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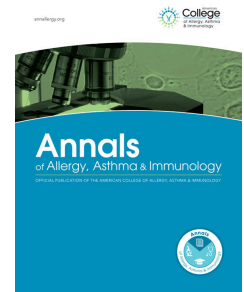
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The Socioeconomics of Atopic Dermatitis

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Conflict of Interest

Dr. Simpson is an investigator for AbbVie Inc., Eli Lilly Co., Genentech, Leo Pharmaceutical Co., Merck, Pfizer, Regeneron Pharmaceuticals, Inc., and a consultant with honorarium for AbbVie Inc., Boehringer-Ingelheim, Dermavant, Dermira, Eli Lilly Co., Glaxo Smith Kline, Incyte, Leo Pharmaceutical Co., Pfizer, and Regeneron Pharmaceuticals, Inc. and Sanofi Genzyme. Janice Chung reports no conflicts of interest.

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Abbreviations:

AD atopic dermatitis
 SES socioeconomic status
 US United States
 NHIS National Health Interview Survey
 NSCH National Survey of Child's Health
 UK United Kingdom
 AAD American Academy of Dermatology Association
 SID Society for Investigative Dermatology
 HCRU healthcare resource utilization

ED emergency department
 WPAI work productivity and activity impairment
 EU European Union
 NHWS National Health and Wellness Survey
 FLG filaggrin
 IQ intelligence quotient
 DALY disability-adjusted life years
 YLD years lived with disability

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1 INTRODUCTION

2 Atopic dermatitis (AD) is a chronic inflammatory skin disorder increasing in prevalence
3 globally and is not, as previously thought, a disease limited to childhood. Recent prevalence
4 studies reveal a large global burden of AD in adults, either due to disease persistence or adult-
5 onset disease.¹⁻³ Because of the global nature of the disease and the years patients may suffer
6 from disability, AD represents the skin disease with the greatest global skin disease burden as
7 measured by disability-adjusted life years.⁴ Patients with AD suffer from symptoms of itch and
8 pain, endure social impacts from having a visible disease, have a predisposition to skin
9 infections, experience reduced health-related quality of life, and have a very high risk of both
10 allergic and mental health comorbidities. The burdens of both allergic and non-allergic
11 comorbidities have been recently reviewed.^{5,6}

12 These and many other studies of comorbidities and disease prevalence have helped define
13 the largely overlooked individual and population-level burden of the disease, raising awareness
14 of the importance of AD. We now have a better understanding of the multi-dimensional nature
15 of the AD burden, as recently reviewed by Bridgman, et al.⁷ New therapies are now judged not
16 only on improving the inflammatory skin lesions of patients but also upon their ability to impact
17 the symptoms of itch, skin infection, and overall quality of life. As new therapies emerge and
18 disease prevalence continues to rise, a better understanding of not just the health burden becomes
19 important, but also the socioeconomic burden. Understanding the socioeconomics of the disease
20 allows for designing disease prevention strategies and improved resource planning and allocation
21 for emerging therapeutics. The objective of this paper is to review the current state of the
22 literature regarding the socioeconomics of AD—more specifically how socioeconomic status
23 (SES) affects AD risk and how the presence of AD may affect one's SES. A discussion of the

cost of the disease to society is also included. Note, like in AD, the role of SES in other atopic/allergic diseases such as asthma is broad and complex and is beyond the scope of this review.^{8–10}

Methods. A PubMed search was performed to include articles relevant to (atopic dermatitis OR atopic eczema) AND (cost OR finances OR economic OR income OR career OR socioeconomic), yielding 862 articles. Articles pertaining to other diagnoses such as “contact dermatitis” were excluded, except when studied as comorbidities, as were those written in a language other than English, and preference was given to articles written in the last 5 years. Some articles were obtained from the reference lists of articles that were reviewed, or in ancillary searches pertaining to comorbidities or other background information.

