

Housing Instability and Birth Weight among Young Urban Mothers

Bianca V. Carrion, Valerie A. Earnshaw, Trace Kershaw, Jessica B. Lewis,
Emily C. Stasko, Jonathan N. Tobin, and Jeannette R. Ickovics

ABSTRACT *Housing instability is an understudied social condition that may be a severe stressor during pregnancy. Aims of this study are to identify correlates of housing instability and to explore the association between housing instability and birth weight among pregnant teens and young mothers. Participants included pregnant women ages 14–21 from seven community hospitals and health centers in New York City (N=623). Data were collected via structured surveys during the second trimester of pregnancy (14 to 24 weeks gestation, M=19.35, SD=3.20). Birth weight was obtained through labor and delivery logs. Housing instability was operationalized as two or more moves within the past year. More than one in four (28.5 %) pregnant teens and young women in this sample reported housing instability. Women who reported housing instability were less likely to be enrolled in school, have parents as main source of financial support, live in a single-family home or apartment, or be food secure; they were more likely to smoke (all $p < 0.05$). After adjusting for important clinical, behavioral, and demographic factors typically associated with lower birth weight, housing instability remained a significant predictor of lower birth weight ($B (SE) = -83.96(35.47)$, $p = 0.018$). Results highlight the importance of housing stability during pregnancy for infant health. Future interventions and policies should ensure that women are housing stable before, during, and after pregnancy.*

KEYWORDS *Adolescent pregnancy, Birth weight, Housing instability, New York City, Pregnancy*

INTRODUCTION

Variations in infant birth weight, even within normal range of weight, have a significant effect on child health and social outcomes.^{1,2} Social conditions during pregnancy have a strong influence on birth outcomes, including birth weight.³ Housing instability is an understudied social condition that may act as a severe stressor during pregnancy. The US Department of Health and Human Services has defined housing instability as having high housing costs (>30 % of a household's monthly income), poor housing quality, unstable neighborhoods, overcrowding, or homelessness.⁴ Other parameters of housing instability include frequent moves and/or living with relatives and friends.⁵ Although up to 55 % of families in poverty experience housing instability,⁶ national and state estimates of housing instability

Carrion, Earnshaw, Kershaw, Lewis, Stasko, and Ickovics are with the Yale School of Public Health, New Haven, CT, USA; Albany Medical College, Albany, NY, USA; Drexel University, Philadelphia, PA, USA; Tobin is with the Clinical Directors' Network, New York, NY, USA.

Correspondence: Jeannette R. Ickovics, Yale School of Public Health, New Haven, CT, USA. (E-mail: jeannette.ickovics@yale.edu)

vary due to differing criteria for measuring housing instability, geographic location, and study sample.

Recently, there has been an increase in studies aimed at understanding whether housing instability adversely influences health.⁷⁻⁹ Among children, multiple moves have been associated with fair or poor child health, increases in attention problems, and lower weight for age.¹⁰ Among adults, homelessness has been associated with higher risk of mortality,¹¹ morbidity,¹² and poor mental health and distress symptoms.¹³

To date, research on the effects of housing instability on birth outcomes has been limited. Stein and colleagues demonstrated that being homeless predicted low birth weight among a sample of 237 women in Los Angeles.¹⁴ However, less is known about the effects of multiple moves, which may affect more pregnant women than homelessness. Moreover, no studies to date have examined these associations among pregnant teens and young women, including those living in urban areas, who may be particularly at risk.

The purposes of this study are the following: (1) to identify factors associated with housing instability (defined as two or more moves in the past year) among pregnant teens and young women; and (2) to examine the association between housing instability and infant birth weight. We hypothesize that housing instability will be associated with lower birth weight.

