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WHITE PAPER

Unveiling the true costs and societal impacts of moderate-to-severe atopic dermatitis in Europe

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Abstract

Atopic dermatitis (AD) is a chronic, auto-immune condition that imposes a high burden on individuals, society, and the healthcare system. Approximately 4.4% of adults and up to 18.6% of children/adolescents have AD in Europe, with 20% of all cases accounting for moderate-to-severe forms. This form of the condition in adults results in annual societal costs across Europe of an estimated €30 billion; €15.2 billion related to missed workdays or reduced work productivity, €10.1 billion related to direct medical costs and €4.7 billion related to personal expenditure of patients/families. AD can also substantially impact physical, emotional, and social quality-of-life. Several studies have shown the debilitating itch-scratch cycle is the main cause of the multifaceted burden, as it causes substantial sleep deprivation and stigmatisation due to the physical appearance of the skin, and confidence issues. These factors lead to psychosocial issues and can cumulate over time and prohibit patients reaching their 'full life potential'. Despite this, many patients with the condition are undertreated, resulting in uncontrolled symptoms and a further strain placed on patients, society, and the economy. The authors of this White Paper comprise the European Atopic Dermatitis Working Group, which is a network of international specialists with expertise in dermatology and healthcare policy decisions. Their programme of action is focused on harnessing their expertise to build consensus, advance research, share knowledge, and ultimately seek to improve AD care outcomes through achieving long-term symptom control. This White Paper presents a systematic evaluation of the overall financial and humanistic burden of moderate-to-severe AD and the current challenges that exist with AD care. It introduces recommendations for how, collaboratively, key stakeholders and policy makers can support improvements in AD management to achieve better disease control, thus reducing the costs and associated burden placed on individuals, society, and the economy.

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Conflict of interest

Professor Matthias Augustin reports consulting fees and/or research grants and/or speaker fees and/or travel fees reimbursement and/or grants for participating in a clinical trial from AbbVie, Almirall, Galderma, Leo Pharma, Lilly, and Sanofi. Professor Laurent Misery reports consulting fees and payment or honoraria from AbbVie, Galderma, Lilly, Pfizer, and Sanofi. He is supported by Sanofi for the present work. Laura von Kobyletzki reports payment or honoraria from Pfizer, Sanofi, Leo Pharma, and Eli Lilly; she has been an investigator, speaker, and consultant for Pfizer, Sanofi, Leo Pharma, and Eli Lilly. Professor José C. Armario-Hita reports grants or contracts from AbbVie, Sanofi, Novartis, Leo Pharma, Janssen, Almirall, Lilly, UCB, Gebro; has received consulting fees and payment or honoraria from AbbVie, Sanofi, Novartis, Leo Pharma, Janssen, Lilly, and UCB. Stuart Mealing has declared no conflicts of interest. Magali Redding was working at Eczema Outreach Support during the time this paper was written. MR reports advisory fees paid to Eczema Outreach Support for the present work; has received grants towards the charitable activities of Eczema Outreach Support from Sanofi, Pfizer, Pierre Fabre, Leo Pharma, Galderma and AbbVie.

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The current challenges in atopic dermatitis

Atopic dermatitis (AD), also known as atopic eczema, is a chronic immunological disease that can begin in childhood and progress in severity through to adulthood.[1-6] The condition disrupts the skin barrier and leads to inflammation and dryness, which is extremely itchy and sore to touch.[2-5] In some instances, the skin can weep fluid and bleed when scratched, making the surface vulnerable to infection.[5] Repeated scratching can cause thickening and hardening, thus worsening skin symptoms.[5] The chronic itch-scratch cycle is the hallmark of AD, and is persistent with flare-ups lasting 6 weeks or more.[5,7] Due to the debilitating nature of the condition, it is associated with a substantial burden that extends into all aspects of the patient's life, including their emotional wellbeing, relationships and work/school performances, as well as their daily routines (Fig. 1).[8-12]

Mild AD can be adequately controlled with basic skin care, environmental control and topical medicines.[1] However, the management of moderate-to-severe AD requires more comprehensive and systemic management to control the symptoms.[1] Patients with moderate-to-severe AD have significantly higher disease burden compared with those with mild AD.[13] Despite recent advances in effective treatments, a considerable number of patients with severe forms of the disease are undertreated and have inadequate control of their symptoms.[14] This undertreatment may be due to a number of reasons[15]:

- An underestimation of the full economic, societal and humanistic implications of AD on patients, families, society and public health systems in Europe
- Inconsistent access to effective treatment and care standards
- A lack of prioritisation for effective management in public policy recommendations

Acknowledgement of the complex burden of moderate-to-severe AD is required to encourage a much needed change in public policy for the recognition, treatment, and care of patients with the disease across Europe. This paper therefore discusses

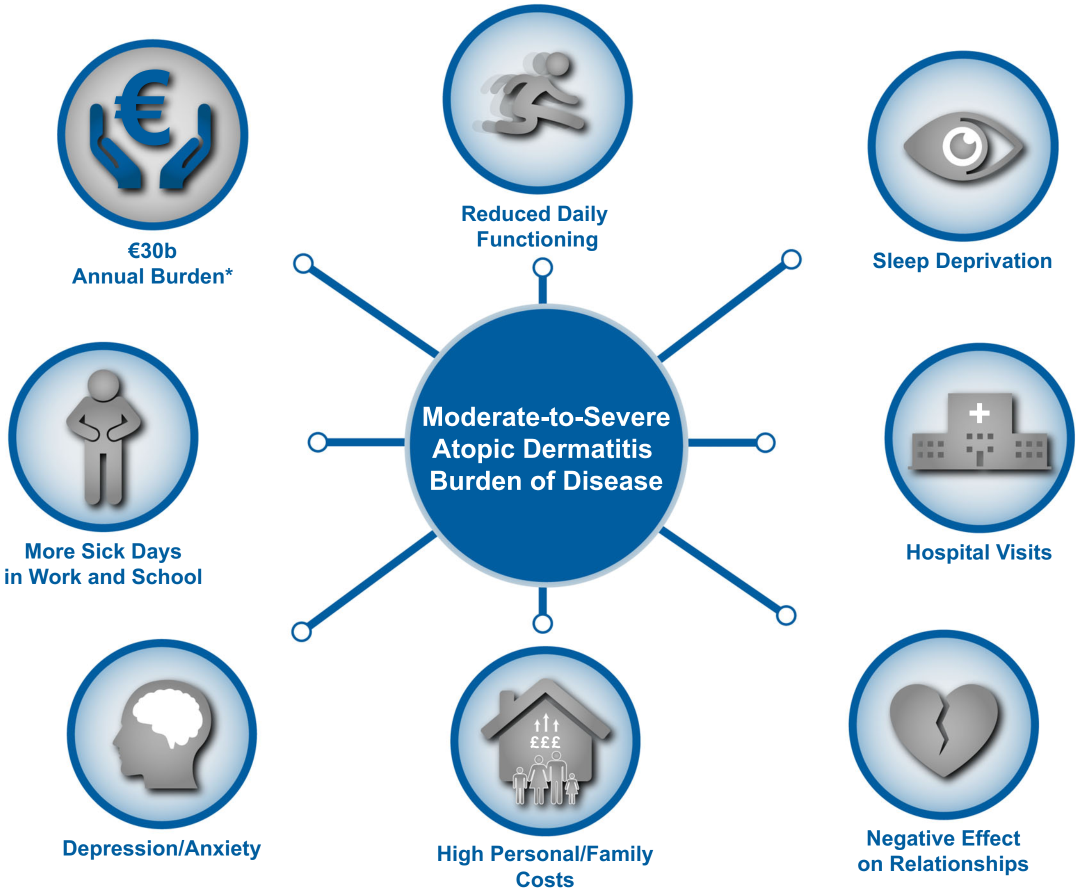

Figure 1 Examples of the widespread burden of AD in Europe. *Adults with moderate-to-severe AD only.

the complex burden of moderate-to-severe disease, with a focus on the financial and humanistic burden on healthcare systems, society, patients and the overall economy.