SES INFLUENCES ON DISEASE RISK

Lower SES correlates with an increased risk of numerous chronic health conditions such as obesity, smoking tobacco, and chronic stress.¹¹ The link between SES and the risk of AD is not as straightforward as most chronic diseases. Many studies globally observed an increased prevalence of AD with higher SES over the past several years.^{12–16} A British study of 7 year old children from 1989 depicted such, with the patients with the highest SES having twofold greater prevalence of AD than those with the lowest SES.¹² A German study from 2010 agreed that higher SES increased AD risk, and also noticed an increase in persistence of the disease in these cases.¹⁴ SES is influenced by household income; both a United States (US) study of the 2010 National Health Interview Survey (NHIS) and a study in Tehran from January 2013 to January 2014 showed a positive correlation between AD prevalence and household income,^{16,17} while a

2010 Denmark study noted no relationship to household income.⁹ Despite this, the Denmark study found decreased AD prevalence where at least one parent was unemployed,⁹ whereas a US study of the 2003 National Survey of Child's Health (NSCH) found that households with a single mother structure had the highest prevalence of AD.¹³ Another aspect of SES is education, and Denmark children were more likely to develop AD if their parents had higher levels of education.⁹ A Belgian study further reported that children were more likely to develop AD when at least one parent had high education, but only maternal education level was found to be significant ($p = 0.018$).⁸ Likewise, children of Korean mothers with at least a bachelor's degree were the most likely to develop AD.¹⁵ Regarding the atopic march, the Belgian authors also reported a positive correlation between asthma and recurrent wheeze to parental educational level, although the authors state that prior studies have been conflicting, possibly including non-allergic forms of these diseases that they accounted for by screening participants for serum IgE levels of 0.35 kU/I or more.⁸ However, the Denmark study was more recent, and while they did not account for IgE levels specifically, they reported an inverse correlation between parental education and both asthma and hay fever.⁹

There are several potential explanations for the correlation of higher SES and increased AD prevalence. One possibility is detection bias. With higher income and more education, families likely have more access to medical care with increased detection of conditions that may not bring lower SES families to seek healthcare. The NHIS study reported increased AD prevalence with increased health care utilization and insurance coverage,¹⁷ as supported by the 2003 NSCH study,¹³ reflecting the greater access to health care resources and potential detection bias within the higher SES population. Also, racial disparities may influence and be influenced by SES; a recently published study reported increased AD incidence in children of non-Hispanic

black and other non-Hispanic race in comparison to non-Hispanic white children,¹⁸ although this must be explored further for confounding variables such as genetics, environment, and SES to support a true correlation of AD incidence and race. Another possibility is the hygiene hypothesis,¹⁹ interpreted in the broader sense with more hygienic practices possibly yielding a greater risk of allergic disease. More access to care is suggestive of more vaccinations, fewer opportunities for infection or microbial exposures, smaller families, and cleaner homes.¹² This was seen in the British study as AD prevalence increased in households with fewer children,¹² and validated by the 2003 NSCH study.¹³ In contrast, this was not the case in the Tehrani study, where there was no association to number of children,¹⁶ nor in a Turkish study where there was no association to increased household size,²⁰ although this may have been influenced by multiple other factors such as different culture and climate. Regarding impact of SES on other manifestations such as asthma, the data have been largely inconclusive regarding the impact of SES on manifestations of the atopic march,⁸⁻¹⁰ although the data is in favor of increased prevalence of asthma with lower SES.¹⁰

SES may also impact AD prevalence via environmental exposures. AD was more prevalent in children with high household SES if they lived in areas of low regional SES, specifically areas of high road density or high road proximity in Korea, although the authors suggest higher income households may be nearer to major roads within those communities which leads to larger exposure;²¹ this also confirms the finding that AD is more severe in urban areas.²² The Belgian study reported increased exposure to cigarette smoke in the children of families with lower education, but smoking was not found to be associated with AD prevalence in this study,⁸ nor the other studies regarding exposure to passive smoking in the household.^{13,20} One could also hypothesize that bathing or moisturization practices may also vary between SES groups—a

factor that may impact early skin barrier status and AD risk, although this has not been previously studied.

SES INFLUENCES ON DISEASE SEVERITY

While many studies evaluated the association between SES and AD prevalence, some studies assessed the influence of SES on AD severity. A study of children from the United Kingdom (UK) in 1998-1999 classified families based on the father's income alone, or the mother's income if she was a single mother or the sole source of income, and found no variation in disease severity that was significant between the classes, with a sample population closely resembling the UK census around the time of the children's birth year.²² However, a US study of the 2007 NSCH determined that children were significantly more likely to develop higher severity AD within households with lower income ($p < 0.0001$), dilapidated housing ($p = 0.00009$) and communities with garbage on the street ($p = 0.001$), single mother households ($p < 0.0001$), and when parents had lower education ($p = 0.001$ for father, $p < 0.0001$ for mother).²³ The first born child was more likely to have more severe AD, which the authors suggest may be due to lack of experience managing childhood AD.²³ Both the UK and US studies found no association between AD severity and family size.^{22,23} Additionally, a study in Denmark suggested that tobacco exposure may predispose to more severe AD,²⁴ and since smoking is more common in lower income households,⁸ this further emphasizes the potential role of lower SES in AD severity. Yet, the 2007 NSCH study noted no association to smokers in the home, indoor smoking, or metropolitan residence,²³ which could be due to sensitization to allergens.