METHOD

Study Participants

Pregnant women were enrolled in a randomized controlled trial of a group prenatal care intervention at 14 community hospitals and community health centers in New York City. This was a cluster randomized controlled trial: one-half of clinical sites were randomized to deliver the group prenatal care intervention and the other half received standard individual prenatal care. For these analyses, data were utilized from the clinical sites delivering standard individual prenatal care only to eliminate possible confounding from participating in the group prenatal care intervention, which has been shown to be associated with birth outcomes in past research.^{15,16}

To be included in the study, women had to be between 14 and 21 years old, less than 24 weeks pregnant at entry to prenatal care, able to speak English or Spanish, have no medical problems requiring care as a high-risk pregnancy, and willing to receive to group or individual prenatal care (randomized at site level). Of the 1549 women eligible for the trial, 1233 enrolled (80 %). In the sites delivering standard individual prenatal care, there were 623 women enrolled. More women at the sites delivering standard individual prenatal care were Latina and enrolled in school, and fewer were born outside the USA than women at sites delivering group prenatal care. There were no differences in age, living situation, or clinical characteristics (e.g., parity, prior preterm birth) between the intervention conditions. Ten women were excluded in this analytic sample because they had incomplete information on housing status.

Procedure

Data come from the baseline survey conducted during the second trimester of pregnancy (14 to 24 weeks gestation, $M=19.35$, $SD=3.20$). Surveys were conducted using Audio-Handheld Assisted Personal Interview (A-HAPI). Participants listened

through headphones to prerecorded questions that were also shown on a handheld computer screen. Sixteen percent of women chose to complete surveys in Spanish as their preferred language. Surveys were translated and back-translated by independent native Spanish speakers to ensure that language would be appropriate for women from different countries and that the meaning was consistent with the original survey. Survey data were supplemented with review of medical records and labor and delivery logs. Participants were paid \$20 for each survey. In addition, data on birth weight and gestational age were collected from labor and delivery logs. All procedures were approved by Institutional Review Boards at Yale University, Clinical Directors Network, Biomedical Research Alliance of New York, and each clinical site.

Measures

Primary Outcome: Infant Birth Weight. Study staff obtained birth weight (measured in grams) from labor and delivery logs from the hospitals and health centers. Gestational age¹⁷ was also extracted from labor and delivery logs, estimated through ultrasound records when available or last menstrual period.

Housing Instability. Respondents were asked the following question: “How many times have you moved in the past year?” Based on previous research by Cutts et al.,⁷ housing instability was defined as having moved two or more times in the past year.

Sociodemographic Characteristics. Sociodemographic and background characteristics were obtained via self-report from the surveys. Questions were developed for this study based on our prior research with this population.¹⁶ Age was calculated based on self-reported date of birth. To determine race/ethnicity, participants were asked whether they identified as Latina and/or Black with two separate questions. Participants were then divided into three mutually exclusive categories: Latina, Black (non-Latina), and White or other (non-Latina). Country of origin was obtained through the question “Were you born outside of the United States?” with women responding yes or no. To determine educational status, women were asked “Are you currently going to school?” with response options yes or no. Employment status was obtained through the question “Are you currently employed?” with response options yes or no. Source of financial support was obtained through “What is your *main* source of financial support?” Women responded the following: own job, husband or boyfriend, parent or guardian, other relatives, government or state, drug dealing, sex work, or other. Women were categorized into receiving financial support from their parent or guardian, or receiving financial support from another source. Living situation was obtained from the following question: “Where do you currently live?” Women responded with single-family home, apartment, street or a shelter, group home, rehab, health facility, or jail/prison. Those who indicated they lived in a single-family home or apartment were combined as were those who reported living on the street, in a shelter, or group home. To determine relationship status, women were asked “How would you best describe yourself?” with responses including single, never married; not married, but living with partner; married; separated/divorced; and widowed. Women currently married or living with a partner were combined into one category as in a relationship. Food insecurity was gathered from the question, “Do you ever run out of money or food stamps to buy food?” Respondents who indicated “yes” were classified as food insecure.

