The Financial and Emotional Impact of Atopic Dermatitis on Children and Their Families

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Objective To examine the personal financial impact of atopic dermatitis (AD) and attempt to correlate cost of AD with emotional impact.

Study design Between March 2011 and December 2013, 82 caretakers of children 6 months to 12 years of age with moderate-to-severe AD were recruited at the time of dermatology clinic visits in Cleveland, Ohio, to complete surveys. The response rate was >95%. Participants were asked questions about direct expenses (medical visits, medications, and other products) and indirect expenses (time missed from work, childcare costs) related to AD in the past 4 weeks. Emotional impact was measured by the Childhood Atopic Dermatitis Impact Scale.

Results The mean monthly personal cost of AD in the month before the office visit was $274 (median $114; IQR $29, $276), with $75 from direct costs (median $45; IQR $20, $110) and $199 from indirect costs (median $0; IQR $0, $208). An average of 34.8% of available monthly money was spent on AD care in the month before the office visit. For patients with Medicaid, there was a significant correlation between monthly adjusted personal cost and Childhood Atopic Dermatitis Impact Scale score ($r = 0.548$; $P < .001$); however, this correlation did not exist for patients who had commercial insurance ($r = 0.269$; $P = .166$).

Conclusions Our results illustrate the high emotional and financial burden of childhood AD and provide insight into spending patterns. In addition, our study correlate costs with emotional burden of AD for lower-income patients. *(J Pediatr 2016;169:284-90)*.

Atopic dermatitis (AD) is a chronic, pruritic, inflammatory skin disorder with a wide range of severity. It is very common in children, with prevalence studies estimating that roughly 10%-20% of children in the US suffer from the disease.[1-3] AD has significant impact on the quality of life of children and their caretakers, equal to that of childhood diabetes, although this impact largely is not recognized by society and health practitioners.[4,5] Common impacts on children include constant scratching, pain, and sleep difficulties (which cause daytime sleepiness), disruptions in play, and school and conduct problems.[6-12] Children also suffer from low self-esteem, difficulties with socialization because of misconceptions about skin lesions, and have a greater incidence of psychiatric comorbidities, such as autism, attention deficit hyperactivity disorder, conduct disorder, and anxiety.[13,14] Caretakers are impacted because of cosleeping and subsequent lack of sleep, feelings of guilt and sadness, worries about side effects and costs of treatments, concerns about their child's psychosocial development, and impacts on family social functioning.[4,8-10,15,16] To better assess the burden of AD, Chamlin et al[8,9,17] created the Childhood Atopic Dermatitis Impact Scale (CADIS), which is a survey validated for children younger than 6 years old and their parents.

The financial burden of AD includes direct costs, or costs directly related to treatment, including health care visits, prescription medications, over-the-counter (OTC) medications, alternative treatments, moisturizers, special foods, detergents, and carpets, to name a few. These can be difficult to quantify because of varying copays with different insurance plans, for example. Indirect costs, including time lost from work or school, transportation, and childcare costs, also make up a significant portion of the financial burden of AD and are difficult to estimate.[18]

Many studies have attempted to quantify the cost of AD from the societal,[19-24] third-party payer,[15,25-31] and personal perspectives.[4,15,16,21,22,30,32] However, studies are difficult to compare and values vary greatly, as variable costs are included in calculations and definitions of "direct" and "indirect" costs vary. Estimates for personal costs range from less than $100 to greater than $2000 per year.[4,15,16,21,22,30,32]

The largest study of US societal burden was the burden of skin diseases 2004.[20] This study reported a direct annual cost (including health services and

AD	Atopic dermatitis
CADIS	Childhood Atopic Dermatitis Impact Scale
OTC	Over-the-counter

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prescriptions but not OTCs) of $1.009 billion for AD, indirect annual cost (due to lost work productivity) of $619 million, and intangible cost attributable to quality of life impact of $2.6 billion (2004 US dollars). Of note, caregiver lost workdays made up 40.1% of the indirect annual cost. The cost attributable to lost caregiver workdays was the greatest for all skin diseases.

We aimed to further investigate the emotional and financial impact of AD on children and their families by examining the correlation between income and family-size adjusted cost of AD with emotional burden of disease. Our primary hypothesis was that a greater financial burden of AD is associated with greater emotional impact of disease.

