



# Diaper Need Is Associated with Pediatric Care Use: An Analysis of a Nationally Representative Sample of Parents of Young Children

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**Objective** To examine the possible association between diaper need, difficulty affording an adequate amount of diapers, and pediatric care visits for urinary tract infections and diaper dermatitis.

**Study design** This cross-sectional analysis using nationally representative survey data collected July-August 2017 using a web-based panel examined 981 parents of children between 0 and 3 years of age in the US (response rate, 94%). Survey weighting for differential probabilities of selection and nonresponse was used to estimate the prevalence of diaper need and to perform multivariable logistic regression of the association between parent reported diaper need and visits to the pediatrician for diaper rash or urinary tract infections within the past 12 months.

**Results** An estimated 36% of parents endorsed diaper need. Both diaper need (aOR 2.37; 95% CI 1.69-3.31) and visiting organizations to receive diapers (aOR 2.14; 95% CI 1.43-3.21) were associated with diaper dermatitis visits. Similar associations were found for diaper need (aOR 2.63; 95% CI 1.54-4.49) and visiting organizations to receive diapers (aOR 4.50; 95% CI 2.63-7.70) for urinary tract infection visits.

**Conclusions** Diaper need is common and associated with increased pediatric care visits. These findings suggest pediatric provider and policy interventions decreasing diaper need could improve child health and reduce associated healthcare use. (*J Pediatr* 2021;230:146-51).

One child is estimated to use between 4600 and 4800 disposable diapers during the first 3 years of life,<sup>1</sup> costing families between \$945 and \$1500 annually.<sup>2</sup> Although diapers are a basic need of infants and vital for good health, research estimates that 1 of 3 families experience diaper need.<sup>3,4</sup> Diaper need is the gap between the number of diapers required for infants to stay clean and the number of diapers a family can afford without cutting back on other basic needs.<sup>5</sup> Diapering an infant is a primary parental activity, but for low-income families, diapering imposes a significant financial burden. The US Bureau of Labor Statistics reported the poorest 20% of families spent almost 14% of their 2014 household income on diapers.<sup>6</sup> Government assistance programs, such as Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) or Supplemental Nutrition Assistance Program (SNAP), cannot be used to purchase diapers. In 2013, the first peer-reviewed published study quantifying diaper need among low-income women in an urban area found that 28% of women reported diaper need and of those women, 27% reported putting off changing a child's diapers when their supply was running short, or "stretching" diapers.<sup>3</sup> Since this paper was published, additional research has supported the negative impact of diaper need on a family's economic success and maternal mental health,<sup>7</sup> yet no research has directly linked diaper need with child health outcomes.

Two child health outcomes associated with the frequency of diaper changes and, thus, diaper need are urinary tract infections (UTIs) and diaper dermatitis.<sup>8-14</sup> Diaper dermatitis is a common reason for visits to the pediatrician,<sup>15</sup> and cases can vary in severity from mild to severe; however, most cases rarely cause long-term health problems for the infant but cause appreciable distress for both the infant and caregiver, with prevalence rate estimates between 8% and 12%.<sup>16,17</sup> The American Academy of Dermatology recommends changing an infant's diaper every 1-3 hours during the day, or as soon as the diaper is soiled, and at least once per night to prevent diaper dermatitis.<sup>18</sup>

UTI is one of the most common serious bacterial infections, with prevalence rate estimates between ~5.0% and 7.0% in infants 2 years old or younger.<sup>19-22</sup> However, UTIs are challenging to detect in very young children<sup>23</sup>; therefore, prevalence may be underestimated.<sup>24</sup> There is an association between untreated UTI in early childhood and serious short- and long-term health complications, including renal scarring<sup>25-28</sup> (even in infants with normal urinary tracts),<sup>29</sup> hypertension,<sup>30</sup> pre-eclampsia,<sup>31</sup> and renal failure.<sup>32</sup>