Clinical and Behavioral Characteristics. Clinical characteristics included parity, pre-pregnancy BMI, nutrition, drinking, and smoking status during pregnancy, and gestational age. Parity was obtained from the question, “How many other times in your life have you been pregnant (not including this pregnancy)?” Individuals who responded with 0 were coded as nulliparous. Pre-pregnancy BMI was calculated from self-reported weight and height. Nutrition was derived from the modified version of REAP/WAVE that assessed the participant’s diet.¹⁸ Participants respond to eleven questions with one of five answer choices: never (0), 1–2 days (1), 3–4 days (2), 5–6 days (3), or every day (4). Participants are asked how often they skip breakfast; eat meals out; eat fried foods; eat chips; eat whole grain products; eat fruits and vegetables; add butter or margarine to foods; eat yogurt; eat cheese or drink milk; eat sweets and drink regular soda. Questions regarding healthy foods (whole grain, eat fruits and vegetables, eat yogurt, cheese, or drink milk) were reverse scored. Responses were then summed to create a composite score ($\alpha=0.86$, range=0–37), with higher scores indicating poorer nutrition. To determine drinking status the following question was used: “Did you use alcohol, including wine, beer or liquor since you have been pregnant?” If women responded “yes,” then they were coded as “drinking during pregnancy.” Similarly, smoking status was assessed by asking, “Did you smoke cigarettes since you have been pregnant?”

Data Analytic Strategy

To achieve our first aim of identifying factors associated with housing instability, we examined differences in clinical, behavioral, and demographic characteristics between women who were characterized as housing stable versus housing unstable. To achieve our second aim of examining the association between housing instability and infant birth weight, multivariate linear regression was conducted to predict birth weight, controlling for relevant clinical and behavioral (nulliparous; pre-pregnancy body mass index; nutrition, drinking, and smoking during pregnancy; gestational age at birth) and demographic (maternal age, race/ethnicity, born outside the USA, enrolled in school, currently employed, source of financial support, living situation, relationship status, food insecurity) characteristics that may influence birth weight. Statistical significance was set at $p \leq 0.05$. Analyses were conducted using SAS 9.2 (SAS Institute, Cary, NC).

RESULTS

Factors Associated with Housing Instability

More than one-quarter (28.5 %) of pregnant teens and young women in this study sample were classified as unstably housed. Compared to women with stable housing, women with unstable housing were less likely to be enrolled in school, have parents as main source of financial support, live in a single-family home or apartment, or be food secure; they were more likely to smoke (all $p < 0.05$) (Table 1). There were no differences in age, race/ethnicity, country of origin, employment status, or relationship status; nor were there any differences in parity, pre-pregnancy BMI, nutrition or drinking during pregnancy, or gestational age at birth.

TABLE 1 Demographic and clinical characteristics of 613 pregnant women by housing instability status, M±SD or n (%)

Housing instability			
Characteristics	Yes (N=175) ^a	No (N=438) ^a	<i>p</i> ^b
Demographic			
Maternal age (years)	18.6±1.7	18.7±1.7	0.727
Race/ethnicity			0.359
Latina	101 (57.7)	280 (63.9)	
Black, non-Latina	67 (38.3)	143 (32.7)	
White or other, non-Latina	7 (4.0)	15 (3.4)	
Born outside the USA	53 (30.3)	118 (26.9)	0.404
Enrolled in school	67 (38.3)	220 (50.3)	0.007
Currently employed	31 (17.7)	101 (23.2)	0.139
Source of financial support			0.014
Parent or guardian	52 (29.9)	177 (40.6)	
Other: self, husband/boyfriend, other relatives, government	122 (70.1)	259 (59.4)	
Living situation			<0.001
Single-family home/apartment	156 (89.1)	429 (98.0)	
Street or shelter/group home	19 (10.9)	9 (2.1)	
Currently in a relationship	143 (81.7)	353 (81.5)	0.956
Food insecurity	91 (52.3)	165 (38.0)	0.001
Clinical and behavioral			
Nulliparous	148 (86.5)	365 (85.1)	0.701
Pre-pregnancy body mass index (kg/m ²)	24.6±6.7	24.0±6.0	0.234
Nutrition during pregnancy (range 0–37)	14.55±5.56	14.91±5.83	0.489
Drinking during pregnancy	14 (8.0)	29 (6.6)	0.551
Smoking during pregnancy	15 (8.6)	17 (3.9)	0.019
Gestational age at birth (days)	271.4±18.6	273.2±15.4	0.257

^aNumbers may not sum to total due to missing data, and percentages may not sum to 100 % due to rounding

^b*P* value is for *t*-test (continuous variables) or χ^2 test (categorical variables)

Association between Housing Instability and Birth Weight

A multivariate linear regression model predicting birth weight indicated that housing instability was a risk factor for lower birth weight (Table 2). Even after adjusting for important clinical, behavioral, and demographic factors typically associated with low birth weight, housing instability was associated with lower birth weight. On average, infants of housing stable women weighed 3155.96 g (SD=532.69), whereas infants of housing instable women weighed 3028.17 g (SD=641.18) .