Methods

Subjects were parents or legal guardians of patients 6 months to 12 years of age with current or past moderate-to-severe AD, most of whom were seeing their dermatologist during a disease flare. Patients were recruited per Institutional Review Board standards from general dermatology and multidisciplinary eczema clinics at multiple campuses of the University Hospitals Case Medical Center in Cleveland, Ohio, from March 2011 to December 2013. Recruitment sites included an urban academic medical center, as well as suburban and rural satellite clinics. We obtained our subjects by convenience sampling; all eligible subjects were approached for participation in the study on days when a study investigator was available in the clinic. Subjects were approached if their treating dermatologist determined that the child had moderate-to-severe AD currently or in the past and was controlled adequately with medication. A power analysis was not performed. Eighty-five subjects were approached, with 3 refusing to participate, and 79 meeting inclusion criteria.

The subjects filled out a survey regarding financial and emotional aspects of AD in the past 4 weeks (**Appendix**; available at www.jpeds.com). Direct costs included physician visit copays (outpatient copays, emergency department copays, and hospitalization charges not covered by insurance), copays for prescription medications, and cost of OTC medications and other products. We provided examples of "other products" (eg, moisturizers, bath products, special clothing, special detergent) so that subjects would understand the question. Indirect costs included caretaker time off work to care for the child (surveys asked about time off work, salary of caretaker who missed work, and whether or not they had benefits), cost of additional childcare attributable to AD, and caretaker time missed from school to care for the child. Other costs incurred before 4 weeks prior to the survey were not assessed. Information about estimated family annual income was collected in these increments: <$20 000, >$20 000-$30 000, >$30 000-$40 000, >$40 000-$50 000, >$50 000-$60 000, >$60 000-$70 000, >$70 000-$80 000, and >$80 000. Information about the number of family members and the child's insurance type (Medicaid, commercial insurance, or self-pay) also was obtained. Most patients with Medicaid were in managed Medicaid programs. Questions about costs were not validated formally but were generated in an attempt to capture all diagnosis-related expenses. Some questions were validated informally by comparing responses with the clinic fee schedule. Lastly, the survey assessed the emotional impact of AD with the CADIS questionnaire. Each participant in the study was paid $25.

Data Analyses

Study data were managed with the Research Electronic Data Capture (ie, REDCap), a secure Web-based application designed to support data capture for research studies.[33] Statistical analysis software SAS version 9.3 (SAS Institute, Cary, North Carolina) and Stata version 13.1 (StataCorp, College Station, Texas) were used for data analysis. We did not normalize costs to a particular benchmark year because the study was conducted during a period of low inflation. In addition, all clinics were part of the University Hospitals Case Medical Center system, so health care costs were consistent at all sites. However, we could not control for costs of external care.

We calculated personal monthly cost of AD in 3 categories: medical visits, medications/other products, and indirect costs. To calculate monthly cost of each category, we used the following formulas:

- Total cost of medical visits = outpatient copay + emergency department copay + hospitalization out of pocket cost
- Total cost of medications/other = total copays for oral prescription medications + total copays for topical prescription medications + total cost of OTC medications + total out of pocket cost of OTC other products
- Total indirect costs:
  - If no benefits : Indirect costs = (time missed from work ∗ salary) + additional childcare costs
  - If had benefits : Indirect costs = [1:3 ∗ (time missed from work ∗ salary)] + additional childcare costs.

The direct cost reported is the sum of total cost of medical visits and total cost of medications/other.

Our total cost reported was a sum of the medical visits, medications/other products, and indirect costs. We calculated the mean, median, and IQR for each financial category and compared costs between commercial insurance and Medicaid using the nonparametric Kruskal-Wallis procedure based on ordered rank sums. The total cost was correlated against the parent 0-10 severity rating. We also calculated the percent of monthly available money spent on AD care (ie, the income and family-size adjusted cost):

- Total cost per month/(family annual income/family size/12) = percent of monthly available money spent on AD care

The same analysis as described above was performed for the percent of monthly available money spent on AD. The percent of monthly available money spent on AD was correlated against the CADIS score for all subjects (self-pay not calculated because of the low number of patients in this category). To satisfy the normality requirement for statistical testing of the correlation between CADIS score and percent of monthly available money spent on AD, the monthly amount was log-transformed; CADIS score was kept in its original scale. Seven subjects who did not provide adequate information on surveys, and 3 subjects who spent $0 on AD were not included (N = 69). Because income was collected in a categorical fashion but based on underlying continuous data, annual income was compared with CADIS score with a polyserial correlation analysis. Four subjects did not provide adequate information for this calculation (N = 75). Parental severity rating was also correlated with CADIS score.

The CADIS score was calculated by giving each of the 45 questions a numerical value based on response (never = 0, rarely = 1, sometimes = 2, often = 3, always = 4). An average score (0-4) was calculated for all answered questions and for each domain: child symptoms, child activity limitation and behavior, family and social functioning, parent sleep, and parent emotions. All CADIS questionnaires were included in analysis, including surveys in which 1-2 questions were not answered.

