

The Burden of Psoriasis

Epidemiology, Quality of Life, Comorbidities and Treatment Goals



PSORIASIS: NOT JUST A SKIN DISEASE



The Burden of Psoriasis

Epidemiology, Quality of Life, Comorbidities and Treatment Goals

This report has been supported by the Irish Skin Foundation and produced by Novartis Ireland in conjunction with the J.E. Cairnes School of Business and Economics of the National University of Ireland, Galway with clinical input from Professor Louise Barnes, Professor Brian Kirby, Professor Oliver Fitzgerald and Dr Anne Marie Tobin.

Contents

Foreword	7
Infographic	8
Introduction	11
1 Epidemiology: Estimates of the Prevalence, Incidence and Disease Severity of Psoriasis in Ireland	13
1.1 The Prevalence of Psoriasis in Ireland	13
1.2 The Incidence of Psoriasis in Ireland	15
1.3 Estimates of those with mild, moderate and severe levels of psoriasis	17
1.4 Conclusion	17
2 The Impact of Psoriasis on Quality of Life	18
2.1 Introduction	18
2.2 Health Related Quality of Life (HRQoL)	18
2.3 Psychological and Psychosocial Impact of Psoriasis	20
2.4 Depression, Anxiety & Suicidality	21
2.5 Impact of psoriasis on work and work related activities.	23
2.6 Conclusion	24
Living with Psoriasis – an Irish perspective	25
Case Studies	27
3 Co-morbidities	31
3.1 Introduction	31
3.2 Psoriatic Arthritis (PsA)	31
3.3 Psoriasis and Cardiovascular Risk Factors	33
3.3.1 Obesity	34
3.4 Metabolic Syndrome	35
3.5 Cardiovascular events	36
3.5.1 Stroke	36
3.5.2 Myocardial infarction	37
3.6 Conclusion	38
4 Treatment Goals	39
4.1 Conclusion	40
5 Conclusion	41
5.1 Limitations and Implications for Future Research	42
6 Appendix	43
7 References	45
8 List of tables & Glossary	49

Foreword

Though psoriasis was only formally recognised as a distinct entity in the mid 1800s, it has likely been described for the past 3,500 years, often confused with conditions such as leprosy.¹⁻³ Indeed, it is this condition that twice Pulitzer prize winner and psoriasis sufferer, John Updike, uses as a metaphor in the short story “From the journal of a leper”, to describe the stigma and trauma, psoriasis sufferers can experience, oftentimes silently.⁴

“She glances at me and does not know I am a leper. If I bared my arms and chest she would run screaming. A few integuments of wool and synthetic fibre save me from her horror: my enrollment in humanity is so perilous.”⁵

Certainly, evidence has shown that psoriasis can affect a patient’s quality of life to a level comparable with other chronic conditions, including myocardial infarction and some cancers.⁶ It has even been independently associated with suicidal ideation.⁷ Though it has long been considered that, with psoriasis, “torture is skin deep”, evidence has been mounting that it is a systemic inflammatory disease with an increased risk of mortality when severe.^{2,5}

This is on a backdrop of an ageing demographic within the developed world, which is resulting in a rapid increase in chronic diseases. Already accounting for 80% of disease burden in the European Union, this change is expected to significantly elevate the cost of healthcare in the coming years.⁸ Improved utilisation of information is expected to be a key player in the fight to meet these demands. Unfortunately, Irish specific information regarding the true epidemiology of psoriasis is sadly lacking, though studies have estimated that its prevalence is high.^{9,10} This suggests that we are inadequately informed to manage a silent epidemic with considerable societal impact, both socially and economically.

“The Burden of Psoriasis in Ireland” is therefore a timely study that estimates the prevalence of psoriasis in Ireland based on UK studies. It comprehensively reviews the growing body of knowledge regarding psoriasis and infers the profound impact that psoriasis, with its co-morbidities, is likely to have on the Irish population.

The Irish Skin Foundation (ISF) is a new organisation that aims “to support in all ways possible, to advocate on behalf of, to educate all involved with, and to bring comfort to those affected by skin disease in Ireland, their families and their carers.”¹¹ In particular, the ISF aims to “bring science to society”.¹² This report supports these philosophies in a manner that will enable significant advocacy for the large number of patients with psoriasis throughout the country.

Estimates from this study highlight an urgent need to rectify a significant epidemiological information deficit existing in this country. Without addressing this problem we will be unable to best utilise the promising treatments referred to in this study, which could significantly alter the outcomes of many of those suffering from psoriasis, each of whom might feel “at war with my skin”.¹³ We will also face an increasingly difficult task of meeting expectations set by well prepared nations, without the means to impact outcomes to any greater degree than “skin deep”.