DISCUSSION

Study results indicate that housing instability is an important predictor of lower birth weight among pregnant teens and young mothers. This association was observed even after controlling for important clinical, behavioral, and demographic factors. Lower birth weight, even within normal ranges of birth weight, is associated with poorer health outcomes during infancy, childhood, and adulthood.^{19–22} These results are consistent with prior research documenting that women who are

TABLE 2 Results of multivariate linear regression examining association between housing instability and birth weight

	Unadjusted		Adjusted	
	<i>B</i> (SE)	<i>p</i>	<i>B</i> (SE)	<i>p</i>
Housing unstable	-127.79 (42.61)	0.003	-83.96 (35.47)	0.018
Characteristics				
Demographic				
Maternal age			13.08 (12.33)	0.289
Race/ethnicity				
Latina			Reference	-
Black, non-Latina			-96.78 (28.38)	0.001
White or other, non-Latina			85.46 (88.70)	0.335
Born outside the USA			-10.85 (36.72)	0.773
Enrolled in school			13.54 (53.34)	0.800
Currently employed			29.20 (40.77)	0.474
Financial support by parents			21.88 (19.45)	0.261
Single-family home/apartment			-114.64 (98.42)	0.244
Currently in a relationship			44.57 (22.43)	0.047
Food insecurity			72.49 (27.74)	0.009
Clinical and behavioral				
Nulliparous			-60.76 (53.97)	0.260
Pre-pregnancy body mass index (kg/m ²)			5.57 (2.35)	0.018
Nutrition during pregnancy			-6.30 (1.65)	0.001
Drinking during pregnancy			74.66 (51.74)	0.149
Smoking during pregnancy			-141.37 (65.68)	0.031
Gestational age at birth			27.39 (1.09)	<0.001

homeless were more likely to have low-birth weight infants.^{12-14,23} They expand this research by demonstrating that housing instability, arguably much less severe and affecting many more families, may also impact birth outcomes. Cutts and colleagues found that multiple moves had a stronger association with food insecurity and fair/poor child health than crowding does, suggesting that multiple moves may be a form of housing instability that carries particular risk.⁷

Strikingly, more than one in four young pregnant women in this study reported housing instability. Women who reported housing instability were less likely to be enrolled in school, have parents as main source of financial support, live in a single-family home or apartment, or be food secure. Therefore, women who faced housing instability during the perinatal period had numerous stressors related to poverty and social instability. Despite the social instability of these women, we found no differences in nutrition scores between participants who experienced housing instability and those who did not. This may be due either to a lack of variability in nutrition scores overall or because the majority of participants, regardless of housing situations, may be taking steps to be eat healthier during pregnancy. Our findings support recent research connecting various elements of poverty and social disadvantage to negative birth outcomes.²⁴ An analysis of mediators suggests that social disadvantage affects birth outcomes through various mechanism,²⁵ of which housing instability may be one. Our findings also support well-documented associations between birth weight and other sociodemographic, clinical, and behavioral indicators, such as, race, gestational age at birth, and smoking status.²⁶

Limitations and Strengths

This study has limitations that should be considered when interpreting results. Our measure for housing instability was based on how many times the participant moved in the past year; it does not capture other aspects of housing instability such as doubling up, affordability, overcrowding, housing safety, or neighborhood quality. Therefore, global housing instability is likely underestimated in this sample of young urban mothers. Relatedly, drinking during pregnancy was unassociated with birth weight in the current analysis. This may be because very few women in our sample reported drinking during pregnancy, and our measure was blunt (e.g., not differentiating between single drinks and repeated binge drinking). Future studies could evaluate the impact of alcohol consumption on housing instability in pregnancy among study samples in which more women may report drinking, and with more nuanced measures of alcohol consumption. Another potential limitation is that baseline surveys were conducted during the second trimester of pregnancy, and we are unsure of when and why the housing moves took place or whether or not they were planned (e.g., since becoming pregnant, deciding to move in with their own parents, father of the baby or his family). This study included a young sample that was predominately comprised women of color; results may not be generalizable to women of other age groups, races/ethnicities, or living in other urban settings. Future research should therefore examine the effect of housing instability on birth weight among other, diverse populations of women. Future research may also seek to determine the mechanisms involved in this relationship (e.g., stress, disruption of prenatal care).