The European Atopic Dermatitis Working Group

The European Atopic Dermatitis (EAD) Working Group is a multidisciplinary, international panel of dermatology clinicians, a health economist, and a patient advocacy group representative of Eczema Outreach Support, UK.

The group was specifically set up to contribute to a programme of work, with the aim of raising awareness of the holistic burden of AD in Europe, the current challenges in the treatment and care of these patients, and how key stakeholders and public policy members can work collaboratively to address them to ultimately reduce burden and lower the costs. The programme comprised three steering committee meetings, and outputs were based on the review and validation of both published research and expert knowledge gained from treating and/or caring for these patients. Specifically, the authors contributed to the development and design of a recently conducted systematic literature review (a separate publication), which assessed the evidence on the burden of moderate-to-severe AD in Europe. Outputs from the programme, together with expert discussions on the impacts of AD were used to guide development of this White Paper. With this, the group aims to communicate that if the recommendations outlined in this paper are acted upon, and effective treatment and personalised care plans are implemented early in the disease, the burden associated with moderate-to-severe AD can be reduced.

The facts

Approximately 8.4–18.6% of children/adolescents aged <18 years, and 4.4% of adults aged ≥18 years, have AD in Europe.[12,16] The course of the disease is characterised by periods of remission and symptom flare-ups;[6,17] it typically begins in the first 2 years of life and decreases in prevalence over the years.[18] Although less common, AD can persist into adulthood[17,19] and exist as moderate and severe forms in at least 20% and 3% in all patients with the condition, respectively.[12,20] In some cases, AD can also start in adulthood.[21] Although the development of AD is not fully understood, it is influenced by altered immune responses and a dysfunctional skin barrier.[22,23] The relationship between environmental and psychological factors and the course of AD has also been reported.[23,24] Symptom flare-ups can be triggered by multiple factors, such as temperature changes, soaps and detergents, fragrances, and clothing materials (i.e. wool, large-fibre textiles).[25,26] Of note, emotional factors and/or stress have been reported as the most commonly cited triggers of AD symptoms.[27]

> ***"It feels like it will never go away. Even though I've had about a couple of years free from it since I was a child, it's always coming back and it sort of comes back with a vengeance and it's just like, ah it's like the bad guy in a movie who just doesn't die."[1]***
>
> **Patient aged 21 years, UK**

Moderate-to-severe AD often occurs in families with a history of AD, bronchial asthma, allergic rhinitis/rhino-conjunctivitis and food allergy.[17,28] The condition involves multiple organ systems, and more than 50% of patients with severe forms of AD also have other atopic conditions, such as asthma or allergic rhinitis.[29] Patients may also have non-atopic co-existing conditions including depression, anxiety, attention deficit hyperactivity disorder (ADHD), other skin diseases (such as contact dermatitis, hand eczema and folliculitis) and cutaneous skin infections.[30-33]

Bacterial and viral secondary infections are major complications of AD,[34] and can be life-threatening.[35] Some of these infections can be very severe, such as infection with a herpes simplex virus that occurs in approximately 3% of patients with AD.[35]

The main symptom of moderate-to-severe AD is persistent itching. Skin is inflamed and dry, can bleed and become very painful. Repeated scratching of the affected area(s) can worsen the skin symptoms.[5] These skin symptoms can have a negative impact on sleep patterns, and mental and social wellbeing.[11,36]

> ***"I don't think they actually understand how severe her itching is; she is bruising herself itching no matter what I do to help her; she doesn't sleep much. She can't not itch for 5 minutes."[3]***
>
> **Mother of a child with AD aged 4 years, UK**

Management of flare-ups is a therapeutic challenge.[26] The main goals of AD treatment are to avoid triggers that cause symptom flare-ups, improve the skin barrier function, gain long-term control of inflammation, treat the skin infections, and educate and empower the patient to manage their condition. To achieve this, treatment and care plans follow a stepped approach, starting with strategies to avoid allergens and irritants, education programmes to address patients' beliefs and questions regarding the management of their disease, and use of emollients and bath oils to improve and soothe the skin barrier.[26] Additional educational and psychological approaches are recommended for the management of itch and skin pain.[37] If these initial strategies do not improve the symptoms, treatments such as topical corticosteroids, topical immunomodulators (calcineurin inhibitors), phototherapy and systemic immunomodulators are required (Fig. 2).[15,26] Overall, the management of AD should consider individual clinical variability of the disease; therefore, highly standardised treatment methods are not recommended.[15]

In 2013, the UK National Institute for Health and Care Excellence (NICE) published a detailed, concise set of priority statements, which highlighted the holistic approach to the treatment and management of children with AD. As part of this framework, childrens' clinical and treatment histories, trigger patterns, recurring infection rates, unresponsiveness to treatment, and psychosocial wellbeing of them and their family, must be considered when making treatment decisions.[38]

The impact or burden of moderate-to-severe AD is extensive and complex

Goals

- Increase understanding of the disease amongst public policy makers, healthcare professionals (HCPs) and payers to improve the recognition of moderate-to-severe AD as a serious medical condition
- Educate public policy makers, HCPs and payers on the full economic, societal and humanistic burden of moderate-to-severe AD in Europe.

The considerable economic and humanistic burden of moderate-to-severe AD cannot be understated. By simple

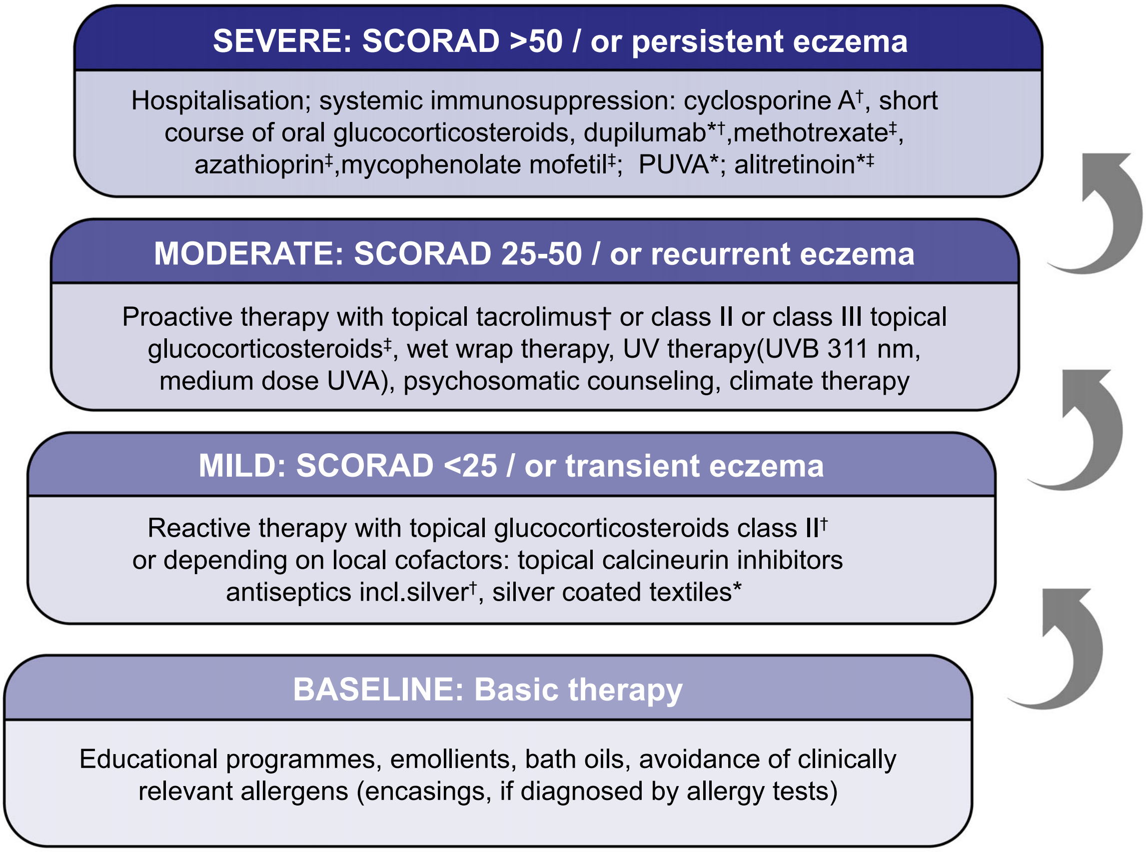

Figure 2 European consensus-based treatment recommendations for adults and children with AD.[26] PUVA, psoralen ultraviolet A; SCORAD, Scoring of Atopic Dermatitis; UV, Ultraviolet.