Dmitri Wall

Research Fellow, Specialist Registrar Dermatology at Irish Skin Foundation

Professor Louise Barnes

Consultant Dermatologist, St. James’s Hospital, Dublin 8

References

- 1 Baker BS. From Arsenic to Biologicals: A 200 Year History of Psoriasis: Garner Press. 2008.
- 2 Nestle FO, Kaplan DH, Barker J. Psoriasis. *New England Journal of Medicine* 2009; 361: 496-509.
- 3 Bateman T. A Practical Synopsis of Cutaneous Diseases: According to the Arrangement of Dr. Willan, Exhibiting a Concise View of the Diagnostic Symptoms and the Method of Treatment: London: Longman, Rees, Orme, Brown, Green, & Longman. 1836.
- 4 Lynch M, Kirby B. John Updike and psoriasis. *British Journal of Dermatology* 2011; 165: 927-8.
- 5 Updike J. From the journal of a leper. In: *The New Yorker*. 1976; July 19; 28-33.
- 6 Christophers E. Comorbidities in psoriasis. *Clinics in dermatology* 2007; 25: 529-34.
- 7 Kurd SK, Troxel AB, Crits-Christoph P et al. The risk of depression, anxiety and suicidality in patients with psoriasis: A population-based cohort study. *Archives of dermatology* 2010; 146: 891-5.
- 8 European Commission. eHealth Task Force Report – Redesigning health in Europe for 2020. In. Luxembourg. 2012.
- 9 Farber E, Nall L. Epidemiology: natural history and genetics. *BASIC AND CLINICAL DERMATOLOGY* 1998; 16: 107-58.
- 10 Raychaudhuri SP, Farber EM. The prevalence of psoriasis in the world. *Journal of the European Academy of Dermatology and Venereology* 2001; 15: 16-7.
- 11 The Irish Skin Foundation website. <http://irishskinfoundation.ie/About-Us/mission>. In.
- 12 O’Brien E. A Century of Service: The City of Dublin Skin and Cancer Hospital 1911-2011. Dublin: The Anniversary Press. 2011.
- 13 Updike J. *Self-Consciousness: Memoirs*. London: Penguin. 1989.

The Burden of Psoriasis

Examining the **prevalence**, **incidence**, **quality of life**, **related co-morbidities** and **treatment goals** in Ireland

There are over
73,000 people
in Ireland with psoriasis¹



More than **9,000** people
in Ireland suffer with
severe psoriasis²

Psoriasis is associated with a range of co-morbidities, including:
psoriatic arthritis; diabetes and
cardiovascular disease³



People with more severe forms of psoriasis have a
43% increased risk of stroke⁶



93% have felt
embarrassed
by their psoriasis⁵



Up to 30% may also have
psoriatic arthritis⁴



Young people with more severe forms of psoriasis have 3 times the increased risk of having
a cardiac event⁷

People with more severe forms of psoriasis have significantly
reduced life span⁸



quality of life

Psoriasis affects health-related quality of life to an extent similar to the effects of depression, myocardial infarction, hypertension and even some cancers⁹

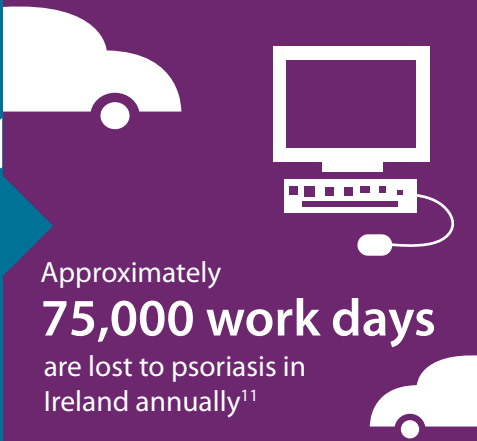


PSORIASIS: NOT JUST A SKIN DISEASE

57% report that others have mistaken the condition as being **contagious**¹⁰



Approximately **75,000 work days** are lost to psoriasis in Ireland annually¹¹



People with severe psoriasis have 1.8 times greater odds of being **unemployed** compared to those who have mild psoriasis¹²



56% say they have been the target of negative, **unpleasant comments**⁵



77% said their skin made them want to

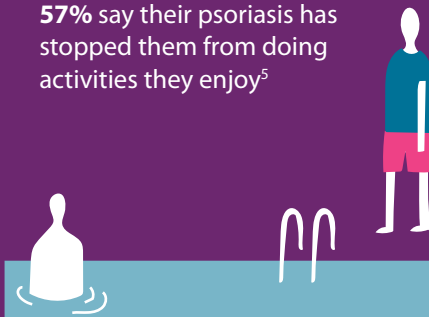


hide away⁵

54% report that psoriasis has a negative impact on their **love lives**⁵



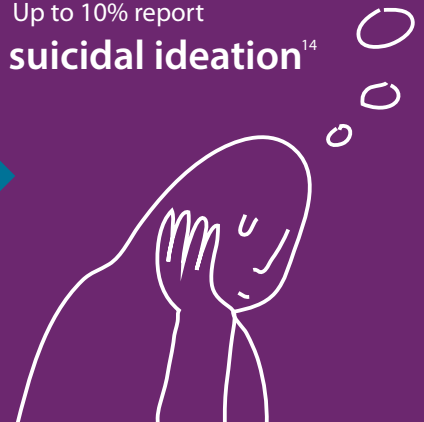
57% say their psoriasis has stopped them from doing activities they enjoy⁵



Up to 32% also suffer with **depression**¹³



Up to 10% report **suicidal ideation**¹⁴



References:

1. The Impact of Psoriasis in Ireland Epidemiology, Quality of Life, Co-morbidities and Treatment Goals, p.6.
2. The Impact of Psoriasis in Ireland Epidemiology, Quality of Life, Co-morbidities and Treatment Goals, p.9.
3. Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB, Gelfand JM. Prevalence of cardiovascular risk factors in patients with psoriasis. Journal of the American Academy of Dermatology. 2006;55 (5):829-35.
4. Haroon M, Kirby B, FitzGerald O. High prevalence of psoriatic arthritis in patients with severe psoriasis with suboptimal performance of screening questionnaires. Annals of the rheumatic diseases. 2013;72 (5):736-40.
5. Psoriasis Patient Survey, Ireland. April 2015.
6. Gelfand JM, Dommasch ED, Shin DB, Azfar RS, Kurd SK, Wang X, et al. The risk of stroke in patients with psoriasis. The Journal of investigative dermatology. 2009;129(10):2411-8.
7. Gelfand JM, Neimann AL, Shin DB, Wang X, Margolis DJ, Troxel AB. Risk of myocardial infarction in patients with psoriasis. Jama. 2006;296(14):1735-41.
8. Gelfand JM, Troxel AB, Lewis JD, Kurd SK, Shin DB, Wang X, et al. The risk of mortality in patients with psoriasis: results from a population-based study. Archives of Dermatology. 2007;143(12):1493-9.
9. Rapp SR, Feldman SR, Exum ML, Fleischer Jr AB, Reboussin DM. Psoriasis causes as much disability as other major medical diseases. Journal of the American Academy of Dermatology. 1999;41(3):401-7.
10. Krueger G, Koo J, Lebwohl M, Menter A, Stern RS, Rolstad T. The impact of psoriasis on quality of life: results of a 1998 National Psoriasis Foundation patient-membership survey. Archives of Dermatology. 2001;137(3):280-4.
11. The Impact of Psoriasis in Ireland Epidemiology, Quality of Life, Comorbidities and Treatment Goals, p.23.
12. Armstrong, A.W., et al., Quality of life and work productivity impairment among psoriasis patients: findings from the National Psoriasis Foundation survey data 2003–2011. PLoS one, 2012. 7(12): p. e52935
13. Schmitt JM, Ford DE. Role of depression in quality of life for patients with psoriasis. Dermatology. 2007;215(1):17-27.
14. Krueger G, Koo J, Lebwohl M, Menter A, Stern RS, Rolstad T. The impact of psoriasis on quality of life: results of a 1998 National Psoriasis Foundation patient-membership survey. Archives of Dermatology. 2001;137(3):280-4.

Introduction

Psoriasis is a chronic, debilitating inflammatory skin disease, characterised by an accelerated rate of turnover of the top layer of the skin (epidermis). Estimates of prevalence vary from 0.3% of the general population in China, to 3% in parts of Northern Europe (Griffiths and Barker 2007). Although it is a chronic condition, its course may be variable, with flare-ups and remissions (Woolacott, Hawkins et al. 2005). The cause of psoriasis is not fully understood but evidence suggests that there is a strong genetic component and that it is mediated by abnormal T lymphocyte function (Griffiths and Barker 2007). Environmental factors also play a role, and it has been established that in some cases factors such as emotional stress or infection may trigger the first episode of psoriasis or exacerbations (Langley, Krueger et al. 2005). The most common form (approximately 90%) of psoriasis is chronic plaque psoriasis (psoriasis vulgaris) (Griffiths and Barker 2007), which is characterised by well-demarcated, often symmetrically distributed, thickened, red, scaly plaques. There is considerable variation in both the size and the number of the plaques, which can range from one or two small plaques to 100% body coverage. Although the plaques can affect any part of the skin, they are typically found on the surfaces of the knees, elbows, and scalp (Griffiths and Barker 2007).

People with psoriasis often experience difficulties such as low self-esteem, problems in body image, maladaptive coping responses and also have feelings of shame, stigma and embarrassment regarding their appearance (Augustin and Radtke 2014). As a consequence, psoriasis is associated with having a debilitating effect on quality of life (QoL) resulting in great strain being placed on the mental health of many of those who have the condition. Although once viewed as simply a skin disease - psoriasis is now viewed as a systemic inflammatory disease which is associated with a range of co-morbidities including psoriatic arthritis (PsA), obesity, hypertension, diabetes and hyperlipidaemia. Evidence supporting the hypothesis that psoriasis is independently associated with cardiovascular (CV) events such as stroke and myocardial infarction (MI) is mounting. Co-morbidities impact on the general health of those who have psoriasis and also have the compounding effect of further encroaching on QoL.

As far as this author is aware, no previous study exists which provides estimates for the prevalence, incidence and severity of psoriasis in Ireland. As a consequence there is a certain gap in the epidemiological information base. There is also a paucity of information with respect to QoL and the co-morbidities associated with psoriasis within an Irish setting. The aim of this report is to address these deficits by estimating the epidemiology of psoriasis in Ireland and utilise these estimates to determine the burden of psoriasis in Ireland. The report is structured as follows:

Chapter 1 presents estimates of the prevalence, incidence and the likely delineation of mild, moderate and severe psoriasis in Ireland.

Chapter 2 examines the impact of psoriasis on quality of life, based on a literature review of current published evidence.

Chapter 3 examines the impact of psoriasis in terms of its related co-morbidities.

Chapter 4 examines the role of newer therapies for psoriasis in enhancing the quality of life of those who have the condition.

There are over **73,000** people
in Ireland with psoriasis*



1. Epidemiology: Estimates of the Prevalence, Incidence and Disease Severity of Psoriasis in Ireland

In this chapter, estimates are presented for the prevalence and incidence of psoriasis in the Republic of Ireland. In the epidemiological literature, prevalence is defined as the proportion of individuals in a population who have the disease of interest in a specified time period, while incidence is a measure of the number of new cases of a disease in a particular time period. Both measures, taken together provide important information for estimating the impact of a particular condition or illness.