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SNAP	Supplemental Nutrition Assistance Program
TANF	Temporary Assistance for Needy Families
UTI	urinary tract infection
WIC	Special Supplemental Nutrition Program for Women, Infants, and Children

Not only do UTIs and diaper dermatitis have multiple predictors of risk,<sup>8-11,14,22,23,33-44</sup> but they also share a risk factor that is shaped by conditions of poverty—diaper need. A significant association between frequency of diaper change and diaper dermatitis is well documented in the literature,<sup>8,9</sup> and an inverse relationship between the frequency of diaper changes and risk of UTI in infants.<sup>10,11</sup>

To further explore the relationship between diaper need and child health outcomes, this study uses nationally representative data to examine whether diaper need was associated with pediatric healthcare visits for diaper dermatitis and UTI.

## Methods

This study is a secondary data analysis of a nationally representative cross-sectional survey of parents commissioned by Kimberly-Clark. Survey Sampling International, a top global digital data-collection company, was contracted to recruit a representative random sample of the general parent population by age, sex, and income ( $n = 1000$ ) from their large web-based respondent panels; the margin of error for this sample was  $\pm 3\%$  at the 95% confidence interval. A study invitation was issued to randomly selected members of the web-based panel. Participants were included if they were 18 years old or older, had children between 0 and 3 years old, were the primary or shared caregiver in the household, and were involved in changing the diaper of children between 0 and 3 years old. Edelman Intelligence, a full-service consumer research firm, conducted cross-sectional online surveys (approximately 15 minutes to complete) from July to August 2017. The response rate was 94% (1064 initial, 64 drop out, 1000 complete surveys). Nineteen participants were excluded because they were not parents of a child, leaving a final analytic sample of 981. All research procedures were conducted in accordance with Marketing Research Association Marketing Research Standards and the CASRO Code of Standards and Ethics. Secondary data analytic procedures were approved by the Yale University institutional review board.

## Measures

### Covariates

**Sociodemographics.** Demographic characteristics including sex, race (self-identified by participants), relationship status, caregiving responsibility, socioeconomic status indices, geographic location, participation in SNAP, Temporary Assistance for Needy Families, and WIC were collected.

**Diaper Need.** Participants were considered to have diaper need if they responded positively to one of the following statements: (1) I currently do not have enough diapers to keep the child(ren) in my household clean, dry and healthy; (2) I find it difficult to afford buying diapers for the child(ren) in my household; and (3) I frequently find myself running out of diapers for the child(ren) in my household.

**Diaper Receipt.** Participants were asked if they visited a variety of locations to obtain diapers. Locations included food banks, churches, synagogues and other places of worship,

early childhood education programs (eg, Head Start), hospitals or health clinics, homeless shelters, or other community-based organizations and non-profit organizations. Those who visited at least one of these locations were classified as “visited organization to get diapers.”

## Outcome Variables

**Diaper Dermatitis and UTIs.** The 2 outcome measures were pediatric care visits for diaper dermatitis and UTIs. Parents reported the number of times in the past year they took their child to see a healthcare professional for diaper rash from 0 to more than 5 times. Participants could also answer not applicable. The same question was asked for UTIs. Responses were dichotomized to 0 and 1 or more times for analysis.

## Statistical Analyses

All analyses were weighted for differential probabilities of selection and nonresponse to produce nationally representative estimates. To test for the association between sociodemographic and diaper variables and diaper rash or UTI,  $\chi^2$  and  $t$  tests were used. Multivariate logistic regression models including significant covariates from bivariate analyses ( $P < .05$ ) were used to examine the association between variables and use of pediatric care for diaper rash and UTI. To ensure that we did not exclude relevant covariates in our multivariate logistic regression models, we did exploratory analysis with a more liberal  $P$  value ( $P < .1$ ) in bivariate analyses. Collinearity statistics were acceptable (variance inflation factor  $< 10$ ). Analyses were performed by using R 3.4.4 (R Project for Statistical Computing) and Stata 13.0 (Stata Corp, College Station, Texas). All tests were set to  $P$  value  $< .05$ .