The medications and other products were categorized by type (oral steroids, topical steroids, topical calcineurin inhibitors, topical antibiotics/antifungals/insecticides, other medicated topical medications, antihistamines, other oral medications, supplements, moisturizers, bath products, and other products). Three subjects who did not report medication copays and 5 subjects who did not specify if a product was a moisturizer or a bath preparation were not included in this analysis (N = 71). A Type 1 error rate of 0.05 was used to determine statistical significance throughout the analysis. No adjustment was made for multiple comparisons.

Assumptions

Because of the nature of our study, a number of assumptions had to be made regarding costs. We assumed that one lost workday was equal to 8 hours and that there are 2000 working hours per year. We also assumed that childcare was required 5 days per week. We assumed the annual income to be the average of the category marked (eg, if >$20 000-$30 000 was marked, we used $25 000 in calculations), or $20 000 if <$20 000 was marked, and $80 000 if >$80 000 was marked, and that benefits were 30% of salary.

Although the vast majority of participants returned completed surveys, we made some assumptions regarding subjects who left portions of the "medication" section incomplete. If a subject wrote a range for a cost, we used the average of the range (eg, subject wrote $4-$6, we used $5). Seven subjects did not fill out the cost of an OTC medication or product, and we sourced the price on the Walgreens drugstore Web site; we sourced the price from Epocrates online for one self-pay subject. If subjects did not specify the bottle size, we used the average cost of all sizes, and if they did not specify the amount of a product purchased, we assumed it to be 1. One participant purchased a moisturizer, but could not recall which one, so we used the value of $8.11, calculated by averaging the costs of the most popular moisturizers.

Results

Caretakers of children with AD participated in this study (n = 82). Three did not meet inclusion criteria, one because of mild disease, another because the discovery that the subject had already enrolled in the study, and the last because the caretaker could not provide proof of guardianship. Thus, 79 were considered for data analysis. Child ages ranged from 0.5 to 12.6 years, with a mean of 4.3 years. A total of 44.3% of the children were female, and 55.7% were male; 50.6% had current or past physician-verified moderate AD, and 49.4% had current or past severe AD. The average parent severity rating of their child's AD was 7 (scale of 1-10). Forty-five participants (57%) had Medicaid, 32 (40.5%) had commercial insurance, and 2 (2.5%) were self-pay.

Cost of AD

The average personal cost of AD in the month before an office visit, including direct costs and indirect costs, was $274 per patient (median $114; IQR $29, $276), with $75 spent on direct costs (median $45; IQR $20, $110) and $199 on indirect costs (median $0; IQR $0, $208) (**Table I**). The cost varied significantly between patients with commercial insurance and Medicaid ($P < .001$): patients with commercial insurance spent an average of $436 (median $240; IQR $99, $507), and patients with Medicaid spent $164 (median $38; IQR $16, $175).

The mean percent of monthly available money spent on AD (ie, income and family-size adjusted cost) was 34.8% (median 16.8%; IQR 3.7%, 48.2%). Values for patients with Medicaid (mean 34.3%; median 12.4%; IQR 2.4%, 42.0%) and patients with commercial insurance (mean 36.1%; median 20.7%; IQR 8.2%, 61.6%) were not significantly different ($P = .198$). When considering all subjects, we found there was a significant correlation between CADIS score and percent of monthly available money spent on AD (N = 69; r = 0.439; $P < .001$). This correlation also was significant for all CADIS subcategories. However, this correlation did not exist for patients receiving commercial insurance (N = 28; r = 0.269; $P = .166$) (**Figure 1**), but the correlation was very strong for patients receiving Medicaid (N = 40; r = 0.548; $P < .001$) (**Figure 2**) and was significant in all CADIS subcategories. There was not a significant correlation between parent severity rating and percent of monthly available money spent on AD (N = 69; r = 0.181;

Table I. Mean, median, Q1, and Q3 of personal monthly direct and indirect costs of AD