Despite these limitations, we were able to demonstrate that those with housing instability have lower birth weight infants, even after controlling for a range of clinical, behavioral and demographic characteristics associated with birth weight. We extend research by demonstrating that housing instability itself is an important predictor of birth weight. Second, we identify correlates of housing instability that may be important as we consider future clinical and social interventions aimed at improving birth outcomes for young urban women of color. Third, we explore associations using longitudinal data as well as birth outcomes data collected from medical records.

CONCLUSIONS

Pregnant adolescents and young mothers may experience more moves than other women, as they relocate to live with the father of their baby or his family, or are ejected from their parents' homes. They may also have become pregnant while marginally housed, as homeless and runaway youth are at a fivefold risk for a teen pregnancy.²⁷ And, women in New York City may be at particularly high risk for housing instability given the high cost of living. During the study period, 20.9 % of residents were living in poverty (i.e., income <\$11,500 annually for a single person, <\$23,021 for a family of four).²⁸ Previous studies have documented an association between chronic maternal stress and low birth weight.³ The current study adds to this literature by demonstrating that housing instability among pregnant teens and young mothers in New York City is associated with lower infant birth weight.

Policies geared towards providing affordable housing may improve housing stability among pregnant teens and young mothers in New York City. The New York City Housing Authority provides affordable housing for low- and moderate-income residents. Families pay no more than 30 % of their family income for rent,

yet applicants needing public housing often have to wait months or even years to be matched.²⁹ As of December 2009, the New York City Housing Authority no longer accepted new Section 8 applications, federally funded subsidy housing program for low-income families.³⁰ Therefore, the need for stable housing persists in New York City, potentially affecting pregnant teens and young mothers. Additionally, results suggest that women who have parents as a main source of financial support are less likely to be housing instable. Social and healthcare workers may encourage housing instable pregnant women to live with parents or other family members as long as they are beneficial to the health of the mother and infant (e.g., supportive, non-abusive). Given the necessity of stable housing for healthy birth weight, which is important for healthy outcomes across the lifespan, identifying strategies to ensure that young women have stable housing is critical.

ACKNOWLEDGMENTS

Research was supported by grants from the National Institute of Mental Health (R01MH074399 and R01 MH07394) and a training grant (T32MH020031) that funded Dr. Earnshaw's effort. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute of Mental Health or the National Institutes of Health.

REFERENCES

1. Child Health USA 2013; Available at: <http://mchb.hrsa.gov/chusa13/dl/pdf/chusa13.pdf>. *US Department of Health and Human Services*. Accessed September 30 2014.
2. Yang S, Platt RW, Kramer MS. Variation in child cognitive ability by week of gestation among healthy term births. *Am J Epidemiol*. 2010; 171(4): 399–406.
3. Dunkel Schetter C, Tanner L. Anxiety, depression and stress in pregnancy: implications for mothers, children, research, and practice. *Curr Opin Psychiatry*. 2012; 25(2): 141–148.
4. Johnson A, Meckstroth A. *Ancillary services to support welfare to work*. Washington DC U.S. Department of Health and Human Services 1998
5. Duchon LM, Weitzman BC, Shinn M. The relationship of residential instability to medical care utilization among poor mothers in New York City. *Med Care*. 1999; 37(12): 1282–1293.
6. Cohen R, Wardrip K. *Should i stay Washington DC or should i go? Exploring the effects of housing instability and mobility on children* Center for Housing Policy 2011
7. Robertson CT, Egelhof R, Hoke M. Get sick, get out: the medical causes of home mortgage foreclosures. *Health Matrix Clevel*. 2008; 18(1): 65–104.
8. Cutts DB, Meyers AF, Black MM, et al. US Housing insecurity and the health of very young children. *Am J Public Health*. 2011; 101(8): 1508–1514.
9. Kushel MB, Gupta R, Gee L, Haas JS. Housing instability and food insecurity as barriers to health care among low-income Americans. *J Gen Intern Med*. 2006; 21(1): 71–77.
10. Ziol-Guest KM, McKenna CC. Early childhood housing instability and school readiness. *Child Dev*. 2014; 85(1): 103–113.
11. Barrow SM, Herman DB, Cordova P, Struening EL. Mortality among homeless shelter residents in New York City. *Am J Public Health*. 1999; 89(4): 529–534.
12. Fischer PJ, Breakey WR. The epidemiology of alcohol, drug, and mental disorders among homeless persons. *Am Psychol*. 1991; 46(11): 1115–1128.
13. Suglia SF, Duarte CS, Sandel MT. Housing quality, housing instability, and maternal mental health. *J Urban Health*. 2011; 88(6): 1105–1116.