## Results

### Demographic and Clinical Characteristics

Overall, 55.9% of parents self-designated as female. The majority of participants were white (72.9% [ $n = 754$ ]), but African Americans (11.3% [ $n = 87$ ]), Asian (5.8% [ $n = 57$ ]), and Native American (2.1% [ $n = 18$ ]) populations were represented. Nationally, 35.9% ( $n = 362$ ) of respondents reported diaper need, 32.1% ( $n = 292$ ) of parents brought their child to a healthcare provider for diaper rash, and 11.7% ( $n = 109$ ) of parents brought their child to a healthcare provider for a UTI (Table I).

### Associations with Diaper Need and Use for Child Diaper Rash and UTIs

Bivariate associations demonstrated that parents who endorsed diaper need or visited an organization to receive diapers had greater proportions of care visits for both diaper dermatitis and UTI (all  $P < .001$ ). Partnered parents (married or in a civil union/domestic partnership) had greater rates of bringing their child to care for diaper dermatitis compared with non-partnered parents ( $P = .007$ ). Fathers ( $P < .001$ )

**Table I. Demographic characteristics of caregivers of young children from a 2017 nationally representative web-based panel survey**

Characteristics	Total, n* (%) <sup>†</sup>	Visited clinician for diaper rash, n* (%) <sup>†</sup>	P value	Visited clinician for UTI, n* (%) <sup>†</sup>	P value
All	981 (100)	292 (100)		109 (100)	
Sex			.09		<b>&lt;.001</b>
Female	578 (55.9)	160 (51.9)		43 (36.9)	
Male	403 (44.1)	132 (48.1)		66 (63.1)	
Age, mean (SE), y	32.28 (0.22)	31.69 (0.41)	.09	31.7 (0.67)	.37
Race			.30		.77
White	754 (72.9)	216 (70.3)		87 (76.0)	
Black or African American	87 (11.3)	31 (13.4)		11 (12.4)	
Asian or Pacific Islander	57 (5.8)	20 (6.1)		6 (5.5)	
Native American or Alaskan Native	18 (2.1)	7 (2.9)		1 (2.2)	
Mixed racial background	35 (4.4)	7 (2.8)		2 (1.9)	
Other	30 (3.4)	11 (4.5)		2 (2.0)	
Education level			.07		.06
High school graduate or less	188 (22.9)	51 (22.9)		18 (19.6)	
Some college/Associate's degree/technical school	328 (30.2)	92 (30.2)		25 (20.9)	
Bachelor's degree	292 (25.6)	77 (25.6)		36 (35.0)	
Master's degree/Post-graduate or professional Degree	173 (21.3)	56 (21.3)		26 (24.5)	
Employment status			.22		<b>.001</b>
Employed	673 (70.5)	210 (73.4)		89 (83.4)	
Unemployed	308 (29.5)	82 (26.6)		20 (16.6)	
Household income, \$			.41		.34
< \$25 000	155 (17.6)	54 (20.4)		14 (14.6)	
\$25 000 to \$34 999	95 (8.8)	30 (9.4)		5 (4.4)	
\$35 000 to \$49 999	141 (13.5)	46 (14.5)		14 (12.1)	
\$50 000 to \$74 999	207 (17.8)	51 (14.6)		26 (19.1)	
\$75 000 to \$99 999	145 (14.0)	49 (15.3)		24 (20.7)	
\$100 000 to \$149 999	154 (15.8)	37 (13.1)		18 (17.9)	
\$150 000 or more	77 (12.4)	22 (12.7)		7 (11.2)	
Partnered			.007		.74
Yes	857 (87.7)	244 (82.7)		97 (88.9)	
No	124 (13.2)	48 (17.3)		12 (11.1)	
Caregiving responsibility			<b>&lt;.001</b>		<b>&lt;.001</b>
Primary caregiver	546 (54.3)	192 (64.7)		80 (73.2)	
Share responsibility with someone else	435 (45.7)	100 (35.3)		29 (26.8)	
Geographic location			.02		<b>.003</b>
Urban	279 (29.6)	106 (36.4)		49 (43.3)	
Suburban	492 (50.4)	125 (43.8)		41 (41.4)	
Rural	210 (20.0)	61 (19.8)		19 (15.3)	
TANF, SNAP, or WIC Recipient			<b>&lt;.001</b>		<b>&lt;.001</b>
Yes	649 (66.5)	134 (56.0)		59 (52.5)	
No	332 (33.5)	158 (44.0)		50 (47.5)	
Diaper need			<b>&lt;.001</b>		<b>&lt;.001</b>
Yes	362 (35.9)	167 (55.3)		79 (71.3)	
No	619 (64.1)	125 (44.7)		30 (28.7)	
Visited organization to get Diapers			<b>&lt;.001</b>		<b>&lt;.001</b>
Yes	190 (19.1)	187 (65.6)		69 (60.5)	
No	791 (80.9)	105 (44.0)		40 (39.5)	
Diaper type			.006		<b>.001</b>
Disposable only	868 (91.8)	244 (84.2)		80 (73.5)	
Cloth only	34 (3.3)	19 (5.7)		16 (13.7)	
Mix of disposable and cloth	77 (7.6)	28 (9.6)		13 (12.8)	
Other	2 (0.3)	1 (0.5)		0 (0)	
Took child to healthcare provider for UTI during past year			<b>&lt;.001</b>		<b>&lt;.001</b>
One or more times	109 (11.7)	78 (27.4)		–	
Never	809 (88.3)	192 (72.6)		–	
Took child to healthcare provider for diaper rash during past year					<b>&lt;.001</b>
One or more times	292 (32.1)	–		78 (27.4)	
Never	631 (67.9)	–		30 (72.6)	