The estimates presented are based on existing evidence from international studies which are then applied to the Irish population. Estimates of prevalence vary from 0.3% of the general population in China, to 3.0% of the population in parts of Northern Europe and Scandinavia (Griffiths and Barker 2007) with estimates of incidence ranging from 5.76 per 10,000 (Bell, Sedlack et al. 1991) to 14 per 10,000 (Huerta, Rivero et al. 2007). The prevalence and incidence estimates in the literature display a degree of variation and the main factors explaining this variation include: age, ethnicity, and geography (Parisi, Symmons et al. 2013). Higher prevalence rates have been reported in Caucasians compared with other ethnic groups and the disease is generally more common in the colder north than in the tropics (Chandran and Raychaudhuri 2010). Another factor when considering the differing estimates of prevalence and incidence is that differing definitions of prevalence, sampling frames and age groups are utilised in the various study designs (Parisi, Symmons et al. 2013). The manifestation of the disease and its severity also displays a level of heterogeneity. For the majority of patients (approximately 90%), the disease manifests as plaque psoriasis, to the less common superficial pustules scattered on the palms or soles, or in rare cases widespread pustules on the body (Meier and Sheth 2009). The severity of disease is described as being mild, moderate or severe and is evaluated by the following measurement tools: the Psoriasis Area and Severity Index (PASI)¹; Body Surface Area (BSA)²; Physician Global Assessment (PGA)³ and in some cases, the severity of disease is linked with various dermatology or psoriasis specific (HRQoL) instruments (see Table 4). For the purpose of this report, disease severity is in the main, defined by the BSA criteria (see Figure 3).

The methods employed and the results generated from an analysis to estimate the overall prevalence and incidence of psoriasis in the Republic of Ireland - as well as the likely delineation of mild, moderate and severe levels of disease within the Irish psoriasis population, are presented in the following sections of this chapter.

1.1 The Prevalence of Psoriasis in Ireland

Currently, there is a lack of information regarding the prevalence of psoriasis in Ireland. In an attempt to overcome this information deficit, estimates from a large UK based prevalence study were adopted and adapted to reflect the Irish setting. In Gelfand et al (2005), the authors used a large UK primary care database called the General Practice Research Database (GPRD).⁴ Out of a total population of 7,533,475 patients, the authors reported that 114,521 were diagnosed with psoriasis, yielding a prevalence estimate of 1.52% (Gelfand,

1. The Psoriasis Area Severity Index (PASI) is an index used to express the severity of psoriasis. It combines the severity (redness, thickness and scaliness) and percentage of affected area, with the scores applied ranging from 0 to 72.

2. Body Surface Area (BSA) is the arithmetic mean of the affected skin surface based on the assumption that the surface area of a patient's hand represents 1% of BSA.

3. Physician Global Assessment (PGA) is an intuitive assessment performed by the physician and the scoring is applied with a 7-point scale ranging from clear to severe.

4. The GPRD is a primary care database which contains information on over 8 million patients in the UK. The database captures approximately 5% of the UK population, which is broadly representative of the general UK population in terms of age, sex, and geographic distributions

93% have felt
embarrassed
by their psoriasis*



Table 1. Estimated prevalence of psoriasis in Ireland

Age Group	Total Irish Males	Total Irish Females	Males %	Females %	Males: Psoriasis	Females: Psoriasis	Total: Psoriasis
0-9	346113	330986	0.50%	0.60%	1683	2044	3727
10-19	299338	286172	1.20%	1.50%	3549	4430	7979
20-29	320350	338003	1.50%	1.50%	4778	5156	9934
30-39	377011	381195	1.90%	1.70%	7035	6471	13506
40-49	317846	318151	2.20%	1.90%	6963	5979	12942
50-59	258858	260050	2.30%	2.10%	6013	5558	11571
60-69	196167	196257	2.30%	2.30%	4439	4429	8868
70-79	110107	123119	1.70%	1.60%	1854	1928	3782
80-84	28423	41690	0.90%	0.90%	255	366	621
>85	18486	39930	0.50%	0.50%	86	190	276
Total	2,272,699	2,315,553	1.60%	1.60%	36,654	36,551	73,205

Table adapted from Gelfand et al (2005) using CSO 2011 figures.

Weinstein et al. 2005). As a breakdown by age and by sex was available in this study, it was possible to adjust the prevalence rates to the Irish age and sex profile, consistent with most recent Irish census figures (2011). Doing so provided for an estimate of 1.6% for Ireland. **According to this estimate we might reasonably expect there to be 73,205 people living with psoriasis in Ireland** (Table 1)

While serving as a good guide to the prevalence of psoriasis in Ireland, the estimate reported here should however be viewed as being a conservative one. The reasons for this are twofold: firstly, the UK study which formed the basis of this analysis, estimated the prevalence of those who had received a *diagnosis* of psoriasis from their GP; it seems probable that there remains a proportion of the population with psoriasis who remain undiagnosed. Indeed, in Kurd et al (2009), the authors estimate the prevalence of undiagnosed psoriasis in the adult population between 0.4% and 2.28%. The conservative estimate is based on a requirement that a diagnosis be agreed on by two dermatologists, while the 2.28% figure required confirmation by a sole clinician. Secondly, while adjusting for age and sex may be expected to capture most of the variation between the populations of the UK and Ireland with respect to the prevalence of psoriasis, one may have concerns about the natural congruency of these populations with regard to ethnic heterogeneity. Indeed as of 2011, Ireland’s population was 95% Caucasian (2011) whereas in the UK this figure was 86% . As higher prevalence rates have been



