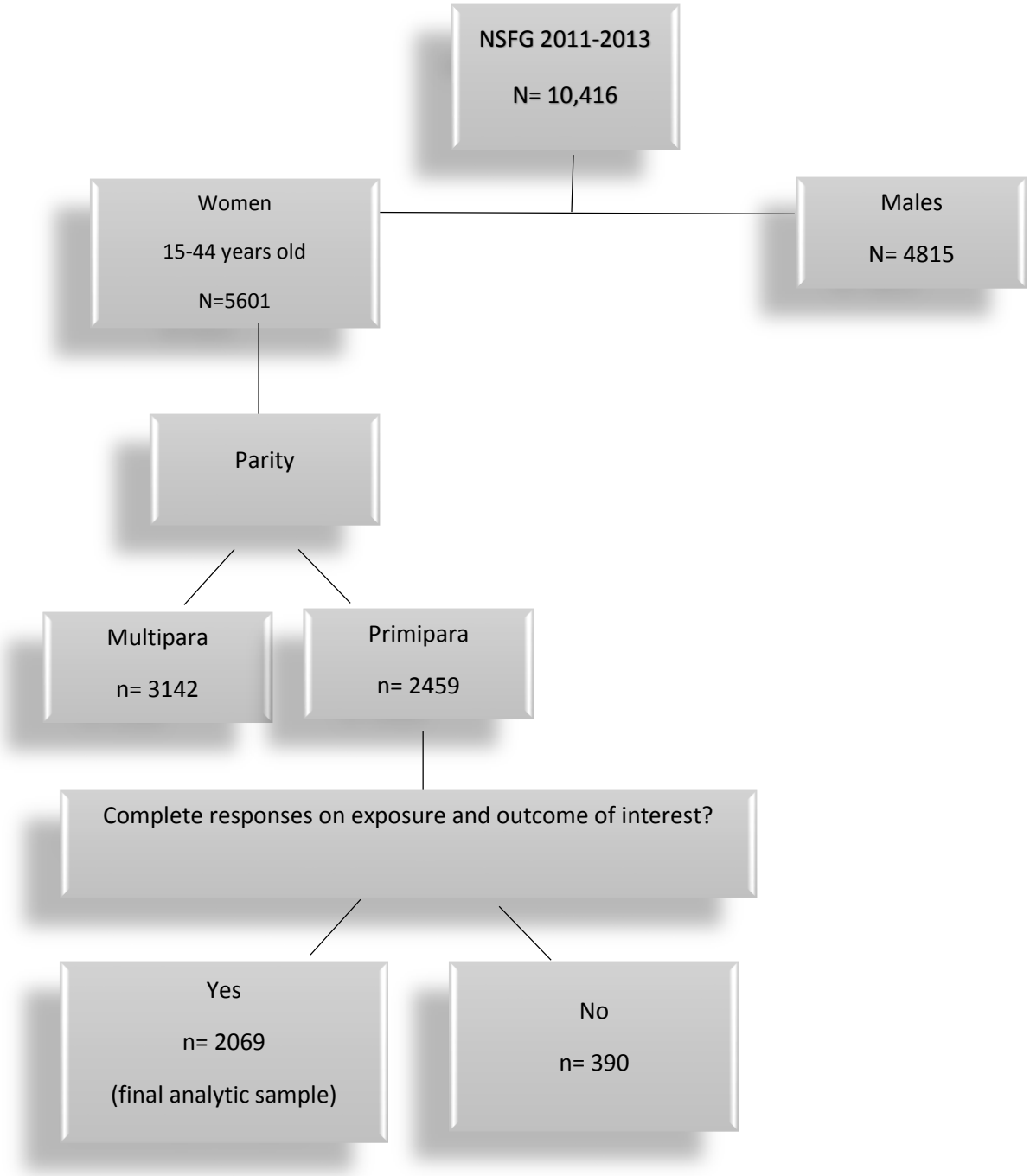

Table 1. Characteristics of U.S primiparas of reproductive age (15-44 years) by self- reported breastfeeding duration, National Survey of Family Growth 2011 -2013*

