2. Hurn M, Justel A, Robert CP. Estimating mixtures of regressions. *J Comput Graph Stat*. 2003;12(1):55-79. doi:10.1198/1061860031329

3. Vazquez BG, Alikhan A, Weaver AL, Wetter DA, Davis MD. Incidence of hidradenitis suppurativa and associated factors: a population-based study of Olmsted County, Minnesota. *J Invest Dermatol*. 2013;133(1):97-103. doi:10.1038/jid.2012.255

4. Garg A, Lavian J, Lin G, Strunk A, Alloo A. Incidence of hidradenitis suppurativa in the United States: a sex- and age-adjusted population analysis. *J Am Acad Dermatol*. 2017;77(1):118-122. doi:10.1016/j.jaad.2017.02.005

5. Saunte DM, Boer J, Stratigos A, et al. Diagnostic delay in hidradenitis suppurativa is a global problem. *Br J Dermatol*. 2015;173(6):1546-1549. doi:10.1111/bjd.14038

6. Garg A, Lavian J, Strunk A. Low utilization of the dermatology ambulatory encounter among patients with hidradenitis suppurativa: a population-based retrospective cohort analysis in the USA. *Dermatology*. 2017;233(5):396-398. doi:10.1159/000480379

Racial and Ethnic Differences in Atopic Dermatitis–Related School Absences Among US Children

Atopic dermatitis (AD) affects up to 20% of children and is more common among black children.[1] An association of AD with school absenteeism has been suggested.[2] In this cross-sectional study, we examined AD-related school absences by race/ethnicity.

Methods | We used baseline data from children enrolled into the US-based Pediatric Eczema Elective Registry (PEER) between November 25, 2004, and July 18, 2017. All children were aged 2 to 17 years and had a physician-confirmed AD diagnosis. Details of PEER have been previously reported.[3] On registry enrollment, children or their caregivers completed a questionnaire collecting information about demographic characteristics, medical conditions, AD history and treatment, and number of school days missed owing to AD (0, 1-5, 6-10, or >10) in the preceding 6-month period. Atopic dermatitis control in the same 6-month period was also reported by the child or caregiver as complete, good, limited, or uncontrolled. In this study, self-reported race/ethnicity, categorized as non-Hispanic white, non-Hispanic black, Hispanic, or other, was the primary explanatory variable. The primary outcome was reporting of 6 or more school days missed owing to AD in the previous 6 months, which approximates the US Department of Education's definition of chronic school absenteeism. The association between race/ethnicity and at least 6 school absences was assessed using logistic regression, adjusting for sociodemographic factors, AD control, comorbid atopic disorders, and health care utilization. Children not enrolled in school or day care were excluded. Caregivers for participants in PEER provided informed consent; the present analysis was granted exempt status by the University of Pennsylvania Institutional Review Board owing to the use of deidentified data.

Results | In total, 8015 children were enrolled. Among these, 4273 (53.3%) were girls; median (interquartile range [IQR]) age was 6.6 (3.9-10.4) years; and 4079 (50.9%) identified as non-Hispanic black, 2576 (32.1%) as non-Hispanic white and 851 (10.6%) as Hispanic. Annual household income differed across racial/ethnic groups; a greater proportion of non-Hispanic black and Hispanic children lived in households with reported incomes below $50 000 (**Table 1**). Black and Hispanic children were also more likely to report uncontrolled AD. Overall, 4835 (60.3%) children used topical steroids in the last 6 months. Among the 7272 children enrolled in school or day care, 241 (3.3%) missed 6 or more days in the last 6 months. Non-