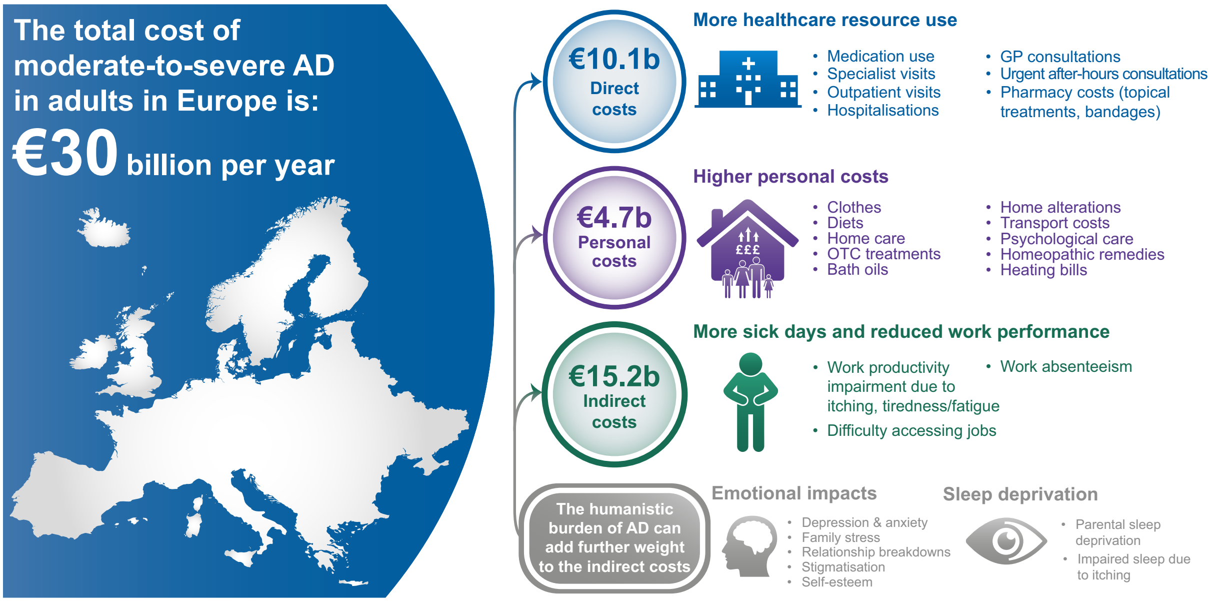

Figure 3 Costs associated with adult moderate-to-severe AD in Europe. AD, atopic dermatitis; GP, general practitioner; OTC, over the counter.

extrapolation from disease prevalence and cost data gathered from studies, **the total annual expenditure associated with adult moderate-to-severe AD in Europe is estimated as €30 billion** (see Supplementary Material 1).[12,13,36,39,40,41] This comprises costs associated with healthcare, costs to society and personal costs to patients. The humanistic impacts of the disease must also be considered when considering overall burden (Fig. 3).

It is important to note that due to limited evidence in the published literature, the estimated annual expenditure calculated does not incorporate the costs associated with the disease in children or the costs incurred by caregivers/family members. Furthermore, the monetary expenditure does not incorporate the lifelong QoL impacts experienced by patients, caregivers and family members. If these impacts, along with cost data for children, caregivers and families, were considered within the total annual expenditure, the costs would be substantially higher.

> ***"These are just huge numbers we are working with. I never realised that AD had such an impact on society as a whole."***
> **Health economist, UK**

The evidence demonstrated herein presents the clear and substantial economic and humanistic burden of moderate-to-severe AD, highlighting the need for immediate action.

Moderate-to-severe AD has a substantial cost impact on healthcare systems

Studies from several European countries demonstrate the considerable economic burden of moderate-to-severe AD on healthcare systems. Across studies, the average annual costs of the disease ranged from €1572[13] to €6993[41] per patient per year (PPPY). Major cost drivers were medication use, dermatologist consultations and hospitalisations due to treatment.[13,36,41,42]

Healthcare costs of moderate-to-severe AD are an estimated €10.1 billion every year

See Supplementary Material 1

The economic burden is higher when the patient's condition is uncontrolled on current medication, thus highlighting the need to achieve disease control in clinical practice. One 2016/2017 study in the Netherlands demonstrated that the annual cost to the healthcare system of patients with uncontrolled moderate-to-severe AD failing to respond to treatment was €6993 PPPY compared with €4401 PPPY for those with controlled disease.[41]

In a German cost-of-illness study using data from 2017 to 2019, the total annual costs for treating adults with AD were remarkably higher in those with moderate-to-severe AD (€5229 PPPY) compared to mild AD (€1466 PPPY).[42] While the costs were highest for inpatient treatment followed by topical treatment amongst those with mild AD, systemic treatment was the greatest cost in moderate-to-severe AD.[42] When the total number of patients with AD in Germany were considered, the estimated total annual costs for the condition reached €2.2 billion in Germany.[42]

Moderate-to-severe AD leads to reduced work productivity and absence from work

Moderate-to-severe AD has a substantial economic impact on society.[36,41] The condition substantially impacts the patient's ability to work, and causes a considerable number of days off work within the working year.[11,13,36,40,43,44,45] In fact, studies have demonstrated that these impacts to work performances comprise most of the economic burden of moderate-to-severe AD.[36,41] In one 2017/2018 study in Italy, patients with moderate-to-severe AD had an average of 21 days of reduced work ability due to sleep deprivation because of the itching[36] This equated to €2604 PPPY of societal losses, accounting for over 60% of the total disease burden.[36]

Reduced work ability and days off work due to AD cost an estimated €15.2 billion every year

See Supplementary Material 1

A study conducted in 2016/2017 in the Netherlands reported that the total economic losses to society due to days off work and reduced work ability were €10 040 PPPY, which accounted for 66% of the total burden for this disease.[41] Costs were highest for patients with uncontrolled moderate-to-severe AD compared to controlled AD (€13 702 vs. €6886, respectively), reinforcing the importance of achieving disease control.[41]

> ***"When we achieve control of the disease in a patient, we not only improve their quality of life, we also allow for their effective contribution into their work, producing a benefit throughout the community. Controlling atopic dermatitis not only benefits the patient, but also their community."***
>
> **Dermatologist, Spain**

Several studies have demonstrated that days off work and societal losses due to AD are higher in those with more severe disease.[13,40,42] In a German study using 2017 to 2019 data, it was demonstrated that days off work for adults with moderate-to-severe AD equated to a societal loss of €756 PPPY[42]; this was substantially higher than losses associated with mild AD (€252 PPPY).[42] In a 2013/2014 Spanish study, the average number of days off work for adults with moderate-to-severe AD ranged from 5.5 to 11.3 days.[13] The number of days off work for these patients was substantially higher when compared to the number for those with milder forms of AD[13]; it was reported as almost four times higher in another 2017/2018 study across multiple European countries.[40]

Children's school performance is often limited due to their condition. Feelings of embarrassment, bullying/teasing and comments often cause social isolation in children, and impact school life.[46] A 2008/2009 study in Spain reported that children with moderate-to-severe AD had 2.5 days off from school due to their disease.[44] A 2017/2018 study in Italy reported that caregivers of a child with moderate-to-severe AD had an average of 2.5 days sick leave.[36]

> ***"The parents of children with eczema experience sleep deprivation due to their intense itch and distress at night. They can end up exhausted and struggling to cope with their job's demands."***
>
> **Patient advocacy group representative, Eczema Outreach Support**

Patients with moderate-to-severe AD often incur high personal costs

There is a perception that dermatological diseases have been of low priority for most governments,[47] and even with recent therapeutic advancements, this field has been regarded as non-fatal and thus understated.[47] Many general practitioners and non-dermatologists believe that skin problems can be adequately treated with topical corticosteroids alone.[47] However, patients and families often incur high personal costs for everyday management of their disease such as additional emollients, special clothing, food supplements and hygiene products.[48] Such personal costs are not widely recognised,[40] and thus the true patient and family-borne financial burden is underestimated.