TANF, Temporary Assistance for Needy Families.

Values in bold indicate statistical significance.

\*Raw totals vary because of missing values.

†Sampling weights are applied to account for differential probabilities of selection and differential nonresponse to derive accurate nationally representative estimates.

and employed parents ( $P = .001$ ) had greater rates of UTI care visits compared with women and unemployed, respectively. Parents who were recipients of Temporary Assistance for Needy Families, SNAP, or WIC had more care visits for

both diaper dermatitis and UTI (both  $P < .001$ ). Geographic location differed such that people living in urban areas had the greatest rates of care visits ( $P = .02$ ,  $P = .003$ , respectively). Similarly, diaper dermatitis and UTI groups differed based

**Table II. Association of healthcare use for diaper rash relating to demographic and diapering variables (n = 922)**

Variables	OR* (95% CI)	P value
Education level		
High school graduate or less	Ref	
Some college/Associate's degree/technical school	0.65 (0.41-1.02)	.06
Bachelor's degree	0.76 (0.47-1.22)	.26
Master's degree/Post-graduate or professional degree	1.09 (0.64-1.87)	.75
Social benefit recipient	0.94 (0.64-1.39)	.77
Partnered	0.80 (0.51-1.33)	.44
Share caregiving responsibility	0.76 (0.55-1.06)	.10
Geographical location		
Urban	Ref	
Suburban	0.80 (0.55-1.16)	.25
Rural	0.94 (0.61-1.47)	.82
Diaper need	2.39 <sup>†</sup> (1.71-3.35)	<b>&lt;.001</b>
Visited organization to get diapers	2.19 <sup>†</sup> (1.46-3.27)	<b>&lt;.001</b>
Diaper type		
Disposable only	Ref	
Cloth only	1.49 (0.69-3.25)	.31
Disposable and cloth	1.24 (0.76-2.06)	.39
Other	—	—

Ref, reference.  
 Values in bold indicate statistical significance.  
 \*Adjusted models included all other variables in the table.  
<sup>†</sup>P < .001.

on the type of diapers participants used (disposable only, cloth only, mix of disposable and cloth, other). Parents using only cloth diapers had greater rates of visits for diaper dermatitis (P = .006), whereas those using only cloth diapers or a mix of disposable and cloth diapers had more visits for UTI (P = .001).