Table 1. Baseline Patient Characteristics by Race/Ethnicity

Characteristic	White non-Hispanic (n = 2576)	Black non-Hispanic (n = 4079)	Hispanic (n = 851)	Other Race/Ethnicity (n = 507)[a]	*P* Value[b]
Male sex, No. (%)	1321 (51.3)	1783 (43.7)	388 (45.6)	249 (49.1)	<.001
Age, median (IQR), y	6.6 (3.9-10.3)	6.7 (4.0-10.6)	6.0 (3.8-10.0)	6.4 (3.7-10.4)	.12
Annual household income, $US, No. (%)					
0-49 999	772 (30.0)	2956 (72.6)	598 (70.7)	218 (43.1)	<.001
50 000-99 999	551 (21.4)	172 (4.2)	82 (9.7)	84 (16.6)	
≥100 000	295 (11.5)	51 (1.3)	9 (1.1)	55 (10.9)	
Prefer not to answer	958 (37.2)	895 (22.0)	157 (18.6)	149 (29.5)	
Duration of AD, median (IQR), y	4.1 (2.3-7.1)	4.1 (2.3-7.3)	3.5 (2.0-6.1)	4.1 (2.3-7.5)	<.001
History of asthma, No. (%)	1326 (51.5)	1815 (44.6)	313 (36.8)	217 (42.8)	<.001
History of allergic rhinitis, No. (%)	2069 (80.4)	2691 (66.1)	514 (60.5)	333 (65.8)	<.001
Family history of AD, No. (%)	1458 (56.6)	2335 (57.2)	338 (39.7)	301 (59.4)	<.001
AD disease control in past 6 mo, No. (%)					
Complete	183 (7.1)	135 (3.3)	63 (7.4)	24 (4.8)	<.001
Good	1319 (51.2)	1856 (45.6)	367 (43.3)	254 (50.3)	
Limited	871 (33.8)	1662 (40.8)	316 (37.3)	187 (37.0)	
Uncontrolled	201 (7.8)	419 (10.3)	102 (12.0)	40 (7.9)	
Used prescription medication and/or topical steroid for AD in past 6 mo, No. (%)	2528 (98.3)	3929 (96.4)	829 (97.5)	489 (96.5)	<.001
Any health care visit for AD in past 6 mo, No. (%)	2357 (92.0)	3914 (96.7)	823 (97.3)	473 (94.6)	<.001

Abbreviations: AD, atopic dermatitis; IQR, interquartile range; NA, not applicable.

[a] Includes patients of Asian, American Indian/Alaskan Native, Pacific Islander, and multiracial race/ethnicity.

[b] Kruskal-Wallis or χ^2 test, as appropriate.

Table 2. Association of Race/Ethnicity With School Absences Owing to AD

Race/Ethnicity	≥6 School Days Missed in the Past 6 Months		
	Children, No./Total No. (%)[a]	Unadjusted OR (95% CI)	Adjusted OR[b] (95% CI)
White non-Hispanic	43/2299 (1.9)	1 [Reference]	1 [Reference]
Black non-Hispanic	136/3821 (3.6)	1.94 (1.37-2.74)	1.49 (1.01-2.18)
Hispanic	49/710 (6.9)	3.89 (2.56-5.91)	3.41 (2.16-5.38)
Other[c]	13/440 (3.0)	1.60 (0.85-3.00)	1.49 (0.77-2.90)
Female sex	NA	NA	1.08 (0.82-1.42)
Age, y	NA	NA	0.95 (0.90-0.999)
Household income			
$0-$49 999	NA	NA	1 [Reference]
$50 000-$99 999	NA	NA	0.55 (0.31-0.97)
≥$100 000	NA	NA	0.40 (0.16-1.01)
Prefer not to answer	NA	NA	0.69 (0.49-0.97)
Duration of AD, y	NA	NA	1.07 (1.01-1.13)
History of asthma	NA	NA	1.78 (1.31-2.40)
History of allergic rhinitis	NA	NA	2.03 (1.35-3.05)
AD disease control in past 6 mo.			
Complete	NA	NA	1 [Reference]
Good	NA	NA	0.77 (0.33-1.82)
Limited	NA	NA	1.94 (0.84-4.50)
Uncontrolled	NA	NA	6.36 (2.71-14.89)
Health care visit for AD in past 6 mo	NA	NA	2.04 (0.74-5.60)

Abbreviations: AD, atopic dermatitis; NA, not applicable; OR, odds ratio.

[a] Excluding 738 patients who are not enrolled in school or day care.

[b] Adjusted for sex, age, household income, duration of atopic dermatitis, history of asthma and allergic rhinitis, recent AD disease control, and recent health care visit for AD.

[c] Includes patients of Asian, American Indian/Alaskan Native, Pacific Islander, and multiracial race/ethnicity.