Figure 1. The prevalence of psoriasis in Ireland stratified by age & sex

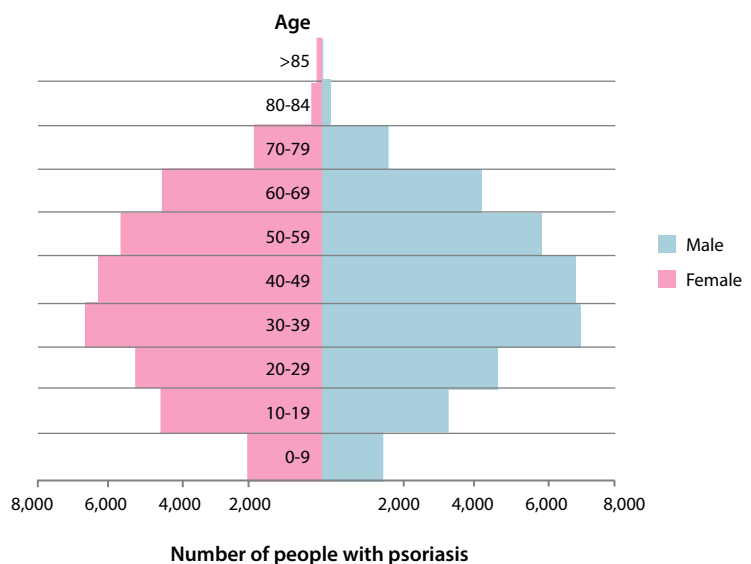


Figure adapted from Gelfand et al (2005) using CSO 2011 figures.

Table 2. Estimated incidence of psoriasis in Ireland

Age	Total Irish Males	Total Irish Females	Males per 10,000	Females per 10,000	Male Psoriasis	Female Psoriasis	Total
0-19 y	645,451	617,158	11	12	710	747	1,457
20-29 y	320,350	338,003	11	16	356	524	879
30-39 y	377,011	381,195	17	13	656	499	1,155
40-49 y	317,011	318,151	13	11	407	334	741
50-59 y	258,858	260,050	16	17	417	447	864
60-69 y	196,167	196,257	19	14	365	283	647
70-79 y	110,107	123,119	12	12	130	145	275
≥ 80 y	46,909	81,620	17	8	81	67	148
Total	2,272,699	2,315,553	14	13	3,121	3,046	6,167

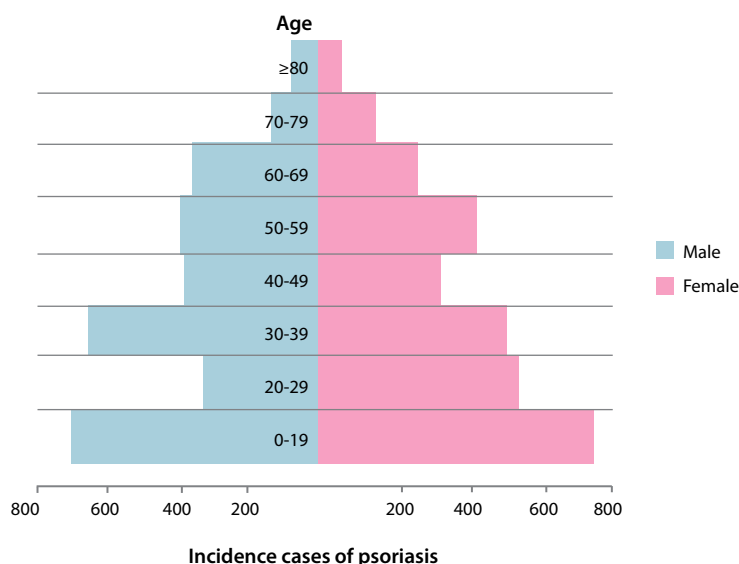
Table adapted from Huerta et al (2007) using CSO 2011 figures.

reported in Caucasians compared with other ethnic groups (Chandran and Raychaudhuri 2010) this may lead to an underestimate of the Irish prevalence figure. The primary estimates were left unadjusted for race in this analysis due to limited data regarding the required adjustment. However, for readers interested in the approximate estimate of the potential underestimate, a simple approach to the adjustment would suggest approximately an underestimate of approximately 5.2%. **Therefore, the age, sex, and race-adjusted estimate for Ireland would be 1.7%, providing for a figure of 77,012 people living with psoriasis in Ireland** (see Table 16).

1.2 The Incidence of Psoriasis in Ireland

To estimate the incidence of psoriasis in Ireland, once more a UK study formed the foundations of the Irish figures (Huerta, Rivero et al. 2007). The authors estimated the incidence of psoriasis as being 14 per 10,000. As a breakdown by age and sex was available in this study, the UK estimate was subsequently adjusted to the Irish demographic profile, resulting in an incidence rate of 13.4 per 10,000. **Extrapolating to the overall Irish population, this infers an estimate of 6,167 new psoriasis cases being diagnosed in Ireland annually.** (Table 2)