Multivariate logistic regression results are presented in **Table II** and **Table III**. Both diaper need (OR 2.37, 95% CI

**Table III. Association of healthcare use for urinary tract infection relating to demographic and diapering variables (n = 916)**

Variables	OR* (95% CI)	P value
Male	2.19 <sup>†</sup> (1.32-3.63)	<b>.002</b>
Employed	1.71 (0.90-3.27)	.10
Social benefit recipient	0.90 (0.52-1.54)	.70
Geographical location		
Urban	Ref	
Suburban	0.82 (0.48-1.42)	.48
Rural	0.89 (0.46-1.75)	.74
Share caregiving responsibility	0.52 <sup>‡</sup> (0.30-0.91)	<b>.02</b>
Diaper need	2.63 <sup>§</sup> (1.54-4.49)	<b>&lt;.001</b>
Visited organization to get diapers	4.50 <sup>§</sup> (2.63-7.70)	<b>&lt;.001</b>
Diaper type		
Disposable only	Ref	
Cloth only	2.57 <sup>‡</sup> (1.07-6.20)	<b>.04</b>
Disposable and cloth	1.43 (0.69-2.98)	.34
Other	—	—

Values in bold indicate statistical significance.  
 \*Adjusted models included all other variables in the table.  
<sup>†</sup>P < .01.  
<sup>‡</sup>P < .05.  
<sup>§</sup>P < .001.

1.69-3.31, P < .001) and visiting organizations to get diapers (OR 2.14; 95% CI 1.43-3.21, P < .001) were strongly associated with greater odds of diaper dermatitis visits. Participants who completed some college/associate's/technical school and bachelor's degree were less likely to bring their child in for diaper dermatitis (OR 0.31; 95% CI 0.12-0.78, P = .01 and OR 0.36; 95% CI 0.14-0.92, P = .03, respectively). Parents' caregiving responsibility and diaper type were not associated with diaper dermatitis visits.

Fathers were more likely to bring their child to care for a UTI (OR 0.31; 95% CI 0.12-0.80, P = .002). Similar to diaper need care visit results, diaper need (OR 2.63; 95% CI 1.54-4.49, P < .001) and visiting an organization to get diapers (OR 4.50; 95% CI 2.63-7.70, P < .001) were the most important factors associated with UTI care visits. Parents using only cloth diapers were more likely to make UTI care visits (OR 2.57; 95% CI 1.07-6.20, P = .04). Parents sharing caregiving responsibility were less likely to bring their child in for UTI (OR 0.52; 95% CI 0.30-0.91, P = .02). Employment status and geographic location were not associated UTI visits.

**Exploratory Analysis**

Using a P value < .1 in bivariate analysis, fathers and younger parents were more likely to bring their child to the pediatrician for diaper dermatitis, and no additional covariates were significant for UTI visits compared with P value < .05. However, when the multivariate model with age and sex was compared with the more parsimonious model (ie, not including age or sex) using the Akaike information criterion, we found the parsimonious model was more appropriate (lower Akaike information criterion). Therefore, we elected to keep the original model using P value < .05 for diaper dermatitis.

**Discussion**

Although diaper dermatitis and UTIs are among the most common reasons parents seek pediatric care, few studies have examined the role of social factors in their etiology. We found that lack of access to diapers, reflected by diaper need and receiving diapers from community organizations, was associated with more visits to a healthcare provider for both diaper dermatitis and UTIs. A non-peer-reviewed report of recipients of diapers from diaper banks in Connecticut<sup>45</sup> found a lower parent-reported incidence of diaper dermatitis, UTI, and associated medical visits. This study adds to the literature by demonstrating similar findings in a nationally representative sample. Further, the current study found this association held when considering potential contributing and confounding factors.