Hispanic black (adjusted odds ratio [aOR] 1.49; 95% CI, 1.01-2.18) and Hispanic (aOR, 3.41; 95% CI, 2.16-5.38) children had higher adjusted odds of having at least 6 school absences compared with non-Hispanic white children (**Table 2**). Younger age (aOR, 0.95; 95% CI, 0.90-0.999); household income between $50 000 and $99 999 (aOR, 0.55; 95% CI, 0.31-0.97); uncontrolled AD (aOR, 6.36; 95% CI, 2.71-14.89); longer duration of AD (aOR, 1.07; 95% CI, 1.01-1.13); and comorbid asthma (aOR, 1.78; 95% CI, 1.31-2.40) or allergic rhinitis (aOR, 2.03; 95% CI, 1.35-3.05) were significantly associated with 6 or more absences (Table 2).

Discussion | We found non-Hispanic black and Hispanic children to be 1.5-fold and 3.4-fold more likely to have missed at least 6 days of school because of AD, respectively, compared with non-Hispanic white children after controlling for sociodemographic factors, AD control, health care visits, and atopic comorbidities. Our findings suggest racial/ethnic disparities in school absenteeism associated with AD that differ from estimates of school absenteeism by race/ethnicity in the United States which find chronic absenteeism to be highest among non-Hispanic black children (17.3%), followed by Hispanic children (14.1%) and non-Hispanic white children (12.7%).[4] In contrast, we observed AD-related school absenteeism to be highest among Hispanic children followed by non-Hispanic black and non-Hispanic white children. Although the reasons for these differences require further study, one potential explanation for the observed differences is that AD may have greater negative impact on quality of life among persons belonging to racial and ethnic minority groups, as has been observed in another chronic skin disease.[5] In turn, racial/ethnic differences in health-related quality of life may directly affect school attendance.[6] Study limitations include self-reported data, residual unmeasured confounding, and too few outcomes in the other racial groups to draw inference. In addition, because the PEER cohort only includes children with previous topical pimecrolimus use, our findings may not be generalizable to all children with AD. Children who are chronically absent from school are more likely to fall behind or drop out.[4] Understanding the factors that drive racial and ethnic differences in AD-related absences can ensure that efforts to reduce absenteeism are directed toward the most vulnerable children.

Joy Wan, MD, MSCE
David J. Margolis, MD, PhD
Nandita Mitra, PhD
Ole J Hoffstad, MA
Junko Takeshita, MD, PhD, MSCE

Author Affiliations: Department of Dermatology, Perelman School of Medicine, University of Pennsylvania, Philadelphia (Wan, Margolis, Takeshita); Department of Biostatistics, Epidemiology and Informatics, Perelman School of Medicine, University of Pennsylvania, Philadelphia (Margolis, Mitra, Hoffstad, Takeshita).

Accepted for Publication: March 5, 2019.

Corresponding Author: Junko Takeshita, MD, PhD, MSCE, Department of Dermatology, Perelman School of Medicine, University of Pennsylvania, 3400 Civic Center Blvd, 7th Flr, South Tower, Office 728, Philadelphia, PA 19104 (junko.takeshita@uphs.upenn.edu).

Published Online: May 22, 2019. doi:10.1001/jamadermatol.2019.0597

Author Contributions: Drs Wan and Takeshita had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.
Concept and design: Wan, Margolis, Takeshita.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Wan, Hoffstad, Takeshita.
Critical revision of the manuscript for important intellectual content: Wan, Margolis, Mitra.
Statistical analysis: Wan, Mitra.
Obtained funding: Margolis, Takeshita.
Administrative, technical, or material support: Wan, Margolis, Takeshita.
Supervision: Mitra, Takeshita.

Conflict of Interest Disclosures: Dr Takeshita reported receiving a research grant from Pfizer Inc to the Trustees of the University of Pennsylvania and receiving payment for continuing medical education work related to psoriasis that was supported indirectly by Eli Lilly. Dr Wan reported receiving research fellowship funding from Pfizer Inc to the Trustees of the University of Pennsylvania and receiving payment for consulting work with Health Union, LLC. Dr Margolis reported serving on advisory committees for Sanofi/Regeneron and Pfizer Inc.