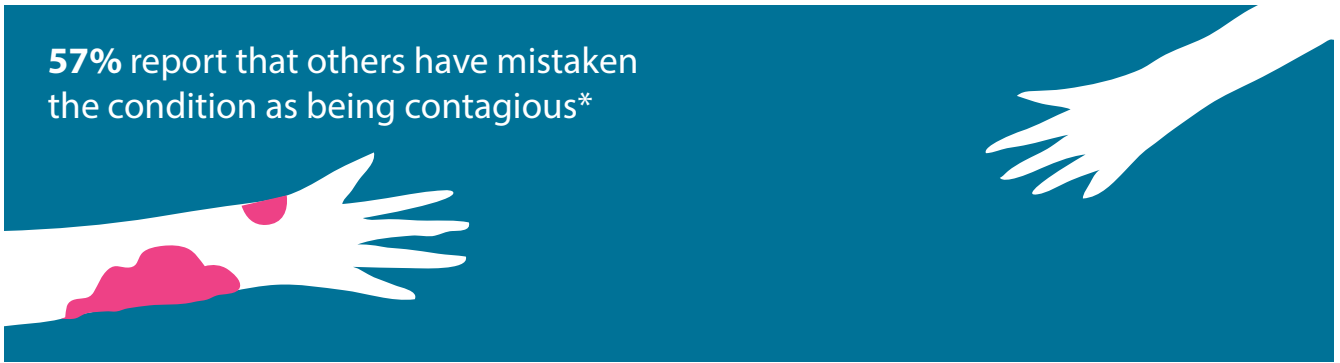
Figure 2. The incidence of psoriasis in Ireland stratified by age & sex



More than 9,000 people in Ireland suffer with **severe psoriasis***

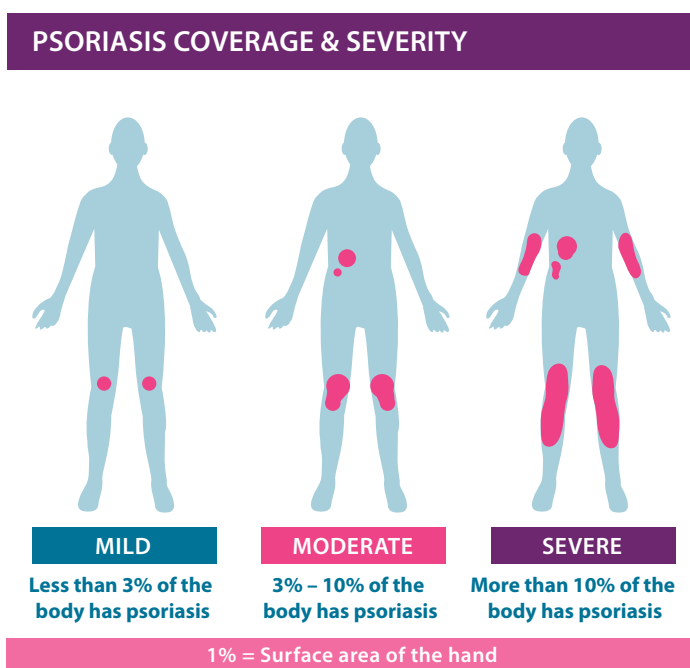
Figure adapted from Huerta et al (2007) using CSO 2011 figures.

57% report that others have mistaken the condition as being contagious*



The incidence estimate of 13.5 per 10,000 suggests the numbers of those with psoriasis are likely to increase into the future. An upward trend has previously been identified in the literature. For example, Icen et al (2009) estimated that the annual incidence of psoriasis almost doubled between the 1970s and 2000 from 5.08 to 10.5 per 10,000. Factors such as changes in lifestyle and environmental factors are offered as explanations for this upward trend. However, it is also likely that part of this increase may be due to changes in the diagnosing patterns over time and an increased awareness of the disease. It may be the case however, that while the prevalence estimate may be conservative in nature, the incidence estimate may overestimate the numbers at risk of developing psoriasis annually. In Huerta et al (2007), the authors suggest that their estimate of 14 per 10,000 may be an overestimate, as their case definition did not require diagnoses to be confirmed by a dermatologist. As a result, the age and sex adjusted figure of 13.5 per 10,000 estimated here, may represent an overestimate of the incidence of psoriasis in Ireland.

Figure 3. Body Surface Area



Source: www.psoriasis.org

Table 3. Estimated prevalence stratified by disease severity

Prevalance	Mild < 2% BSA	Moderate > 2% - 10% BSA	Severe > 10% BSA	Total
%	51.8%	35.8%	12.4%	100%
1.6% (GPRD)	37,919	26,208	9,078	73,205

Table adapted from Yeung et al (2013) using CSO 2011 figures.



1.3 Estimates of those with mild, moderate and severe levels of psoriasis

In Yeung et al (2013), the authors estimated the levels of severity of psoriasis for the UK. This study was used as the basis to estimate the levels of mild, moderate and severe psoriasis in Ireland. In the UK study, psoriasis severity was determined by the process of a self-reported questionnaire according to the Body Surface Area criteria (Figure 3), in 8,726 patients, among whom 4,523 (51.8%) had mild, 3,122 (35.8%) had moderate, and 1,081 (12.4%) had severe psoriasis. The breakdown of the levels of mild, moderate and severe disease was then applied to the estimated prevalence figures for Ireland. The estimates of those with mild, moderate or severe psoriasis for Ireland are displayed in Table 3.

We estimate that there may be in excess of 9,000 people in Ireland with severe psoriasis. This represents a significant number of people who are heavily impacted by the disease. Those with severe psoriasis experience poorer quality of life and are more likely to have co-morbidities such as psoriatic arthritis, cardiovascular disease and depression compared to those with the mild form of the disease (Kurd, Troxel et al. 2010, Ogdie, Langan et al. 2013, Yeung, Takeshita et al. 2013). The severity of disease also impinges on peoples' work-lives, as according to research conducted in the US, people with severe psoriasis have 1.8 times greater odds of being unemployed compared to those who have mild psoriasis (Armstrong, Schupp et al. 2012).