	All subjects (n = 79)			Medicaid (n = 45)			Commercial insurance (n = 32)		
	Mean	Median	(Q1, Q3)	Mean	Median	(Q1, Q3)	Mean	Median	(Q1, Q3)
Direct costs									
Medical visits									
Outpatient	20.11	0.00	(0.00, 30.00)	0.67	0.00	(0.00, 0.00)	47.47	37.50	(10.00, 60.00)
Emergency department	2.41	0.00	(0.00, 0.00)	0.89	0.00	(0.00, 0.00)	4.69	0.00	(0.00, 0.00)
Hospitalization	1.14	0.00	(0.00, 0.00)	2.00	0.00	(0.00, 0.00)	0.00	0.00	(0.00, 0.00)
Subtotal (medical visits)	23.66	0.00	(0.00, 35.00)	3.56	0.00	(0.00, 0.00)	52.16	37.50	(10.00, 60.00)
Medication/other products									
Rx oral medications	2.62	0.00	(0.00, 0.00)	0.62	0.00	(0.00, 0.00)	4.97	0.00	(0.00, 9.00)
Rx topical medications*	14.07	0.00	(0.00, 20.00)	2.82	0.00	(0.00, 0.00)	31.91	25.00	(7.00, 50.00)
OTC medications	6.86	0.00	(0.00, 11.99)	4.73	0.00	(0.00, 6.00)	9.83	8.00	(0.00, 14.50)
OTC other products	28.44	21.00	(9.00, 38.00)	23.36	18.41	(7.98, 31.00)	34.69	26.50	(17.00, 40.25)
Subtotal (meds/other)†,‡	51.46	38.00	(18.48, 72.50)	31.53	28.50	(9.00, 41.29)	78.42	64.50	(39.86, 104.00)
Direct costs total†	75.12	44.50	(19.50, 110.00)	35.09	28.97	(15.97, 44.50)	130.58	115.00	(69.15, 162.24)
Indirect costs									
Missed work	185.84	0.00	(0.00, 208.00)	123.24	0.00	(0.00, 128.00)	282.36	0.00	(0.00, 433.13)
Additional childcare	12.82	0.00	(0.00, 0.00)	6.00	0.00	(0.00, 0.00)	23.22	0.00	(0.00, 0.00)
Indirect costs total	198.66	0.00	(0.00, 208.00)	129.24	0.00	(0.00, 128.00)	305.58	0.00	(0.00, 433.13)
Direct + indirect costs total†	273.78	114.00	(28.50, 276.00)	164.33	38.00	(16.00, 175.08)	436.16	239.74	(99.00, 506.64)

Q1, quartile 1; *Q3*, quartile 3; *Rx*, prescription.
Subjects without insurance ("self-pay") not included.
*Rx topical medications have N = 76 for the "all subjects" group and N = 29 for "commercial insurance" group for the mean and median calculation.
†Medications/other subtotal, direct costs total, and direct + indirect costs total have N = 76 for the "all subjects" group and N = 29 for the "commercial insurance" group for median calculations.
‡Medications/other subtotal is a weighted mean for the "all subjects" and "commercial insurance" groups.

$P = .137$). There was a significant correlation between CADIS score and parental disease severity rating (r = 0.498, $P < .001$). There was no correlation between annual income and CADIS score for the total sample (N = 75, r = −0.09, $P = .47$), patients with commercial insurance (N = 31, r = −0.18, and $P = .33$), and patients with Medicaid (N = 43, r = 0.10, and $P = .58$).

Monthly Direct Costs

An average of $75 was spent on direct costs, with $24 spent on medical visits (median $0; IQR $0, $35) and $51 spent on medications and other products (median $38; IQR $18, $73). Fifty-one children (64.6%) had at least 1 outpatient visit in the past month, 17 (21.5%) at least 1 visit to the emergency department, and only 2 patients (2.5%) had hospitalizations. The greatest contributor to medication/other product costs was OTC "other" products (eg, moisturizers, bath products), with an average of $28 spent on this category (median $21; IQR $9, $38) and 73 (92.4%) patients using products in this category. Of medications and other products, the most money was spent on moisturizers, used by 82.3% of patients in the previous 4 weeks

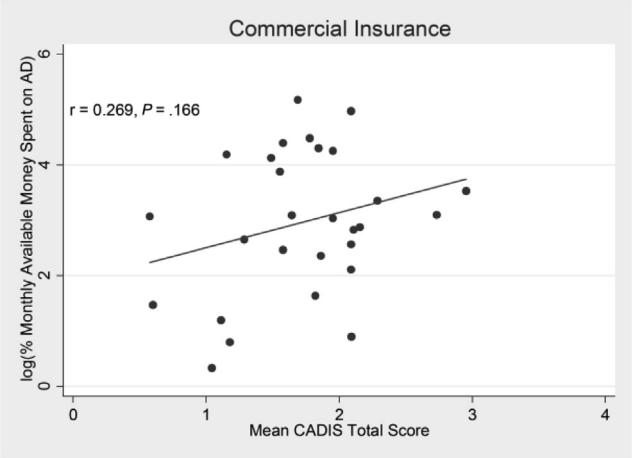

Figure 1. Correlation between percent monthly available money spent on AD (ie, income and family-size adjusted cost) and mean CADIS total score for patients with commercial insurance (N = 28).