Characteristics	Never Breastfed **(n=700) (%?)** *Frequency (weighted%)*	Less than a week to 8 weeks **(n=371) (%?)** *Frequency (weighted%)*	9 - 52 weeks **(n=791)** *Frequency (%)? (weighted%)*	53 weeks - still breastfeeding **(n=207) (%)?** *Frequency (weighted%)*	Unadjusted Odds Ratios OR (95% CI)	*P* value
Educational Level						
Less than high school	161 (18.28)	65 (10.58)	125 (13.53)	38 (20.63)	**0.65 (0.44, 0.94)**	<.0001
High school graduate	277 (41.18)	111 (28.93)	190 (20.81)	51(26.44)	1.00	
College or greater	262 (40.53)	195 (60.48)	476 (65.83))	118 (52.92)	**0.46 (0.36, 0.60)**	
Age						
Less than 20 years	319 (42.69)	128 (23.41)	222 (23.77)	36 (18.99)	**2.58 (1.82, 3.64)**	<.0001
20 -24 years	253 (35.81)	136 (36.04)	293 (34.32)	62 (27.41)	1.65 (1.13, 2.41)	
25- 29 years	84 (14.54)	75 (29.29)	178 (25.76)	67 (33.06)	1.00	
30-44 years	44 (6.94)	32 (11.25)	98 (16.13)	42 (20.51)	**0.76 (0.47, 1.22)**	
Race and Ethnicity						
NH, White	245 (22.26)	60 (11.24)	124 (9.55)	16 (4.70)	1.00	<.0001
NH, Black	170 (18.07)	100 (17.73)	283 (24.70)	78 (34.70)	**2.24 (1.74, 2.88)**	
Hispanic	264 (55.13)	197 (67.11)	331 (57.61)	91 (47.52)	**0.63 (0.58, 0.69)**	
Other	21 (4.53)	14 (3.90)	53 (8.11)	22 (13.07)	**0.45 (0.26, 0.79)**	
Marital Status						
Unmarried	250 (23.63)	83 (15.35)	150 (13.62)	28 (8.32)	**2.17 (1.92, 2.45)**	<.0001
Married	215 (43.40)	180 (63.14)	401 (59.02)	132 (65.94)	1.00	
Other	235 (32.95)	108 (21.50)	240 (27.35)	47 (25.73)	**1.44 (1.22, 1.68)**	
Place of residency						
Urban	560 (80.16)	312 (83.62)	699 (85.34)	186 (89.76)	1.00	0.4518
Rural	140 (19.83)	59 (16.37)	92 (14.65)	21 (10.23)	1.46 (0.83, 2.58)	
Religious beliefs						
No religion	120 (21.37)	72 (19.60)	139 (19.15)	26 (11.30)	1.00	0.0001
Catholic/Protestant	550 (72.90)	281 (76.72)	574 (70.82)	141 (65.63)	0.85 (0.69,1.05)	
Other	30 (5.71)	18 (3.67)	78 (10.01)	40 (23.06)	**0.29 (0.19, 0.45)**	
Employment status						
Full-time	266 (39.45)	153 (47.03)	317 (42.82)	47 (24.27)	1.00	0.0007
Other	434 (60.54)	218 (52.96)	474 (57.17)	160 (75.72)	0.86 (0.66, 1.11)	
Federal Poverty level						
<=99	357 (42.10)	140 (27.95)	275 (29.51)	74 (27.57)	**2.42 (1.51,3.87)**	0.0024
100-299	243 (36.15)	146 (36.15)	319 (37.81)	67 (35.64)	**1.86 (1.22, 2.84)**	
300-499	70 (13.14)	52 (22.31)	114 (19.37)	36 (18.08)	**1.47 (1.24, 1.75)**	
500-1000	30 (5.76)	33 (13.57)	83 (13.29)	30 (18.70)	1.00	
Born outside U.S						
Yes	77 (10.09)	54 (12.60)	232 (23.76)	78 (36.56)	**2.815 (2, 3.96)**	<.0001
No	623 (89.90)	371 (87.39)	559 (76.23)	129 (63.43)	1.00	

Table 1a. Comparison of included vs. excluded eligible primaparas from the NSFG 2011- 2013 survey