1.4 Conclusion

New estimates generated in this study indicate that psoriasis affects a large number of people in Ireland. In terms of prevalence, the estimate reported here provides for a figure of 73,205 people living with psoriasis in Ireland. With respect to incidence, there may be up to 6,167 people being diagnosed with psoriasis each year. Within the psoriasis population an estimated 12.4% have severe psoriasis. Furthermore, these numbers are likely to increase in the coming years as an upward trend has been identified in the prevalence and incidence of the disease internationally (Icen, Crowson et al. 2009, Danielsen, Olsen et al. 2013). Nonetheless, as the estimates reported are based on population based epidemiological UK studies; future research would benefit from similar such studies for the Republic of Ireland.

58% have said their psoriasis has **stopped them** from doing activities they enjoy*



2. The Impact of Psoriasis on Quality of Life

2.1 Introduction

In the previous chapter, we estimate that in excess of 73,000 people suffer with psoriasis in Ireland, making it one of the country's most prevalent skin diseases. In this chapter, the impact of psoriasis on patient health is examined. In particular, the focus of analysis is its impact on the quality of life of the person. While psoriasis manifests in physical form, the emphasis here is the psychosocial effect – as psoriasis is a chronic condition which has a significant negative impact on the quality of life of those who suffer with the disease.

Evidence suggests that psoriasis affects health-related quality of life (HRQoL) to an extent similar to the effects of other chronic diseases such as depression, myocardial infarction, hypertension and even some cancers (Rapp, Feldman et al. 1999). Psoriasis may also impact negatively on mental health, which has a compounding effect on QoL. It is the visible nature of psoriasis that can be particularly disabling. People with psoriasis often experience difficulties like low self-esteem, problems in body image, maladaptive coping responses and also have feelings of shame, stigma and embarrassment regarding their appearance. This can be frequently accompanied by the perception of being evaluated by others based on the visibility of the disease (Augustin and Radtke 2014). These negative psychological factors that arise as a consequence of the condition may place a heavy burden on those affected by psoriasis and evidence suggests that depression, anxiety and suicidal ideation are independently associated with the disease (Kurd, Troxel et al. 2010). Psychological impairment associated with the disease has been observed in the workplace and as a result psoriasis may play a role in respect of absenteeism and productivity (Pearce, Singh et al. 2006).

In the following sections of this chapter, we examine the impact of psoriasis in terms of HRQoL and psychological burden. Part of this process involves the examination of the various tools used to measure the quality of life of people with psoriasis (Table 4)

Data obtained from literature reviews are then combined with estimates of Irish psoriasis prevalence, estimated in Chapter 2, in an attempt to quantify the wider burden of the condition. Furthermore, the aim here is to examine the burden that psoriasis places on the work-lives of those who suffer from the disease.

2.2 Health Related Quality of Life (HRQoL)

The concept of health-related quality of life (HRQoL) and its determinants encompass those aspects of overall quality of life that can be clearly shown to affect health - either physical or mental. Several measures have been used to assess HRQoL; these measures are general instruments such as the EQ-5D⁵ and disease specific tools

5. EQ-5D is a standardized instrument for use as a generic measure of the quality of health-related life and of health outcome. It is particularly associated with the QALY (quality-adjusted life-year). It is designed for self-completion by respondents and is suited for use in postal surveys, clinics and face-to-face interviews. The EQ-5D has five dimensions: Mobility, Self-care, Usual activity, Pain/discomfort, Anxiety/Depression. The traditional EQ-5D instrument described each dimension in terms of three levels: 1- no problem, 2 - some problem, 3 - extreme problem. In each case, the instrument comprises two parts: respondents rate their health on the dimensions/levels and record an overall assessment of their health on a visual analogue scale, the EQ-VAS.



quality of life

Psoriasis affects health-related quality of life to an extent similar to the effects of depression, myocardial infarction, hypertension and even some cancers*



Table 4. Examples of HRQoI instruments used in psoriasis management

Instrument	Area of analysis	No. of items
Psoriasis-specific questionnaires		
Salford Psoriasis Index	Clinical PASI, Psychosocial Impact Score, Historic Disease Severity Score	3
Psoriasis Disability Index	Daily activities, impact on work/school, leisure/social activities	15
Psoriasis Life Stress Inventory	Stress/social stigmatisation, stress/disease/treatment	15
Psoriasis QoI Questionnaire and PQOL 12	Psychosocial and physical domains covering self-consciousness, helplessness, embarrassment, anger/frustration, emotional wellbeing, capacity to enjoy life, itching, physical irritation, pain soreness, and influence on choice of clothing	41
Dermatology-specific questionnaire		
Dermatology Life Quality Index (DLQI)	Symptoms/feelings, daily activities, work/school, personal relationships, treatment	10

Table adapted from Kimball et al (2005)

– examples of which, for psoriasis, are outlined in Table 4. Psoriasis-specific HRQoL measures are designed to assess in detail domains of HRQoL that are specifically affected by psoriasis and to facilitate between-or-within-treatment comparisons. They are designed to increase the sensitivity to detect small but clinically important differences in HRQoL.