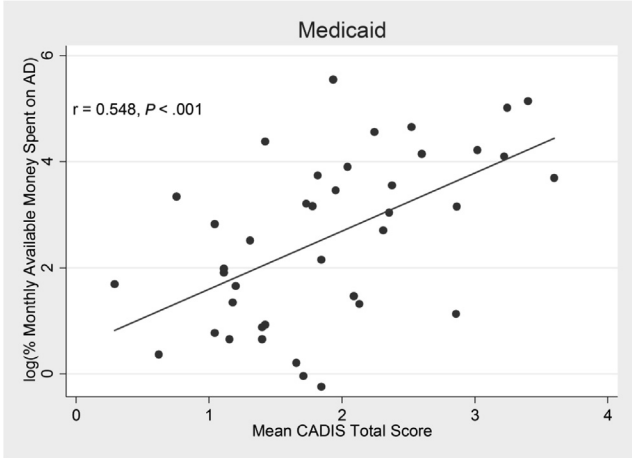

Figure 2. Correlation between percent monthly available money spent on AD (ie, income and family-size adjusted cost) and mean CADIS total score for patients with Medicaid (N = 40).

(mean cost $15; median $12; IQR $6, $22); topical steroids, used by 78.5% of patients (mean cost $9; median $0; IQR $0, $13); bath products, used by 64.6% (mean cost $8; median $6; IQR $0, $12); and antihistamines, used by 60.8% of patients (mean cost $5; median $0; IQR $0, $7) (Table II).

The direct costs were significantly greater for patients with commercial insurance compared with patients receiving Medicaid ($P < .001$), primarily accounted for by differences in medical visits costs ($P < .001$), oral prescriptions ($P < .001$), and topical prescriptions ($P < .001$) (Table I). The pattern of medical visit utilization also differed between patients receiving Medicaid and those with commercial insurance. Outpatient visits were used significantly more by patients with commercial insurance (87.5% of patients receiving commercial insurance vs 48.9% of patients receiving Medicaid; $P = .013$). Although the difference was not significant, emergency department visits were used more often by patients receiving Medicaid (28.9% of patients receiving Medicaid vs 12.5% of patients with commercial insurance; $P = .087$), and hospitalizations occurred exclusively in patients with Medicaid (4.4% of patients with Medicaid vs 0% of patients with commercial insurance; $P = .227$).

Monthly Indirect Costs

Indirect costs made up the largest portion of the overall cost, with an average of $199 lost as the result of lost caregiver workdays and additional childcare. Although the difference was not significant, this value was greater for patients with commercial insurance (mean $306; median $0; IQR $0, $433) than patients with Medicaid (mean $129; median $0; IQR $0, $128) ($P = .138$). The largest indirect cost was missed work, accounting for $186 of the total (median $0; IQR $0, $208). Thirty-two (40.5%) caregivers missed work to take care of their child, with an average 20.5 hours missed amongst these caregivers. Five (6.3%) caregivers paid for extra childcare because of their child's AD.

Discussion

Our study demonstrated a significant correlation between monthly adjusted personal cost and emotional impact of AD in patients with Medicaid but not patients with commercial insurance. There was no correlation between annual income and emotional impact, suggesting that patients receiving Medicaid did not experience greater burden of disease solely because they had lower income. Rather, many complex factors associated with lower socioeconomic status, such as access to care, social stressors, and poor support systems, may have contributed to this correlation.

Our reported out-of-pocket costs are greater than most other previous studies performed from the personal perspective, even those which included indirect costs in their calculations.[4,15,21,22,30] One explanation is that most of our subjects were interviewed during an AD flare, indicating that the financial and emotional burden was greatest in the weeks preceding the visit. In addition, there are few recent studies; therefore, our reported costs are likely greater because of inflation. However, our cohort had more children with Medicaid than the national average, which should result in lower reported total out-of-pocket costs. Our calculation of cost compared with available monthly money is different from most other studies. Lastly, out-of-pocket costs are simply difficult to assess, leading to different and inconsistent reported values. However, our average cost of OTC medications and creams is very similar to those reported in a 2001 American study by Anderson and Rajagopalan.[32] We report a mean of $7 and $15 spent on OTC medications and creams, respectively, and Anderson and Rajagopalan report $10 and $13, respectively (converted to 2013 US dollars).