Patients with moderate-to-severe AD spend an estimated €4.7 billion every year managing their disease

See Supplementary Material 1

A 2017/2018 study across multiple European countries assessing the annual personal expenditure amongst adult patients with AD reported that only 5% were not paying extra out-of-pocket costs for their condition. Most patients were paying additional expenses of around €927 PPPY for their AD.[40] Emollients and moisturisers accounted for the highest costs, followed by medication, healthcare appointments, phototherapy, bandages and travel expenses.[40] Costs increased with disease severity; adult patients with moderate-to-severe AD paid an average of 9% more for these items compared with those with mild AD.[40] In another study assessing the annual personal expenditure in France, the estimated out-of-pocket costs for bandages/medical supplies, hygiene products and specific clothing increased with severity from €77 to €247 and €462 PPPY in those with mild, moderate and severe AD, respectively.[48] The medical and non-medical resources most frequently required by patients were emollients, hygiene products and sun protection (Fig. 4).[48]

AD-related personal expenses are a major concern amongst low- or unstable-income families, such as students/recent graduates, single-parents and those early on in their careers. Patients often feel as though it is unfair that other long-term, chronic conditions qualify for 'free' prescriptions.[46,49] In a recent German study using 2017 to 2019 patient data, it was demonstrated that young adults with moderate-to-severe AD early in their professional careers encountered the highest personal costs (18–34 years; €448 PPPY) compared to other age groups with the disease.[42]

> ***"I am always impressed by the resilience of atopic dermatitis patients, in terms of both their psychological and also financial resilience"***
>
> **Dermatologist, France**

The intangible burden of AD on the daily lives of patients and their families is extensive and complex

Moderate-to-severe AD carries a substantial physical and psychological burden that negatively impacts patients' and families' lives, such as their relationships, social activities, work and emotional wellbeing.[10,11,30,41,44,50,51,52,53,54,55,56,57,58,59] In particular, anxiety, depression, and social isolation are widely experienced in those with AD.[31] Furthermore, a higher risk of suicide ideation, and even attempts, has been reported in patients with AD compared to those without the disease.[60] These impacts can cumulate over a long period of time and prohibit patients from achieving their 'full life potential', termed cumulative life course impairment (CLCI).[31,59] Despite this, the lifetime burden of AD has not been given the serious consideration it deserves in wider society and the healthcare community.[61-63]

> **The humanistic burden can further impact the economic and societal burden of moderate-to-severe AD**

The vicious itch–scratch cycle has been considered the largest contributor to QoL impacts in patients and family members.[51,57,64,65] This can cause chronic sleep disruption, which leads to emotional and behavioural problems, difficulties with daytime functioning and work performance, and can have an impact on sexual health.[10,66,67] For children and adolescents, the physical and emotional effects of this cycle can be particularly disruptive during their critical years of development, impacting school performance, preventing them from taking part in school, sports and social activities, and hindering them forming relationships due to bullying, social stigmatisation and feelings of low self-esteem. These impacts are worse in patients with more severe AD.[9,10,11,46,58]

> ***"It's mentally exhausting being itchy all the time and having people tell you not to scratch. It makes me feel disgusting when people comment on my skin. I feel like I'm defined by my eczema now, not by who I am".[68]***
>
> **Patient with AD**

> ***"This [AD] has affected my lifestyle and my social life in the sense that I can't do things I used to... Do my friends understand? They know it's not contagious, but they don't really understand what atopic dermatitis is. I don't think anyone does unless they have it. You haven't experienced it. You haven't experienced the itching."[69]***
>
> **Patient with AD**

The cumulative interaction of both physical and emotional impacts is associated with a severe disease burden that can cause lifetime impairment to the patient and their family (Fig. 5).[70]

Moreover, caring for a child with moderate-to-severe AD is both mentally and physically exhausting and can result in emotional impacts such as depression, parental anxiety and lower job performance. Family relationships can also be impacted and cause parenting conflict amongst partners. Many parents also report tiredness/exhaustion, feelings of resentment, anger, social isolation and financial worries, which can have a negative influence on illness management and worsen when caring for a child with more severe AD (Fig. 6).[12]

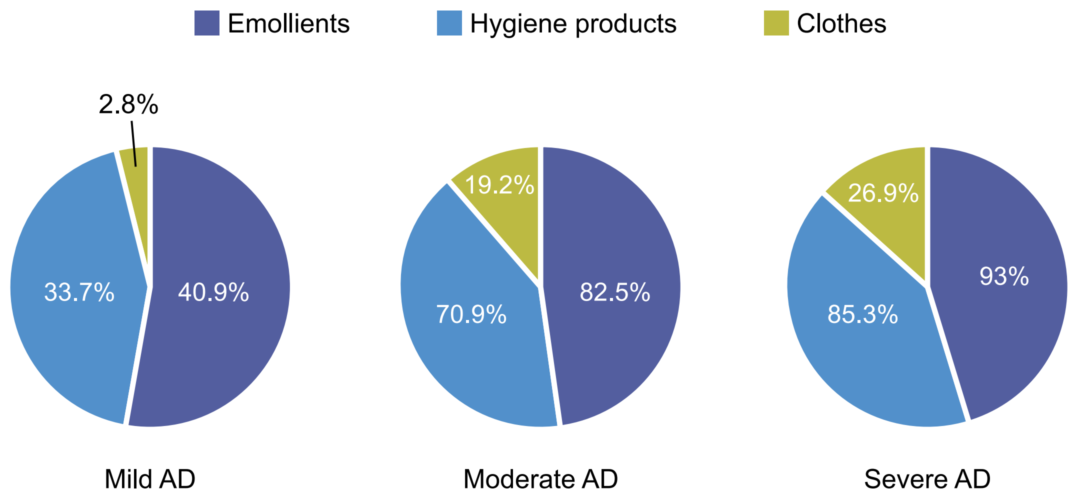

Figure 4 Out-of-pocket costs for AD in France.[48] Figure adapted from Launois *et al*. 2019.[48] AD, atopic dermatitis.

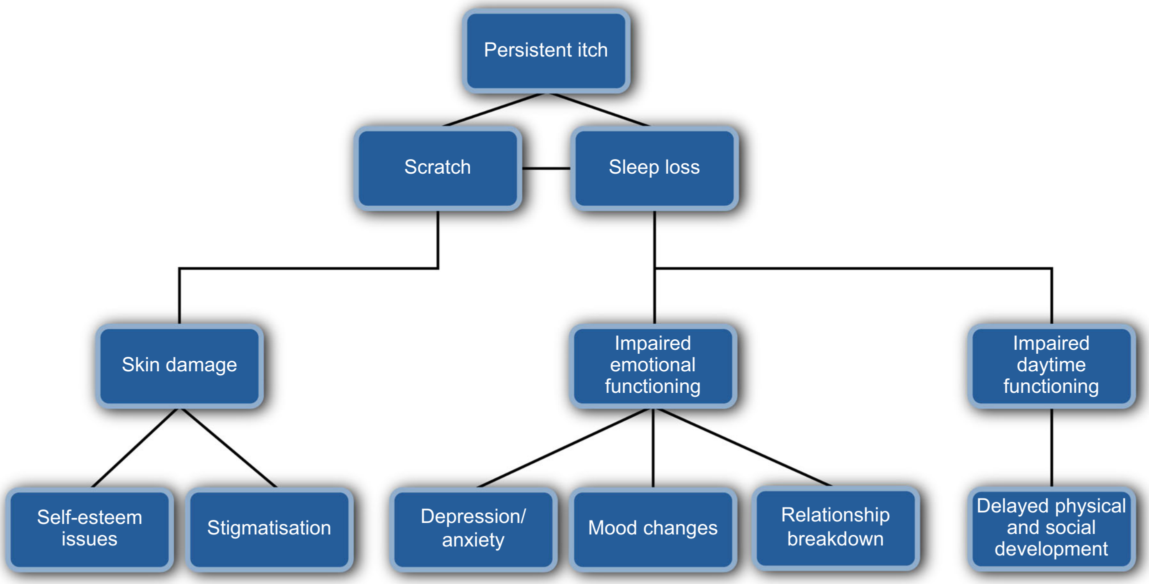

Figure 5 Impact of itch on the QoL of patients with AD.