14. Stein JA, Lu MC, Gelberg L. Severity of homelessness and adverse birth outcomes. *Health Psychol.* 2000; 19(6): 524–534.
15. Allen J, Gamble J, Stapleton H, Kildea S. Does the way maternity care is provided affect maternal and neonatal outcomes for young women? A review of the research literature. *Women Birth.* 2012; 25: 54–63.
16. Ickovics J, Kershaw T, Westdahl C, et al. Group prenatal care and perinatal outcomes: a randomized controlled trial. *Obstet Gynecol.* 2007; 110: 330–339.
17. Wilcox AJ, Skjaerven R. Birth weight and perinatal mortality: the effect of gestational age. *Am J Public Health.* 1992; 82(3): 378–382.
18. Gans KM, Ross E, Barner CW, Wylie-Rosett J, McMurray J, Eaton C. REAP and WAVE: new tools to rapidly assess/discuss nutrition with patients. *J Nutr Feb.* 2003; 133(2): 556S–562S.
19. Black SE, Devereux PJ, Salvanes KG. From the cradle to the labor market? The effect of birth weight on adult outcomes. *Q J Econ.* 2007; 122(1): 409–439.
20. Matte TD, Bresnahan M, Begg MD, Susser E. Influence of variation in birth weight within normal range and within sibships on IQ at age 7 years: cohort study. *Bmj.* 2001; 323(7308): 310–314.
21. Richards M, Hardy R, Kuh D, Wadsworth MEJ. *Birth weight and cognitive function in the British 1946 birth cohort: longitudinal population based study.* *BMJ* 2001; 322: 199–203.
22. Oreopoulos P, Stabile M, Walld R, Roos LL. Short-, medium-, and long-term consequences of poor infant health. *J Hum Resour.* 2008; 43(1): 88–138.
23. Richards R, Merrill RM, Baksh L. Health behaviors and infant health outcomes in homeless pregnant women in the United States. *Pediatrics.* 2011; 128(3): 438–446.
24. Collins J Jr, Wambach J, David R, Rankin K. Women’s lifelong exposure to neighborhood poverty and low birth weight: a population-based study. *Matern Child Health J.* 2009; 13(3): 326–333.
25. Gavin AR. Mediators of adverse birth outcomes among socially disadvantaged women. *J Women’s health (Larchmont, NY 2002).* 2012; 21(6): 634–642.
26. de Valero Bernabé J, Soriano T, Albaladejo R, et al. Risk factors for low birth weight: a review. *Eur J Obstet Gynecol Reprod Biol.* 2004; 116(1): 3–15.
27. Smid M, Bourgois P, Auerswald CL. The challenge of pregnancy among homeless youth: reclaiming a lost opportunity. *J Health Care Poor Underserved.* 2010; 21(2 Suppl): 140–156.
28. Rodriguez C. NYC’s poverty rate goes up for 3rd straight year. *WNYC News.* September 20, 2012.
29. NYC Affordable Housing Resource Center. Available at: http://www.nyc.gov/html/housinginfo/html/apartments/apt_rental.shtml. Accessed April 28, 2013.
30. Brooks-Gunn J, Furstenberg FF Jr. Adolescent sexual behavior. *Am Psychol.* 1989; 44(2): 249–257.