Our reported proportions of money spent on various direct costs were similar to those in other studies. We report a high proportion of money spent on OTC products (mean of $28, almost 40% of the total direct cost of $75),

Table II. Mean, median, Q1, and Q3 of personal monthly costs of medications (Rx or OTC) and other products for AD treatment

	All subjects (n = 71)			Medicaid (n = 44)			Commercial insurance (n = 25)		
	Mean	Median	(Q1, Q3)	Mean	Median	(Q1, Q3)	Mean	Median	(Q1, Q3)
Moisturizers	15.28	12.00	(5.50, 22.00)	13.39	9.00	(3.00, 20.00)	18.78	15.00	(10.00, 22.00)
Topical steroids	9.42	0.00	(0.00, 13.00)	5.17	0.00	(0.00, 2.25)	17.00	13.00	(6.00, 25.00)
Bath products	8.46	5.50	(0.00, 12.00)	8.71	6.00	(0.00, 14.50)	8.45	5.00	(2.00, 10.00)
Anti-histamines	4.66	0.00	(0.00, 7.00)	2.52	0.00	(0.00, 3.25)	8.21	5.97	(0.00, 15.00)
Other products*	4.03	0.00	(0.00, 0.00)	0.41	0.00	(0.00, 0.00)	8.60	0.00	(0.00, 0.00)
Topical antibiotics, antifungals and insecticides	1.79	0.00	(0.00, 0.00)	0.00	0.00	(0.00, 0.00)	5.08	0.00	(0.00, 0.00)
Topical calcineurin inhibitors	1.55	0.00	(0.00, 0.00)	0.00	0.00	(0.00, 0.00)	4.40	0.00	(0.00, 0.00)
Supplements†	1.10	0.00	(0.00, 0.00)	0.00	0.00	(0.00, 0.00)	3.12	0.00	(0.00, 0.00)
Other topical medications‡	1.04	0.00	(0.00, 0.00)	0.32	0.00	(0.00, 0.00)	2.40	0.00	(0.00, 0.00)
Other oral medications§	0.39	0.00	(0.00, 0.00)	0.18	0.00	(0.00, 0.00)	0.80	0.00	(0.00, 0.00)
Oral steroids	0.28	0.00	(0.00, 0.00)	0.00	0.00	(0.00, 0.00)	0.00	0.00	(0.00, 0.00)

Subjects without insurance ("self-pay") not included.
*Other products include homeopathic products, special clothing, sunscreens, and detergents.
†Supplements include probiotics and special vitamins.
‡Other topical medications include zinc oxide and mixed drug preparations.
§Other oral medications include antacids, immune modulators, and oral antibiotics or antifungals.

which also was illustrated in other studies,[21,30] especially for moisturizers.[15,30]

We replicate previous work showing that indirect costs make up the majority of costs of AD care.[4,15] It is likely that we underestimated the indirect costs of AD, as studies have shown significant costs of transportation, which we did not consider in our study.[4,30] In addition, we did not consider indirect costs which are more difficult to calculate, such as child days missed from school or caretaker career choice.[18]

Although almost all parents interviewed agreed that the burden of AD is not recognized by the public, the level of emotional strain among caretakers varied greatly. Multiple caretakers reported being accused of child abuse or neglect, which also was reported in parent interviews performed by Chamlin et al[9] and Smith et al.[16] Again, our reported levels of emotional burden are skewed to represent the burden experienced during an AD flare.

Our use of surveys inherently introduced error into values reported, because caretakers may not accurately recall past expenses. We also approximated and calculated the cost of some OTCs, which introduced error into our reporting. Another limitation is that we collected data over 3 years and did not correct our data for inflation; it should be noted, however, that our data were collected during a period of low inflation. We also did not use the exact annual family income in our adjusted cost calculation; rather, the income used was just an estimate, thus introducing error into the "percent of monthly available money spent on AD" calculation. In addition, although we considered the main direct and indirect costs implicated in AD, there are other costs that we did not include, such as cost of travel, home changes (such as changing carpets, removal of pets), medical insurance deductible cost, career choice, and cost of alternative practitioner visits or therapies (acupuncture, aromatherapy).[4,18,21]

Our study also has some limitations regarding the CADIS questionnaire. By asking caretakers about costs of AD while at the same time administering the CADIS, they may have been biased when filling out the questionnaire. The CADIS questionnaire was developed primarily for parents of children with AD younger than 6 years of age, and we used the questionnaire for parents of children 6 months to 12 years of age.[17] In addition, the CADIS was developed based on a population of predominantly white, privately insured, married families, with many having an income of greater than $70 000[8]; our population included many single parents of lower socioeconomic status, many of whom were on Medicaid. Our study population's relatively small size and limited geographic location limit the applicability of our findings to other populations. In addition, our use of a convenience sample potentially introduced selection bias and the exploratory nature of our study increased possibility of type I error.