The burden of moderate-to-severe AD is comparable to other chronic conditions

Several studies suggest that AD has a similar or higher burden compared to other chronic diseases, such as diabetes, asthma, and psoriasis.[27,40,46,71,72] Furthermore, the social and mental health impact of the disease is comparable to, or worse than, chronic obstructive bronchitis, cardiovascular disease, hypertension and diabetes (Box 1).[73,74]

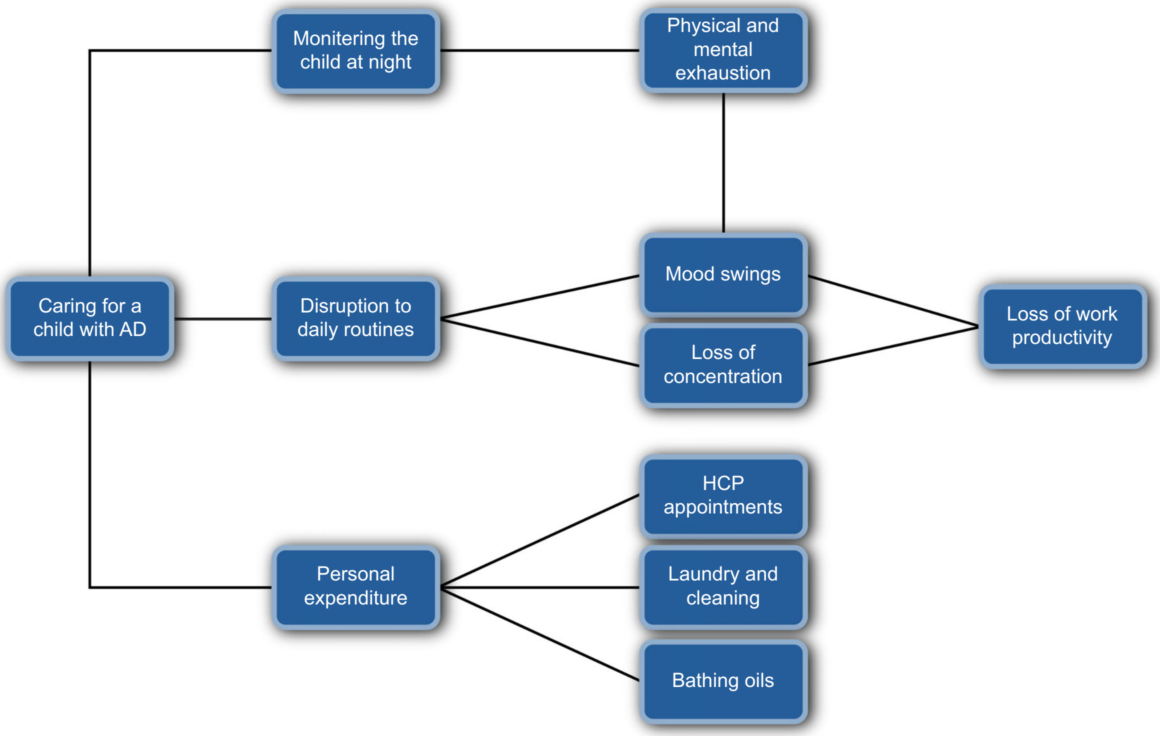

Figure 6 Impact on family members caring for a child with AD.

There is no cure for AD, but an effective treatment and care plan can control symptoms and alleviate the burden

Goals

- Prioritise funding for effective treatment that controls the patient's disease
- Improve the support given to patients with moderate-to-severe AD to help them manage their disease
- Consider individual patient needs in planning treatment and care plans
- Improve public awareness on the importance of effective treatment inachieving disease control
- Start patient care as early as possible to avoid cumulative life course impairment (CLCI)

Many patients with AD are substantially undertreated, which can lead to inadequately controlled symptoms;[14,79] thus increasing the economic burden placed on patients, healthcare systems and society.[9,27,41] Many patients with moderate-to-severe AD do not receive the topical therapies recommended in treatment guidelines and in some European countries, patients with severe AD are still managed with topical therapies alone despite international guidance recommending the use of systemic treatments.[79] Moreover, variations in the availability of appropriate treatments between countries, and regions within the same country, may lead to undertreatment at the national and regional levels. Uncontrolled moderate-to-severe AD due to undertreatment is a very important issue and the consequences have been poorly investigated.[79]

In addition to limitations in optimal treatment practices, considerable gaps exist in access to support services and patient education programmes across Europe, setting the stage for patient non-adherence and issues with self-management. Psychosomatic counselling, structured educational programs, relaxation techniques and psychological interventions can improve disease severity and QoL outcomes for most patients;[80-82] behavioural therapy to avoid the itch-scratch cycle is also considered beneficial.[26] Moreover, patient education programmes can improve the patient and/or family understanding of their disease and help them to cope with treatment to maintain or even improve treatment adherence and QoL.[26] Such programmes can also empower the patient to engage in learning about their disease, help to address patient beliefs and questions, and eliminate parental fear.[83]

These services are considered as preventative measures and, when adopted, have been known to influence the course of the disease and enhance patient participation and empowerment.[82] However, the value of these support services in the care plan of

Box 1: Snapshot – burden of AD versus other chronic diseases

- Raising a child with AD could have a greater impact for the family than raising a child with diabetes.[72]
- Psychological comorbidities have been reported to be more prevalent in children with AD than those with leukaemia or epilepsy.[75]
- AD has a higher personal cost burden than asthma, rheumatoid arthritis, and diabetes.[72,76]

AD versus psoriasis

- Adults with AD report more flares, skin pain and itching than patients with psoriasis of comparable severity.[77]
- Studies suggest that the indirect and personal costs of AD are higher than psoriasis (Table 1).[40,42,78]
- It is suggested that adults with AD have more days off work due to their disease, and have a poorer QoL than patients with **psoriasis**.[27]
- Adults with AD have a higher level of insomnia, due to itching, when compared to patients with **psoriasis**.[71]

Box 1 Snapshot – burden of AD vs. other chronic diseases

Table 1 Mean PPPY costs in Germany[40,42,78]

Cost	AD	Psoriasis
Direct costs	€2229	€4942—5164
Indirect costs	€4257	€379
Out-of-pocket	€941	€224
Total	€7427	€5545—5767

Abbreviations: AD, atopic dermatitis; PPPY, per-patient-per-year.

patients is not widely acknowledged and funding is varied across and within countries. Moreover, logistical issues in terms of funding to train healthcare professionals and implementation into a patient's care pathway is an issue that often prevents families from accessing such services.