There are well-described barriers to care access for patients who are of low SES, such as difficulties in obtaining medical resources, such as specialist care²⁵ and affordable medications,²⁶

which can result in poor adherence and poor control of the disease. While the lower SES population may be at lower risk for developing AD, the healthcare barriers they face likely contribute to higher severity in this population. Also, non-Hispanic black children and Hispanic children are more likely to have persistent AD¹⁸ and more severe disease²³ as these populations are well-known to have less access to quality healthcare. Addressing socioeconomic disparities in patients with AD should help minimize the subsequent and substantial costs associated with disease progression.

SOCIOECONOMIC EFFECTS OF AD

AD produces direct, indirect, and intangible costs (Table 1). Direct costs include medical billing and copays for the appointment, the transportation to and from the appointment, prescription and over-the-counter medications including emollients, laboratory tests, procedures, hospitalizations, and need for a caregiver. Absenteeism, presenteeism, loss of employment, social and psychological burden comprise some of the indirect costs.²⁷ Intangible costs account for the unmeasurable negative impacts of the disease, such as the neuropsychiatric effects on learning ability and the consequences on quality of life.^{28,29} A 2004 study by the American Academy of Dermatology Association (AAD) and the Society for Investigative Dermatology (SID) estimated the total annual cost of AD to exceed \$4 billion per annum in the US, without accounting for over-the-counter costs and impacts on work unrelated to office visits.^{29,30} The annual cost is likely much greater now accounting for inflation and the increase in AD prevalence over the past 14 years,³⁰ with the 2004 US data extrapolated to an equivalent \$5.3 billion in the US in 2015.⁶

Direct costs

Based on the 2004 study by the AAD and SID, AD generates over \$1 billion in direct costs in the US.²⁹ An Australian study from 1997 (n = 48) reported that medications comprised the majority of direct costs for the participating families of children with AD. Other costs included home modifications, such as carpet removal and acquiring hypoallergenic bedding, and purchasing clothing made from textiles thought to be less irritating.³¹

To understand the burden of direct costs, a study followed a cohort of Korean juvenile and adult patients with AD over the course of three months in 2010; upon generalizing the results the researchers estimated the equivalent of \$2,281 spent per annum (per family). They suggested a trend of increasing direct cost for more severe AD, although this was not found to be statistically significant likely due to the small sample size (n = 32).³² A study at Case Western clinics from March 2011 to December 2013 calculated the costs of flaring moderate to severe AD in the pediatric population found that direct costs were \$75 for the month leading up to the office visit, which can be generalized to be \$800 for the year; although this was a much smaller amount, the study only accounted for costs after insurance.³³

Another study compared adult patients with AD to demographically matched patients without AD, in addition to adults with more severe AD to those with less severe AD, based on Commercial and Medicare (January 2010 -September 2015) as well as Medi-Cal claims (January 2010 – December 2014). There were both increased healthcare resource utilization (HCRU) and average individual cost when comparing adults with AD to their non-AD counterparts, and a similar trend was noted with severe AD compared to less severe counterparts. Study of the HCRU with the AD population indicated that patients required more visits to the emergency department (ED), outpatient provider (severe patients utilizing an allergist or dermatologist more

frequently than those with less severe AD), and pharmacy for prescription medications. Costs were largely comprised of outpatient visits and prescriptions, and excluding copayments, amassed over \$3,000 more per AD patient in comparison to non-AD patients across the insurance plans studied (Commercial: \$10,461 versus \$7,187, Medicare: \$16,914 versus \$13,714, Medi-Cal: \$19,462 versus \$10,408, on average per patient annually), and over \$5,000 more per patient with more severe AD in comparison to less severe AD (Commercial: \$14,580 versus \$7,192, Medicare: \$21,779 versus \$12,490, Medi-Cal \$22,123 versus \$16,639, on average per patient annually).³⁴