Lastly, the nature of our study precludes us from making any conclusions regarding causality. Rather, we are only able to illustrate correlation between financial burden and emotional impact.

Our study illustrates the high financial and emotional burden of AD on children and their families. In addition, it describes the correlation between personal cost and emotional burden of AD for lower income families. This provides insight as to actions practitioners can take to decrease the burden of disease for families of lower socioeconomic status. Perhaps the burden of AD on both patients and caretakers can be reduced by addressing the impact of disease, promoting insurance coverage of moisturizers, and having knowledge of OTC product costs and making recommendations accordingly. In addition, practitioners can discuss coping mechanisms and credible resources of support and information (eg, National Eczema Association), include sleep pattern regulation and control of scratching in the plan of care, and explore creative ways to offer after-work office hours or nurse-on-call visits during AD flares. Further research should be aimed at assessing the effectiveness of these and other interventions on burden of disease. ■

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Part 1: Financial Survey
These questions pertain to the previous **4 weeks**. Do not include the costs of today's clinic.

1. Please answer the following regarding **office visits in the last 4 weeks:**

A) (i) Number of visits to doctor's office (please include visits to the primary care physician, dermatologist, allergist etc): _____

(ii)What was the total co-pay amount for the visit(s): _____

B) (i) Number of emergency room visits: _____

(ii)What was the total co-pay amount for the visit(s): _____

C) (i) Number of hospitalizations: _____

(ii) What was the total out of pocket expenses: _____

(iii) What were the total costs of hospitalization (please include transportation, gas, parking etc): _____

2. Please answer the following questions regarding **time off work in the last 4 weeks:**

A) How much work time was missed by a parent/guardian of this child due to atopic dermatitis/eczema issues? :
_____ Hours **OR** _____ days

B) Is the parent/guardian who missed work paid an hourly or annual salary? :

☐ Hourly ☐ Annually

C) What is hourly wage or annual salary of the parent/guardian who missed work? :
_____

D) Does the parent/guardian who missed work have benefits? :

☐ Yes ☐ No

E) What is the total amount of money lost in wages/earnings due to care of the child with atopic dermatitis? :
_____

F) Additional childcare costs (eg, sick care) due to child unable to attend school or daycare:

_____

G) If applicable, how many hours of schooling were missed by the parent/guardian of the child with atopic dermatitis ?
_____

Appendix. Survey completed by the study subjects. *(Continues)*

3. A) How many earning members are there in the child's family? : _____

B) How many non-earning members (including the child) are there in the child's family? : _____

4. What is the average annual income for the child's family?

☐ Less than $20 000 ☐ >$20 000 to $30 000 ☐ >$30 000 to $40 000

☐ >$40 000 to $50 000 ☐ >$50 000 to $60 000 ☐ >$60 000 to $70 000

☐ >$70 000 to $80 000 ☐ more than $80 000 ☐ Do not want to disclose

5. Medications:
Please list the medications along with their strengths and doses that you have used in the last 4 weeks. Also, tick the check box if the medicines were dispensed generically.

A) List oral (suspensions/pills) prescribed

Name of medicine	Strength	Quantity	Dispensed generically?	Amount of copay or self-pay
			☐	
			☐	
			☐	
			☐	
			☐	

B) List prescription topicals (eg, ointments, shampoos, etc.) prescribed

Name of medicine	Strength	Quantity	Dispensed generically?	Amount of copay or self-pay
			☐	
			☐	
			☐	
			☐	
			☐	

Appendix. Continues.

C) List over-the-counters (eg, anti-histamines, hydrocortisone, etc.) purchased

Name of medicine	Strength	Quantity	Dispensed generically?	Amount of copay or self-pay
			☐	
			☐	
			☐	
			☐	
			☐	

6. List special moisturizers, body washes, etc. Please list these special moisturizers, body washes, etc. along with their strengths and doses that you have used in the last 4 weeks. Also, tick the check box if these special moisturizers were dispensed generically.

Name of medicine	Strength	Quantity	Dispensed generically?	Amount of copay or self-pay
			☐	
			☐	
			☐	
			☐	
			☐	

7. On a scale of 1 to 10 where 10 is the worst dermatitis ever experienced and 1 is most clear, what is the average score for the past 4 weeks?

☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10
Clear **Worst**

8. A) What type of insurance does the child have for doctor's office visits?

☐ Medicaid ☐ Commercial Insurance ☐ Self Pay

B) What type of insurance does the child have for pharmacy / prescription medicines?:

☐ Medicaid ☐ Commercial Insurance ☐ Self Pay

Appendix. Continues.