> ***"There are huge differences in waiting times, quality of care and access to medicine across the country. It can feel like a postcode lottery to families with eczema."***
>
> **Patient advocacy group representative, Eczema Outreach Support**

> ***"The excellent data on patient education both in children and adults show such programmes are highly effective and should be part of every disease management* programme."**
>
> **Professor of Dermatology, Germany**

The World Health Organization's (WHO) framework for integrated people-centred health services calls for all people to have equal access to quality health services in a way that meets their life course needs and respects their preferences, thus highlighting the importance of optimal and equal treatment in AD.[84]

A key element of clinical decision-making is the consideration of patients' own perspectives and psychosocial issues to ensure individual disease burden and potential QoL impacts are considered.[15] However, a lack of guidance exists on how to define patient perspectives in clinical disease management processes,[15] and evidence suggests there is a high unmet need from the patient perspective that extends beyond healing of skin changes, into all areas of life.[85] A nationwide German study carried out in

91 dermatology practices and outpatient clinics assessed personalised treatment goals in more than 7500 patients. The most common patient-reported goal was to be ‘free of itch’, followed by ‘to get better skin quickly’ (Fig. 7).[86] Considering such issues in the disease management and long-term care plans is of great importance and contributes towards improving QoL of patients and their families.[86]

Studies in clinical practice have shown that following an optimal treatment regimen, with the addition of basic topical treatments, fulfils important long-term therapeutic goals that can also improve QoL and patient satisfaction.[87] New treatment guidelines and/or better implementation of existing ones are therefore needed to improve the medical care of AD, to handle the complexities of disease management and improve the healthcare delivered to the patient.[15,27,85,88]

Given the multidimensional impact of the disease on patient and family life, components of the care plan must be individually applied to reduce the extent of CLCI.[15] Identifying appropriate risk factors for CLCI early in the diagnosis is an important step in fulfilling long-term disease management outcomes and reducing the physical and psychological disease burden.[61] Healthcare professionals should consider the chronic course of AD (e.g. disease severity, early onset of disease), psychosocial well-being of the patient (e.g. stigmatisation, QoL, mood/personality, negative behaviours), social support, coping mechanisms, impact on profession, and comorbidities.[61] The extent to which the chronicity of AD impacts the patient’s QoL vary and the ability to cope with the impacts are unique to each patient’s personality trait and coping mechanisms.[89] Understanding the unique cumulative impacts of AD will help guide a personalised treatment plan that considers patient’s own therapeutic goals and psychosocial factors relevant to both patients and their family early in the disease management process to reduce the risk of associated cumulative impacts.

Concluding remarks and action points

Despite the substantial economic and humanistic burden of moderate-to-severe AD, there is still a lack of priority amongst multiple stakeholders in the treatment, care and support for patients and families living with the disease. Ultimately, this leads to undertreatment and inadequately controlled symptoms, further increasing the burden.

Within this White Paper, the EAD Working Group has developed goals and actions to improve access to effective treatment and encourage high-quality care in AD. In essence, this White Paper is a call to action for key stakeholders to:

- **Recognise** AD as a serious condition and educate public policy makers, healthcare professionals and payers about the long-term financial and humanistic impact of AD on families, societies and the economy.
- **Provide** better access to effective treatments and care services to achieve long term disease control, a reduction in the burden associated with uncontrolled disease and ultimately an improvement in patients’ QoL.
- **Fund** and **encourage** additional research into the wider implications of AD on patients, healthcare systems and societies, with a specific focus on the uncontrolled moderate-to-severe AD population. Ensure research also evaluates the quality of healthcare for AD and defines national goals of disease management.

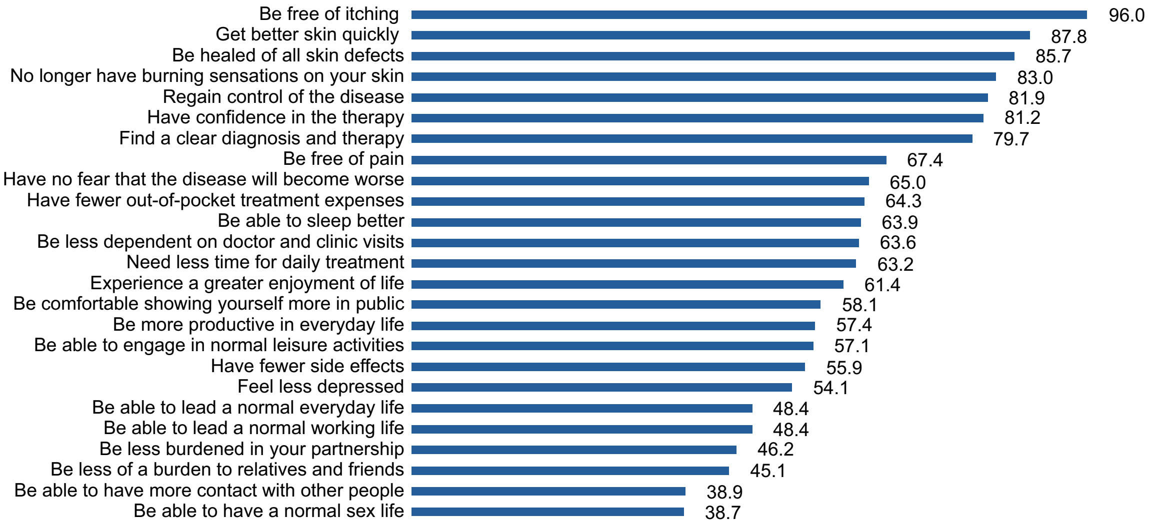

Figure 7 Self-reported treatment needs of patients with AD (n = 7697)[86]

- **Ensure** a multidisciplinary approach to care and support, while prioritising education programmes for patients and families with moderate-to-severe AD. Ensure this is part of the individual's integrated care plan.
- **Encourage** inclusion of patients' needs and psychosocial factors in individual treatment and care plans to maximise patients' self-management skills. Ensure support programmes fighting stigmatisation of people with AD are included within these plans.
- **Enhance** early detection and prevention of AD to avoid CLCI.

Data availability statement

The data supporting the content of our White Paper are from publicly available sources; however, some of the articles from journal sites were paid access and not freely available. For comments on the issues discussed in this White Paper, please address the most relevant member of The European Atopic Dermatitis (EAD) Working Group.