We found that nearly 36% of parents nationwide cannot afford to properly diaper their children. These findings align with 2 previous studies based in the US and Canada where one-third of mothers reported diaper need.<sup>3,4</sup> Given the high number of patient presentations for diaper dermatitis and UTI, pediatric healthcare providers should screen for



diaper need in addition to providing treatment and education. Screening for social determinants of health has been recommended as part of the Bright Futures Guidelines for pediatric well care visits<sup>46</sup> and should include specific questions on diaper need as part of pediatric social determinants of health. However, we acknowledge that screening without access to resources or referrals can cause unintentional harm,<sup>47</sup> and the value of screening depends largely on accompanied access to free or very low-cost diapers for families with need. Clinical interventions can support an individual family in meeting this basic need and should accompany larger public health strategies to address diaper need as a social determinant of health.<sup>48</sup>

Our findings suggest improving access to diapers is one way to decrease the healthcare use for these ailments. Without diapers or emollients, caregivers may be unable to carry out recommended treatment regimens. Unfortunately, many parents are unaware of diaper banks and community organizations which provide free diapers and child hygiene products,<sup>4</sup> and these organizations remain underfunded. Asking parents if they visit organizations to obtain diapers may help increase clinician knowledge of community resources. These efforts align with the American Academy of Pediatrics recent recommendation to connect families with community resources to help with basic needs.<sup>49</sup>

Diapers are a basic need of infants and young children, yet government assistance programs for low-income families, namely SNAP and WIC, do not allow for the purchasing of diapers. Given the negative impact of diaper need on child health, we recommend that these programs expand their rosters of allowable expense items to include diapers and legislation similar to the 2015 “Hygiene Assistance for Families of Infants and Toddlers Act” be revisited.<sup>50</sup> Despite the Bill not passing the Subcommittee on Human Resources, some states are making incremental progress toward reducing diaper need by providing diapers to families, removing sales tax, and requiring Early Head Start programs to provide diapers to children.<sup>51</sup> Only a small proportion of low-income families access diapers through community diaper banks and highlights the need for policies at a municipal, state, and federal level to address diaper need in low-income families.<sup>52</sup> In addition, the impact of these policies on child outcomes should be further evaluated.

Although not explored in this study, the effects of diaper need on psychological and economic outcomes of families is worth additional study. Diaper need has been associated with maternal depressive symptoms<sup>3</sup> and diaper dermatitis is associated with parental anxiety.<sup>48</sup> Missing work to bring children to appointments, enforced absence from childcare because of lack of a sufficient supply of diapers, and healthcare expenses, are all possible ways diaper dermatitis and UTIs negatively affect the economic security of families. Economic insecurity in turn, is associated with poor parental mental health.<sup>53,54</sup> Although the use of cloth diapers may defray costs for families who have access to free laundry, a previous study found that exclusive use increases the risk of diaper rash.<sup>55</sup> We did not find an association between diaper

type and diaper rash, but exclusive use of cloth diapers was associated with visits for UTI. This finding should be explored in future studies.

This study has several limitations. Parents reported visits for their child, and thus reports may be subject to different types of reporting bias or general confounding by parental characteristics, such as knowledge and perceptions about diaper dermatitis and UTI, and it is unclear if diaper dermatitis or UTI was diagnosed during pediatric appointments. Thus, incorporating administrative data from the health record would be beneficial. Also, because this is a cross-sectional study, causal associations cannot be determined. Although the study sample was nationally representative, because participants were recruited from the web-based panel participants, the results may not generalize to people with limited Internet access. The diaper need questionnaire is not validated but was developed with expert input and pilot testing and has been used in multiple studies. Despite these limitations, our study reinforces the importance of a sufficient supply of diapers for child health.

Longitudinal studies, ideally with administrative data, are needed to further assess this relationship.<sup>56</sup> Individual, community, and policy interventions are needed to acknowledge, and better address diaper need as a social determinant of health. ■

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## Data Statement

Data sharing statement available at [www.jpeds.com](http://www.jpeds.com).

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