Part 2: CADIS Survey: For the following questions, please select 1 of the 5 available options

No	Question	Never	Rarely	Some-times	Often	Always
1	This skin condition affects how well my child sleeps	☐	☐	☐	☐	☐
2	Because of this skin condition, I limit my child's outdoor activities such as playing at parks or beaches	☐	☐	☐	☐	☐
3	My child's skin condition affects how well my spouse and I sleep	☐	☐	☐	☐	☐
4	I am bothered that this skin condition affects our vacation plans.	☐	☐	☐	☐	☐
5	This skin condition affects our social life	☐	☐	☐	☐	☐
6	This skin condition makes my child fussy or irritable	☐	☐	☐	☐	☐
7	I am bothered that my family stays home more because of this skin condition	☐	☐	☐	☐	☐
8	I am bothered that this skin condition affects our relationships with relatives	☐	☐	☐	☐	☐
9	My child scratches or rubs his/her skin	☐	☐	☐	☐	☐
10	This skin condition makes my child feel frustrated	☐	☐	☐	☐	☐
11	I worry about leaving my child with others (babysitters, relatives) because of this skin condition	☐	☐	☐	☐	☐
12	My child seems to cry more because of this skin condition	☐	☐	☐	☐	☐
13	I worry that my child's skin condition will continue	☐	☐	☐	☐	☐
14	My child's skin seems to be painful or irritated	☐	☐	☐	☐	☐
15	I am frustrated with my child's skin condition	☐	☐	☐	☐	☐
16	I/we avoid taking photos of my child because of this skin condition	☐	☐	☐	☐	☐
17	My child seems to be restless or hyperactive because of this skin condition	☐	☐	☐	☐	☐
18	I am bothered by how much time is needed to care for my child's skin condition	☐	☐	☐	☐	☐
19	I worry about the costs of my child's skin condition	☐	☐	☐	☐	☐
20	My child's skin condition affects my spouse's or my work performance due to missed time and decreased productivity	☐	☐	☐	☐	☐
21	Taking a bath makes my child uncomfortable	☐	☐	☐	☐	☐
22	My child's itching / scratching affects his/her play	☐	☐	☐	☐	☐
23	I feel helpless about my child's skin condition	☐	☐	☐	☐	☐
24	My child scratches his/her skin to get attention	☐	☐	☐	☐	☐
25	I am bothered by the reaction of strangers to this skin condition	☐	☐	☐	☐	☐
26	I am disappointed that my child has this skin condition	☐	☐	☐	☐	☐

Appendix. Continues.

No	Question	Never	Rarely	Some-times	Often	Always
27	Certain fabrics or clothes seem to bother my child's skin	☐	☐	☐	☐	☐
28	I worry that my child is exposed to things that may worsen this skin condition	☐	☐	☐	☐	☐
29	It is difficult to discipline my child because of this skin condition	☐	☐	☐	☐	☐
30	My child's skin condition has strained my relationship with my spouse or partner	☐	☐	☐	☐	☐
31	My child sleeps in my bed because of this skin condition	☐	☐	☐	☐	☐
32	I worry about the side effects from treatments for this skin condition	☐	☐	☐	☐	☐
33	I worry that this skin condition will affect my child's ability to make friends	☐	☐	☐	☐	☐
34	My child misbehaves more because of this skin condition	☐	☐	☐	☐	☐
35	This skin condition has affected how confident I feel about my child's medical care	☐	☐	☐	☐	☐
36	I am bothered by my child sleeping in my bed	☐	☐	☐	☐	☐
37	I am angry that my child has this skin condition	☐	☐	☐	☐	☐
38	I worry that this skin condition will affect my child's self esteem	☐	☐	☐	☐	☐
39	My child's skin condition makes me feel sad or depressed	☐	☐	☐	☐	☐
40	My child's skin condition has affected my decision to have other children	☐	☐	☐	☐	☐
41	Children seem to avoid touching or playing with my child because of this skin condition	☐	☐	☐	☐	☐
42	I blame myself or feel guilty that my child has this skin condition	☐	☐	☐	☐	☐
43	My child dislikes having creams and ointments applied to his or her skin	☐	☐	☐	☐	☐
44	I am embarrassed by the way my child's skin looks	☐	☐	☐	☐	☐
45	My child's skin condition makes it hard to do what I enjoy	☐	☐	☐	☐	☐

Part 3: Physician estimate of global disease severity.

A) What is the disease severity assessment in University Hospitals Eczema Clinic?

☐ Mild ☐ Moderate ☐ Severe

B) In the range of 0% to 100%, what is the estimated body surface area value for this patient? _____

Appendix. Continued.