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References

1 Yum HY, Kim HH, Kim HJ *et al*. Current Management of Moderate-to-Severe Atopic Dermatitis: a survey of allergists, pediatric allergists and dermatologists in Korea. *Allergy Asthma Immunol Res* 2018; **10**: 253–259.
2 Bieber T. Atopic dermatitis. *Ann Dermatol* 2010; **22**: 125–137.
3 Boguniewicz M, Leung DYM. Atopic dermatitis: a disease of altered skin barrier and immune dysregulation. *Immunol Rev* 2011; **242**: 233–246.
4 Guttman-Yassky E, Nograles KE, Krueger JG. Contrasting pathogenesis of atopic dermatitis and psoriasis--part I: clinical and pathologic concepts. *J Allergy Clin Immunol* 2011; **127**: 1110–1118.
5 National Eczema Association. Atopic Dermatitis. 2021. https://nationaleczema.org/eczema/types-of-eczema/atopic-dermatitis/
6 Weidinger S, Novak N. Atopic dermatitis. *Lancet* 2016; **387**: 1109–1122.
7 Harrison IP, Spada F. Breaking the itch-scratch cycle: topical options for the Management of Chronic Cutaneous Itch in atopic dermatitis. *Medicines* 2019; **6**: 76.
8 Dalgard FJ, Gieler U, Tomas-Aragones L *et al*. The psychological burden of skin diseases: a cross-sectional multicenter study among dermatological out-patients in 13 European countries. *J Invest Dermatol* 2015; **135**: 984–991.
9 Eckert L, Gupta S, Gadkari A, Mahajan P, Gelfand JM. Burden of illness in adults with atopic dermatitis: analysis of National Health and wellness survey data from France, Germany, Italy, Spain, and the United Kingdom. *J Am Acad Dermatol* 2019; **81**: 187–195.
10 Misery L, Seneschal J, Reguiai Z *et al*. The impact of atopic dermatitis on sexual health. *J Eur Acad Dermatol Venereol* 2019; **33**: 428–432.
11 Misery L, Seneschal J, Reguiai Z *et al*. Patient burden is associated with alterations in quality of life in adult patients with atopic dermatitis: results from the ECLA study. *Acta Derm Venereol* 2018; **98**: 713–714.
12 Barbarot S, Auziere S, Gadkari A *et al*. Epidemiology of atopic dermatitis in adults: results from an international survey. *Allergy* 2018; **73**: 1284–1293.
13 Sicras-Mainar A, Navarro-Artieda R, Carrascosa Carrillo JM. Economic impact of atopic dermatitis in adults: a population-based study (IDEA study). *Actas Dermosifiliogr* 2018; **109**: 35–46.
14 Pascal C, Maucort-Boulch D, Gilibert S *et al*. Therapeutic management of adults with atopic dermatitis: comparison with psoriasis and chronic urticaria. *J Eur Acad Dermatol Venereol* 2020; **34**: 2339–2345.
15 Unpublished Outputs and Feedback from the European Atopic Dermatitis (EAD) Working Group. 2020.
16 Silverberg JI, Barbarot S, Gadkari A *et al*. Atopic dermatitis in the pediatric population: a cross-sectional, international epidemiologic study. *Ann Allergy Asthma Immunol* 2021; **126**: e412.
17 Brown SJ. Atopic eczema. *Clin Med* 2016; **16**: 66–69.
18 Augustin M, Radtke MA, Glaeske G *et al*. Epidemiology and comorbidity in children with psoriasis and atopic eczema. *Dermatology* 2015; **231**: 35–40.
19 Wollenberg A, Barbarot S, Bieber T *et al*. Consensus-based European guidelines for treatment of atopic eczema (atopic dermatitis) in adults and children: part I. *J Eur Acad Dermatol Venereol* 2018; **32**: 657–682.
20 Deleanu D, Nedelea I. Biological therapies for atopic dermatitis: an update. *Exp Ther Med* 2019; **17**: 1061–1067.
21 Kowalska-Olędzka E, Czarnecka M, Baran A. Epidemiology of atopic dermatitis in Europe. *J Drug Assess* 2019; **8**: 126–128.
22 Muraro A, Lemanske RF, Hellings PW *et al*. Precision medicine in patients with allergic diseases: airway diseases and atopic dermatitis—PRACTALL document of the European academy of Allergy and clinical immunology and the American Academy of Allergy, Asthma & Immunology. *J Allergy Clin Immunol* 2016; **137**: 1347–1358.
23 Bekić S, Martinek V, Talapko J, Majnarić L, Vasilj Mihaljević M, Škrlec I. Atopic dermatitis and comorbidity. *Healthcare* 2020; **8**: 70. https://doi.org/10.3390/healthcare8020070
24 Mitchell AE. Bidirectional relationships between psychological health and dermatological conditions in children. *Psychol Res Behav Manag* 2018; **11**: 289–298.
25 Ghio D, Muller I, Greenwell K *et al*. It's like the bad guy in a movie who just doesn't die': a qualitative exploration of young people's adaptation to eczema and implications for self-care. *Br J Dermatol* 2020; **182**: 112–118.
26 Wollenberg A, Christen-Zäch S, Taieb A *et al*. ETFAD/EADV eczema task force 2020 position paper on diagnosis and treatment of atopic dermatitis in adults and children. *J Eur Acad Dermatol Venereol* 2020; **34**: 2717–2744.
27 Langenbruch A, Radtke M, Franzke N, Ring J, Foelster-Holst R, Augustin M. Quality of health care of atopic eczema in Germany: results of the national health care study AtopicHealth. *J Eur Acad Dermatol Venereol* 2014; **28**: 719–726.
28 Darsow U, Raap U, Ständer S. Atopic dermatitis. In Carstens E, Akiyama T, eds. Itch: mechanisms and treatment. CRC Press/Taylor & Francis, Boca Raton (FL), 2014.
29 National Eczema Association. Overview. 2021. https://nationaleczema.org/research/eczema-facts/#identifier_56_6880.%20Accessed%20on%2013%20January%202021
30 Thyssen JP, Hamann CR, Linneberg A *et al*. Atopic dermatitis is associated with anxiety, depression, and suicidal ideation, but not with psychiatric hospitalization or suicide. *Allergy* 2018; **73**: 214–220.
31 Schmitt J, Buske-Kirschbaum A, Tesch F *et al*. Increased attention-deficit/hyperactivity symptoms in atopic dermatitis are associated with history of antihistamine use. *Allergy* 2018; **73**: 615–626.
32 Zander N, Augustin M, Reinert R, Schäfer I. Atopic dermatitis shows significant cutaneous comorbidity: results from large-scale investigations in the working population. *J Eur Acad Dermatol Venereol* 2020; **34**: 135–141.
33 Radtke MA, Schäfer I, Glaeske G, Jacobi A, Augustin M. Prevalence and comorbidities in adults with psoriasis compared to atopic eczema. *J Eur Acad Dermatol Venereol* 2017; **31**: 151–157.
34 Paller A, Jaworski JC, Simpson EL *et al*. Major comorbidities of atopic dermatitis: beyond allergic disorders. *Am J Clin Dermatol* 2018; **19**: 821–838.
35 Wang V, Boguniewicz J, Boguniewicz M, Ong PY. The infectious complications of atopic dermatitis. *Ann Allergy Asthma Immunol* 2021; **126**: 3–12.

36 Sciattella P, Pellacani G, Pigatto PD *et al*. The burden of atopic dermatitis in adults in Italy. *G Ital Dermatol Venereol* 2020; **155**: 19–23.

37 Misery L, Belloni Fortina A, El Hachem M *et al*. A position paper on the management of itch and pain in atopic dermatitis from the International Society of Atopic Dermatitis (ISAD)/oriented patient-education network in dermatology (OPENED) task force. *J Eur Acad Dermatol Venereol* 2021; **35**: 787–796.

38 National Institute for Health and Care Excellence. Atopic eczema in under 12s: Quality standard [QS44]. 2021. https://www.nice.org.uk/guidance/qs44/chapter/Introduction

39 Eurostat. First population estimates EU population in 2020: almost 448 million. 2020. https://ec.europa.eu/eurostat/documents/2995521/11081093/3-10072020-AP-EN.pdf/d2f799bf-4412-05cc-a357-7b49b93615f1

40 Zink AGS, Arents B, Fink-Wagner A *et al*. Out-of-pocket costs for individuals with atopic eczema: a cross-sectional study in nine European countries. *Acta Derm Venereol* 2019; **99**: 263–267.

41 Ariens LFM, van Nimwegen KJM, Shams M *et al*. Economic burden of adult patients with moderate to severe atopic dermatitis indicated for systemic treatment. *Acta Derm Venereol* 2019; **99**: 762–768.

42 Mohr N, Naatz M, Zeervi L *et al*. Cost-of-illness of atopic dermatitis in Germany: data from dermatology routine care. *J Eur Acad Dermatol Venereol* 2021; **35**: 1346–1356.

43 Andersen L, Nyeland ME, Nyberg F. Increasing severity of atopic dermatitis is associated with a negative impact on work productivity among adults with atopic dermatitis in France, Germany, the U.K. and the U.S.A. *Br J Dermatol* 2020; **182**: 1007–1016.

44 Torrelo A, Ortiz J, Alomar A, Ros S, Prieto M, Cuervo J. Atopic dermatitis: impact on quality of life and patients' attitudes toward its management. *Eur J Dermatol* 2012; **22**: 97–105.

45 Pinheiro B, Gouveia M, Borges M. PSY6 absenteeism in adult patients with moderate-to-severe treated atopic dermatitis in Portugal: an econometric analysis. *Value Health* 2019; **22**: S902.

46 Lewis-Jones S. Quality of life and childhood atopic dermatitis: the misery of living with childhood eczema. *Int J Clin Pract* 2006; **60**: 984–992.

47 Kullavanijaya P. More than just eczema. *Lancet* 2000; **356**: s59.

48 Launois R, Ezzedine K, Cabout E *et al*. Importance of out-of-pocket costs for adult patients with atopic dermatitis in France. *J Eur Acad Dermatol Venereol* 2019; **33**: 1921–1927.

49 healthtalk.org. Eczema (young people): Money and eczema. 2021. https://healthtalk.org/eczema/money-and-eczema

50 Boccardi D, D'Auria E, Turati F *et al*. Disease severity and quality of life in children with atopic dermatitis: PO-SCORAD in clinical practice. *Minerva Pediatr* 2017; **69**: 373–380.