	Included = 2069	**excluded =390**	**P value**
*Educational Level**			
Less than high school	389 (18.80)	86 (22.05)	
High school graduate	629 (30.40)	139 (35.64)	
College or greater	1051 (50.79)	165 (42.30)	**0.0126**
*Age**			
Less than 20 years	705 (34.07)	284 (72.82)	
20 -24 years	744 (35.95)	88 (4.25)	
25- 29 years	404 (19.52)	9 (2.30)	
30-44 years	216 (10.43)	9 (2.30)	**<.0001**
*Race and Ethnicity**			
NH, White	883 (42.67)	160 (41.02)	
NH, Black	445 (21.50)	103 (26.41)	
Hispanic	631 (30.49)	112 (28.71)	**0.0134**
Other	110 (5.31)	15 (3.84)	
*Marital Status**			
Unmarried	511 (24.69)	64 (16.41)	
Married	928 (44.85)	138 (35.38)	
Other	630 (30.44)	188 (48.20)	**<.0001**
*Place of residency **			
Urban	1757 (84.92)	305 (78.20)	
Rural	312 (15.07)	85 (21.79)	0.0764
*Religion **			
No religion	357 (17.25)	61 (15.64)	
Catholic/Protestant	1546 (74.72)	307 (78.71)	
Other	166 (8.02)	22 (5.64)	0.5764
*Employment status**			
Full-time	783 (37.84)	157 (40.25)	
Other	1286 (62.15)	233 (59.74)	**<.0001**
*Federal Poverty level **			
<=99	846 (40.88)	159 (40.76)	
100-299	775 (37.45)	155 (39.74)	
300-499	272 (13.14)	52 (13.33)	
500-1000	176 (8.50)	24 (6.15)	0.1221
Born Outside Us			
Yes	441 (21.31)	57 (14.61)	
No	1628 (78.68)	333 (85.38)	0.324

Table 2. Ordinal logistic regression model to examine the relationship between Educational level and self- reported breastfeeding duration among US primiparas between 15 -44 years old participating in The National Survey of Family Growth (NSFG) 2011- 2013

Characteristics	Model 1 Full Model Adjusted OR (95% CI)	Model 2 Reduced Model Adjusted OR (95% CI)
Educational Level		
Less than high school	0.75 (0.40, 1.35)	0.75 (0.43, 1.32)
High school graduate	1.00	1.00
College or greater	**0.59 (0.47, 0.74)**	**0.57 (0.43, 0.74)**
Age		
Less than 20 years	**1.89 (1.50, 2.38)**	**1.93 (1.54 ,2.42)**
20 -24 years	**1.37 (1.14, 1.64)**	**1.40 (1.13, 1.75)**
25- 29 years	1.00	1.00
30-44 years	0.74 (0.49, 1.10)	0.72 (0.48, 1.07)
Race and Ethnicity		
NH, White	1.00	1.00
NH, Black	**0.65 (0.43, 0.98)**	**1.56 (1.06, 2.31)**
Hispanic	**0.28 (0.23, 0.34)**	**0.44 (0.28, 0.70)**
Other	**0.41 (0.17, 0.99)**	0.63 (0.23, 1.77)
Marital Status		
Unmarried	1.24 (1.00, 1.54)	**1.31 (1.07, 1.59)**
Married	1.00	1.00
Other	1.05 (0.92, 1.19)	1.13 (0.97, 1.32)
Religious beliefs		
No religion	1.00	1.00
Catholic/Protestant	1.05 (0.97, 1.14)	1.04 (0.95, 1.14)
Other	**0.40 (0.19, 0.81)**	**0.38 (0.19, 0.79)**
Employment status		
Full-time	1.00	
Other	0.81 (0.64, 1.02)	
Federal Poverty level		
<=99	**1.53 (1.11, 2.11)**	
100-299	1.27 (0.85, 1.89)	
300-499	**1.31 (1.06, 1.61)**	
500-1000	1.00	
Born outside U.S		
Yes	2.12 (1.42, 3.18)	
No	1.00	

*Each variable is adjusted for all other variables in the model.