Several studies have analyzed the use of the ED separate from other HCRU. Although ED visits for AD frequently cost less than ED visits for other diseases, AD poses a substantial burden on the ED system. For example, Korean patients with AD reported an average of 5.6 ± 3.5 outpatient visits and for the minors an average of one ED visit over a three-month period in 2010.³² A US study reported more frequent visits to the ED along with increased ED costs over the years, with the annual cost of services being \$1.3 billion in 2006 and then \$2.7 billion in 2012; these patients were more likely to be on Medicaid, self-pay, or no charge than other patients.³⁵ Low SES likely leads to poor access to dermatologic outpatient care with subsequent poor chronic disease control and increased ED visits. While insurance may provide a great amount of coverage for patients, out-of-pocket costs can nonetheless present a considerable burden for the individual patient, with adult AD patients in the US spending a cumulative \$37.8 billion in 2010 and \$29.3 billion in 2012, equating to \$371 and \$489 per patient in those years.²⁶

The direct costs of AD do not solely impact the AD population, but also society as a whole by creating an increasing burden on taxpayer contributions to disability and healthcare. A Danish study noted a substantial 450% increase in disability pensions over the years, from 4.2

pensions per annum during 1970-1976 to 18.0 pensions per annum from 1999-2002.³⁶ While the prevalence of AD in US healthcare claims was 0.99% in 2013, being the 12th most prevalent of 24 studied skin disorders,³⁷ the disease still represents a considerable burden on the payer. Fowler et al. reviewed the employer self-insurance claims of 31 Fortune 500 companies from 1998 to 2005 and noted \$991 per patient per year due to AD, with almost 40% due to disability and sick leave (n = 13,749).³⁸ A similar study by Joish et al. in 2009 reported that AD claims charge the US payer \$912 more per patient per annum than patients without AD.³⁹ With 2-10% of adults affected across the globe,¹ direct costs represent a considerable burden on the patients and the payers, but in order to get a comprehensive view, we must consider indirect costs that contribute to the AD burden as well.

Indirect costs

The AAD and SID estimated \$619 million of indirect costs in the US based on impaired productivity of the patient and caregiver.²⁹ These costs first affect the parents of a child with AD. In a 1997 Australian study, the severity of the child's AD was directly proportional to the number of parents who took time off work for the purpose of attending to their child's AD, such as management and office visits (33% of the mild group, 60% of the moderate group, and 70% of the severe group) and the number of parents who experienced reduced, terminated, or postponed employment (5% of the mild group, 30% of the moderate group, and 60% of the severe group).³¹ A more recent study from Poland (n = 50 children) concurred that parents experienced lost work hours that directly correlated to their child's disease severity, and also noted that household finances were strongly impacted by those of their child's AD.⁴⁰ Although the loss of income was not determined in either study, they emphasize that indirect (and direct) costs are at the root of caring for a child with AD, causing emotional and financial strain.^{31,40}

One would presume that the loss of income restricts finances and therefore the means to manage the AD, but it is not known whether the impact is enough to create socioeconomic changes within these families.

The estimated costs described thus far do not include the costs of the many comorbidities associated with the disease. Paller et al. thoroughly outlined the numerous related diseases including allergic rhinitis and asthma, neuropsychiatric disorders (i.e. insomnia and anxiety/depression), metabolic diseases, autoimmune disorders, and certain cancers.⁵ A US study on health insurance claims from the entire calendar years of 1999 to 2004 showed that atopic march manifestations increased patient costs by an average of \$482, an amount approximately 2.5 times the cost of AD treatment alone.⁴¹ Although a comprehensive measure of the costs for associated diseases would be difficult to measure and compare, this information suggests that comorbidities pose an additional and potentially significant financial cost to the patient. Such costs are not included in cost impact analyses. However, intangible costs were approximated to be \$2 billion by the AAD and SID in 2004 based on detriments to quality of life, resulting in an increased willingness to pay for symptomatic relief,²⁹ which is important to consider in the treatment of the patient.

Impact on work

Patients experience indirect costs from the substantial influence that AD has on their work lives. Employee productivity is affected by absenteeism and presenteeism. Absenteeism refers to the time taken off work secondary to the disease process, such as sick leave or absences from school, including any time taken off for appointments. Presenteeism refers to a person who is physically at work or school but is not as productive as possible due to the effects of the

disease. The sum of these two productivity losses represent the overall work impairment and can be used to calculate the work productivity and activity impairment (WPAI).