51 Ražnatović Đurović M, Janković J, Ćirković A *et al*. Impact of atopic dermatitis on the quality of life of children and their families. *Ital J Dermatol Venereol* 2021; **156**: 29–35. https://doi.org/10.23736/S20392-20488.23719.06447-23732

52 Misery L, Seneschal J, Ezzedine K *et al*. Atopic dermatitis is associated with poor quality of life in adult patients. *Value Health* 2017; **20**: A808.

53 Ridolo E, Caffarelli C, Olivieri E *et al*. Quality of sleep in allergic children and their parents. *Allergol Immunopathol* 2015; **43**: 180–184.

54 Ring J, Zink A, Arents BWM *et al*. Atopic eczema: burden of disease and individual suffering - results from a large EU study in adults. *J Eur Acad Dermatol Venereol* 2019; **33**: 1331–1340.

55 Schonmann Y, Mansfield KE, Hayes JF *et al*. Atopic eczema in adulthood and risk of depression and anxiety: a population-based cohort study. *J Allergy Clin Immunol Pract* 2020; **8**: 248–257.e216.

56 Taieb C, Ezzedine K, Reguiai Z, Misery L, Seneschal J. The burden of AD in French adult patients: a multicentric cross-sectional study. *Value Health* 2017; **20**: A943.

57 Theodosiou G, Montgomery S, Metsini A, Dalgard FJ, Svensson Å, Kobyletzki LB. Burden of atopic dermatitis in Swedish adults: a population-based study. *Acta Derm Venereol* 2019; **99**: 964–970.

58 Haufe E, Abraham S, Heratizadeh A *et al*. Decreased professional performance and quality of life in patients with moderate-to-severe atopic eczema: results from the German atopic eczema registry TREATgermany. *Hautarzt* 2018; **69**: 815–824.

59 Kimball AB, Gieler U, Linder D, Sampogna F, Warren RB, Augustin M. Psoriasis: is the impairment to a patient's life cumulative? *J Eur Acad Dermatol Venereol* 2010; **24**: 989–1004.

60 Sandhu JK, Wu KK, Bui TL, Armstrong AW. Association between atopic dermatitis and suicidality: a systematic review and meta-analysis. *JAMA Dermatol* 2019; **155**: 178–187.

61 Augustin M. Cumulative life course impairment: identifying patients at risk. *Curr Probl Dermatol* 2013; **44**: 74–81.

62 Fang MM, Nowinski CJ, Lai J *et al*. Characteristics and impacts of itch in children with inflammatory skin disorders. *Br J Dermatol* 2021; **184**: 896–904.

63 Matterne U, Apfelbacher CJ, Loerbroks A *et al*. Prevalence, correlates and characteristics of chronic pruritus: a population-based cross-sectional study. *Acta Derm Venereol* 2011; **91**: 674–679.

64 Djurović MR, Janković J, Ćirković A *et al*. Quality of life in infants with atopic dermatitis and their families. *Postepy Dermatol Alergol* 2020; **37**: 66–72.

65 Silverberg JI, Garg NK, Paller AS, Fishbein AB, Zee PC. Sleep disturbances in adults with eczema are associated with impaired overall health: a US population-based study. *J Invest Dermatol* 2015; **135**: 56–66.

66 Capozza K, Gadd H, Kelley K, Russell S, Shi V, Schwartz A. Insights from caregivers on the impact of pediatric atopic dermatitis on families: "I'm tired, overwhelmed, and feel like I'm failing as a mother". *Dermatitis* 2020; **31**: 223–227.

67 Jeon C, Yan D, Nakamura M *et al*. Frequency and Management of Sleep Disturbance in adults with atopic dermatitis: a systematic review. *Dermatol Ther* 2017; **7**: 349–364.

68 Sanofi Genzyme; Allergy UK. Getting under the skin of adult severe eczema (Seeing Red Report) 2017.

69 American Journal of Managed Care. Living With Atopic Dermatitis. 2021. https://www.ajmc.com/view/living-with-atopic-dermatitis

70 Warren RB, Kleyn CE, Gulliver WP. Cumulative life course impairment in psoriasis: patient perception of disease-related impairment throughout the life course. *Br J Dermatol* 2011; **164**: 1–14.

71 Kaaz K, Szepietowski JC, Matusiak Ł. Influence of itch and pain on sleep quality in atopic dermatitis and psoriasis. *Acta Derm Venereol* 2019; **99**: 175–180.

72 Su JC, Kemp AS, Varigos GA, Nolan TM. Atopic eczema: its impact on the family and financial cost. *Arch Dis Child* 1997; **76**: 159–162.

73 Kiebert G, Sorensen SV, Revicki D *et al*. Atopic dermatitis is associated with a decrement in health-related quality of life. *Int J Dermatol* 2002; **41**: 151–158.

74 Balieva F, Kupfer J, Lien L *et al*. The burden of common skin diseases assessed with the EQ5D™: a European multicentre study in 13 countries. *Br J Dermatol* 2017; **176**: 1170–1178.

75 Na CH, Chung J, Simpson EL. Quality of life and disease impact of atopic dermatitis and psoriasis on children and their families. *Children* 2019; **6**: 133.

76 Westhoff G, Listing J, Zink A. Was kostet die rheumatoide Arthritis den Erkrankten? "Out-of-Pocket" – Ausgaben im Frühstadium der Erkrankung. *Z Rheumatol* 2004; **63**: 414–424.

77 Egeberg A, Griffiths CEM, Williams HC, Andersen YMF, Thyssen JP. Clinical characteristics, symptoms and burden of psoriasis and atopic dermatitis in adults. *Br J Dermatol* 2020; **183**: 128–138.

78 Jungen D, Augustin M, Langenbruch A *et al*. Cost-of-illness of psoriasis - results of a German cross-sectional study. *J Eur Acad Dermatol Venereol* 2018; **32**: 174–180.

79 Gisondi P, Girolomoni G. Undertreatment in adult patients with moderate-to-severe atopic dermatitis and other chronic inflammatory skin diseases. *J Eur Acad Dermatol Venereol* 2020; **34**: 2168–2169.

80 Ersser SJ, Cowdell F, Latter S *et al*. Psychological and educational interventions for atopic eczema in children. *Cochrane Database Syst Rev* 2014; **2014**: Cd004054.

81 Staab D, Diepgen TL, Fartasch M *et al*. Age related, structured educational programmes for the management of atopic dermatitis in children and adolescents: multicentre, randomised controlled trial. *BMJ* 2006; **332**: 933–938.

82 Zyriax BC, Augustin M, Abeck F, Mohr N, Kirsten N, Langenbruch A. Adherence to guideline-oriented preventive measures in patients with atopic dermatitis in Germany. *Dermatology* 2021; **238**: 307–312.

83 van Os-Medendorp H, Deprez E, Maes N *et al*. The role of the nurse in the care and management of patients with atopic dermatitis. *BMC Nursing* 2020; **19**: 102.

84 World Health Organization. WHO Framework on integrated people-centred health service.2021. https://www.who.int/servicedeliverysafety/areas/people-centred-care/en/

85 Gutknecht M, Reinert R, Augustin M. Review of health economic analyses in atopic dermatitis: how diverse is the literature? *Expert Rev Pharmacoecon Outcomes Res* 2019; **19**: 127–145.

86 Augustin M, Langenbruch A, Blome C *et al*. Characterizing treatment-related patient needs in atopic eczema: insights for personalized goal orientation. *J Eur Acad Dermatol Venereol* 2020; **34**: 142–152.

87 Steinke S, Langenbruch A, Ständer S, Franzke N, Augustin M. Therapeutic benefits in atopic dermatitis care from the patients' perspective: results of the German national health care study 'Atopic health. *Dermatology* 2014; **228**: 350–359.

88 Heratizadeh A, Haufe E, Stölzl D *et al*. Baseline characteristics, disease severity and treatment history of patients with atopic dermatitis included in the German AD registry TREATgermany. *J Eur Acad Dermatol Venereol* 2020; **34**: 1263–1272.

89 Ros S, Puig L, Carrascosa JM. Cumulative life course impairment: the imprint of psoriasis on the Patient's life. *Actas Dermo-Sifiliográficas (English Edition)* 2014; **105**: 128–134.

Supporting information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Supporting Information.