Funding/Support: This study was supported in part by grants K23-AR068433 (Dr Takeshita), T32-AR007465 (Dr Wan), R01-AR069062, and R01-AR070873 (Dr Margolis) from the National Institute of Arthritis and Musculoskeletal and Skin Diseases and a Dermatology Foundation Dermatologist Investigator Research Fellowship (Wan). The data source used in this study is the Pediatric Eczema Elective Registry, a study funded by Valeant Pharmaceuticals through a grant to Dr Margolis.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

1. Silverberg JI, Simpson EL. Associations of childhood eczema severity: a US population-based study. *Dermatitis*. 2014;25(3):107-114. doi:10.1097/DER.0000000000000034

2. Bridgman AC, Eshtiaghi P, Cresswell-Melville A, Ramien M, Drucker AM. The burden of moderate to severe atopic dermatitis in Canadian children: a cross-sectional survey. *J Cutan Med Surg*. 2018;22(4):443-444. doi:10.1177/1203475418761859

3. Margolis DJ, Abuabara K, Hoffstad OJ, Wan J, Raimondo D, Bilker WB. Association between malignancy and topical use of pimecrolimus. *JAMA Dermatol*. 2015;151(6):594-599. doi:10.1001/jamadermatol.2014.4305

4. US Department of Education. Chronic Absenteeism in the Nation's Schools: a Hidden Educational Crisis. https://www2.ed.gov/datastory/chronicabsenteeism.html. Updated January 2019. Accessed December 7, 2018.

5. Shah SK, Arthur A, Yang YC, Stevens S, Alexis AF. A retrospective study to investigate racial and ethnic variations in the treatment of psoriasis with etanercept. *J Drugs Dermatol*. 2011;10(8):866-872.

6. Emerson ND, Distelberg B, Morrell HE, Williams-Reade J, Tapanes D, Montgomery S. Quality of life and school absenteeism in children with chronic illness. *J Sch Nurs*. 2016;32(4):258-266. doi:10.1177/1059840515615401

Clinical Outcomes of Hospitalized Adult Patients With Dermatologic Manifestations of Protein Malnutrition and Zinc Deficiency

Despite adequate or excess total caloric intake, protein-energy malnutrition and micronutrient deficiencies in minerals such as zinc and other essential vitamins can occur due to increased physiological demand and consumption of nutrient-poor foods.[1-4] Dermatologic manifestations of these deficiencies, when presenting in the hospitalized adult patient of an industrialized, developed nation, may signify severe, combined malnutrition and may be associated with a poor outcomes.

Methods | We conducted a detailed retrospective review of medical records from January 1, 2005, through December 31, 2017, for patients evaluated by the Department of Dermatology at a large-volume, tertiary referral academic medical center for cutaneous manifestations suggesting zinc (acquired acrodermatitis enteropathica), protein (kwashiorkor or marasmus), and niacin (pellagra) deficiency or the related necrolytic acral erythema of hepatitis C, for whom skin biopsy findings, laboratory values, and outcome data were available. The institutional review board of the University of Pittsburgh granted a waiver of informed consent and approval of this observational study with deidentified data. Data were analyzed from April 1, 2005, through December 22, 2017, using Kaplan-Meier survival curves.

Results | Eighteen patients meeting the inclusion criteria were identified (**Table**) (10 men [56%] and 8 women [44%]; mean [SD] age, 53.2 [15.4] years). Patients presented with erythem-

Table. Summary of Patient Demographics, Comorbidities, and Nondermatologic Signs and Symptoms by Outcome

Characteristic	Patient Group[a]		
	All (N = 18)	Living (n = 5)	Deceased (n = 13)
Age, y			
Mean (SD) [95% CI]	53.2 (15.4) [46.1-60.3]	66.2 (12.5) [55.2-77.2]	48.2 (13.6) [40.8-55.5]
Median (range)	52.5 (25-86)	64 (52-86)	47 (25-69)
Sex			
Male	10 (56)	2 (40)	8 (62)
Female	8 (44)	3 (60)	5 (38)
Race			
White	9 (50)	1 (20)	8 (62)
African American	9 (50)	4 (80)	5 (38)
Comorbidities			
Failure to thrive	12 (67)	2 (40)	10 (77)
Morbid obesity	8 (44)	2 (40)	6 (46)
Alcoholism	8 (44)	2 (40)	6 (46)
Cirrhosis	8 (44)	2 (40)	6 (46)
Hepatitis C virus infection	5 (28)	3 (60)	2 (15)
History of weight loss surgery	6 (33)	1 (20)	5 (38)
Large, chronic, postsurgical wound or decubitus ulcer	4 (22)	1 (20)	3 (23)
End-stage renal disease requiring hemodialysis	2 (11)	1 (20)	1 (8)
Malignant disease (both hepatocellular carcinoma)	2 (11)	1 (20)	1 (8)
HIV/AIDS	1 (6)	0	1 (8)
Cerebral palsy	1 (6)	0	1 (8)

(continued)