Researchers have studied the effects of cutaneous and/or respiratory allergic disease on European Union (EU) employees in 2012. Workers experienced an average of 3 days of absenteeism per year, costing the equivalent of \$840 per person, and 5-10 days of presenteeism, costing the equivalent of \$1335-\$2688 each. The authors explained that, of the expected 44-76 million employees aged 15-65 in the EU that had allergic disease, roughly 90% were not receiving adequate treatment which likely caused them to incur these costs.⁴²

A study from the following year depicted the effects of AD alone. When evaluated against a matched non-AD population, it became clear that AD had a substantial, although not statistically significant, effect in the 2013 US workplace, with increased rates of absenteeism (9.9% AD versus 3.6% non-AD), presenteeism (21.1% versus 16.1%), overall work impairment (25.6% versus 18.1%), and mean annual indirect costs (\$8907 versus \$6517).⁴³

Costs of absenteeism

Several studies have provided insight on the role of absenteeism in AD. Employees with AD, regardless of their disease severity, were more likely to take 5 or more days off of work than their non-AD counterparts (n = 27,157 in 2010 and 34,613 in 2012).²⁶ This was similar to the 2002 Danish finding of 5.8 work days taken off specifically for the employee's own AD,³⁶ and prior studies have also observed that patients with AD took more days off due to illness than those without AD.^{44,45} Interestingly, pruritic dermatoses appeared to affect employees to a greater degree if they did not have steady employment, with rates of absenteeism at 1.8% of hours lost with a regular job versus 5.3% without.^{27,46}

To put this into perspective, the 3-month Korean study of AD across ages generalized their results to estimate \$1,293.02 in indirect costs per patient for the year of 2010, measuring only time taken off work.³² After insurance, a study from Case Western University calculated \$199 of indirect costs incurred the month prior to an office visit regarding an AD flare, which can be generalized to about \$2400 per year; most of these costs came from lost work hours, which averaged 20.5 hours for the month.³³ However, much of these costs could potentially be avoided, as suggested by the 2012 EU study; they calculated that the equivalent of \$3,835.81 comprise the annual indirect costs per patient with any allergic disease, 95% of which could be saved as treatment averages \$199.39 per patient.⁴² This finding was supported by the results of a phase IIb clinical trial of dupilumab for persistent moderate to severe AD, where patients who were randomized to any of the treatment groups had fewer absences from full-time work or school than those receiving the placebo (average of 0.5-2.1 days versus 3.5 days) by week 16. Likewise, there were more patients with no absences in the dupilumab group (72.9-88.5%) than the placebo group (71.4%) (n=380).⁴⁷ Furthermore, accompanying symptoms including depression, anxiety, and insomnia are improved with appropriate AD treatment, as seen in dupilumab clinical trials,⁴⁸ which could potentially lead to a decrease in indirect costs such as psychiatric treatment.

Costs of presenteeism

Regarding presenteeism, it has been suggested that productivity in the workplace is diminished in workers with allergic diseases, especially AD, urticaria, and prurigo.^{46,49} Of the pruritic dermatoses, AD was found to be the most incapacitating in performing routine activities and among the highest in negatively impacting work and classroom performance. The impact on

work and routine activities, but not classroom activities, was directly correlated to symptoms of pruritis.⁴⁹ AD patients across eight countries including the US reported a mean of 15% of the school or work day being impacted by disease flares (n = 2002).⁵⁰ The 2012 EU study had a similar finding of 10-20% presenteeism; the authors suggested that negative impacts on concentration have variable impacts based on the type of occupation.⁴² For example, employers accumulate losses when employees take sick leave from production-based jobs, and upon serious consequences (e.g. life-threatening accidents) in jobs requiring the operation of heavy machinery.⁴²

Overall, the WPAI is higher in AD than psoriasis, with positive correlation to disease severity,⁴⁶ which reaffirms the previously mentioned impact of pruritic dermatoses on work and routine activities.⁴⁹ Another study of US adults exhibited a 30% WPAI in workers with AD in comparison to 16.3% in workers without the disease; they corroborated a positive correlation to disease severity.⁵¹ Furthermore, US adults with moderate to severe AD had significantly less employment than those with mild AD (49.4% versus 65.1% respectively, $p = 0.006$) per the 2013 National Health and Wellness Survey (NHWS),⁵² possibly due to higher disease burden.

Effect on career choice

Although there are some conflicting studies, AD appears to impact career choice. Wei, et al. found that participants with a diagnosis of AD prior to employment did not necessarily avoid high-exposure occupations in their first job.⁵³ Nyren, et al. corroborated findings that childhood AD does not appear to affect career choice, given that exposure to irritants was similar between employees with and without AD, with similar proportions of the two groups in high-risk jobs.⁴⁴ However, of the 100 participants of a 2002 Danish survey, 38% reported declining educational or

occupational opportunities due to their AD, a percentage that the authors suggest may underestimate the true number, as there may be patients who subconsciously avoided certain occupations.³⁶ Respondents who endorsed career choice influence reported avoiding certain occupations such as those in healthcare, food service, and cleaning and maintenance because of concerns of exacerbating their AD or developing chronic hand dermatitis and/or secondary infection.³⁶ The authors note that AD patients inherently have an increased risk of hand involvement without exposure to irritants, but occupational exposure further increases the likelihood, which provides basis for the concern.³⁶ A separate study found that employees with AD, loss-of-function filaggrin (FLG) gene mutation, and a history of hand dermatitis prior to age 15 were unlikely to choose careers with irritant exposure.⁵⁴

Patients with AD are more likely to change jobs if employed in ones that are high-risk for hand eczema. Nyren, et al. reported that people with childhood AD had a higher risk of developing occupational hand dermatitis.⁴⁴ This study and that of Holm, et al. both found an association between job change due to eczema and high-risk occupations such as healthcare.^{36,44} In particular, a study of hairdressers reported that significantly more hairdressers with AD changed professions than those who remained ($p = 0.017$), and there was a direct correlation between having AD and leaving the profession due to hand dermatitis.⁵⁵ Thus, AD may influence occupational changes after entering high-risk jobs, possibly because of new insight to how such jobs can worsen their condition. A study of occupational hand dermatitis (not limited to AD-related hand dermatitis) reported 22.9% of participants ($n = 612$) lost their job in the past year due to their condition, especially in food-related jobs.⁵⁶ While this number includes dermatoses other than AD, employees with AD are more at risk for contact dermatitis, which is important to consider when choosing a career.

Effect on education

Opportunity costs are difficult to illustrate since it is impossible to determine the life course of any individual given different circumstances. What is known is the impact of AD on children's sleep and behavior is correlated to negative impacts on intelligence quotient (IQ), verbal comprehension, perceptual reasoning, processing speed, and working memory.⁵⁷ In particular, neurocognitive performance in AD children was reduced by 16 IQ points compared to matched controls, and 8 points lower than expected for their age.⁵⁷ It follows that these hinderances could create barriers to education and career opportunities in the future.

The estimated cost of AD may very well be an underestimate when considering the aforementioned factors. Considering the disability-adjusted life years (DALY) and years lived with disability (YLD) of "eczema" (a broad category not limited to AD) is the highest of all studied skin disorders including psoriasis, at \$8897 in 2010 for all ages and genders, or \$129 per 100,000 age-standardized,^{58,59} it becomes clear that the disease creates not only a large economic burden annually, but one compounds over the course of many years.

CONCLUSION

In this paper, we highlighted both the role SES plays in AD risk and the substantial SES effects of AD. Many studies have reported that higher SES is associated with increased AD prevalence, while lower SES is associated with increased AD severity. Regardless of patient SES, AD creates substantial direct costs that affect the patient, patient's family, and the payer. Additionally, the effects of the disease create indirect costs from absenteeism and presenteeism, as well as opportunity costs from hinderances in learning, affecting patient SES and the

346 economy. These costs are not included in cost impact analyses generated by standard economic
347 health models in their consideration of treatment utility, or their impact on patient quality of life.
348 Therefore, these models are potentially underestimating the value of novel, effective treatments
349 on indirect costs, prevention or subsequent relief of comorbidities, and patient life course. Given
350 the substantial and growing burden on the patient and the economy when access to appropriate
351 treatment is limited, the socioeconomic burden of AD represents a tangible public health concern
352 that must be addressed.

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Tables

Table 1. Costs of Atopic Dermatitis (AD)

Direct Costs	Indirect Costs
• visits to dermatologist and/or allergist • medical billing • appointment copayments • transportation to and from the appointment and pharmacy • prescription medications from topical cortisones to biologics • over-the-counter medications and products such as moisturizers and occlusive gloves • laboratory tests such as routine liver function tests for biologics • procedures such as wet dressings, light therapy • hospitalizations or emergency care • caregiver, home aide • skin cancer screenings in patients who have used psoralen and ultraviolet A therapy	• absenteeism from time taken off for appointments, or being asked to leave due to condition especially in food service • presenteeism from lack of concentration due to pruritis • loss of employment due to condition • social burden causing embarrassment that may prevent individuals from going to social outings or even work • psychological burden from lack of sleep secondary to pruritis, depression, anxiety, suicidal ideations due to condition