The DLQI, while not psoriasis specific, is the most commonly used HRQoL measure in the assessment of psoriasis. The DLQI is commonly used in clinical practice, and according to European guidelines, it is a necessary tool to assess psoriasis severity and treatment success (Mrowietz, Kragballe et al. 2011). A set of DLQI score bands has been proposed according to a global question (GQ) score: DLQI = 0–1 implies no effect on patient’s HRQoL (GQ = 0), and DLQI = 2–5 implies a small effect on patient’s HRQoL. The index has a ceiling of 30, with the effect of the disease on QoL increasing as the DLQI score increases⁶ (Puig 2014).

The impact of psoriasis on patient reported outcomes (PROs) and HRQoL has been investigated in several studies and has been shown to be similar to that for other chronic diseases such as depression, post-myocardial infarction, congestive heart failure, and even some cancers (Rapp, Feldman et al. 1999). When compared with other dermatologic conditions, psoriasis appears to have less impact on HRQoL than atopic dermatitis, but more impact than acne, basal cell carcinoma, or viral warts (Woolacott, Hawkins et al. 2005). The impact on physical domains appears to be greater than for people with hypertension or diabetes (Rapp, Feldman et al. 1999). The key elements that determine HRQoL in patients with psoriasis are presented in (Table 5)

In 2002, the largest survey to date conducted in Europe with respect to the quality of life of people with psoriasis took place, with 18,368 responses from seven European countries (Dubertret, Mrowietz et al. 2006). The results from this survey highlight the burden placed on the daily lives of those who have the condition. In particular, respondents reported difficulties with respect to clothing choice, bathing routine and sporting activities (see Table 6)

Table 5. Key elements that determine HRQoI in patients with psoriasis

Domains affecting HRQoI	Symptoms / Parameters
Physical factors	Itching, irritation, Pain, Insomnia, Inability to use hands or legs
Psychological and social factors	Self-consciousness, embarrassment, anger/frustration, stigmatisation, depression, capacity to enjoy life, and influence on choice of clothing
Sexual factors	Feeling physically unattractive - leading to less sexual activity, concern about a new partner’s reaction to the disease
Occupational factors	Day of work missed, fewer opportunities in jobs which appearance is critical
Physical and psychosocial comorbidities	Psoriatic arthritis, Cardiac disease, Diabetes, Depression Alcohol misuse, Obesity

Adapted from Kimball et al (2005)

6. Meaning of DLQI Scores: 0-1 = no effect at all on patient’s life, 2-5 = small effect on patient’s life, 6-10 = moderate effect on patient’s life, 11-20 = very large effect on patient’s life, 21-30 = extremely large effect on patient’s life.

Table 6. Impact of moderate or severe psoriasis

Percentage of patients with moderate or severe psoriasis replying that psoriasis affected the following activities “a lot” or “very much”	
Clothing choice	56%
Need for more baths	45%
Wash/change clothes more often	40%
Sport activities	38%
Sleep affected	34%
Inhibits work/school activities	27%

Source: Dubertret et al (2006)

It appears that the physical manifestation of the disease makes life difficult for people by restricting clothing choice and participation in physical activities (e.g. sports, which may affect skin through sweating, bleeding or increasing its visibility) and increasing bathing frequency, which may be related either to coping with the symptoms of psoriasis or to the use of topical treatments. Perhaps one of the most striking results from this questionnaire, was that overall, 77% of the respondents reported that psoriasis was a problem or a significant problem in conducting the activities of daily life. **This implies that psoriasis places a large strain on over three quarters of those who have the condition – in an Irish context, this may represent in excess of 56,000 people who feel that psoriasis encroaches on their ability to conduct their daily lives (Dubertret, Mrowietz et al. 2006).**

2.3 Psychological and Psychosocial Impact of Psoriasis

A number of studies have examined the psychological and psychosocial impact of psoriasis. For example, in a US study of 265 adults with psoriasis, 32% of participants were screened positive for depression and there was a graded relationship between depressive symptoms and HRQoL impairment ($p < 0.001$) (Schmitt and Ford 2007). More than 16% of those with high depression scores were treated with antidepressant medication. Both dissatisfaction with psoriasis treatment and illness-related stress were highly associated with depression (Schmitt and Ford 2007).

A study of 323 patients with moderate-to-severe psoriasis, from 17 dermatology clinics throughout Italy, indicated that psoriasis elicited anger, annoyance, and irritation in approximately 50% of patients (Linder, Dall’Olio et al. 2009). Aspects of life limited by psoriasis included choice of clothing (57%), social interactions (43%), and personal hygiene (31%). The disease was often seen by patients as incomprehensible, incurable, and uncontrollable (Linder, Dall’Olio et al. 2009). Psoriasis has been reported to have a high negative impact on patients’ health-related quality of life (HRQoL). Reduction in HRQoL associated with psoriasis has been found to be comparable to that of patients with hypertension, diabetes, cancer, depression, or heart disease (Rapp, Feldman et al. 1999).

To assess peoples’ (members of National Psoriasis Foundation (NPF); (N=17,425)) perspectives on the impact of psoriasis on their lifestyles, emotional well-being and the social ramifications of living with the disease, a mail survey was conducted in 1998 in the US (Krueger, Koo et al. 2001). In an attempt to quantify this burden in an Irish context, the US estimates were applied to 2011 Irish census data. The results were adapted to reflect the Irish psoriasis population for the age groups 18 to 34, 35 to 54 and those older than 54 (Table 7). Notwithstanding the concerns relating to the transferability of data from one setting to the other, these results provide estimates of the extent of the burden in Ireland.

The results reported in this analysis suggest that psoriasis places a considerable burden, in terms of quality of life, on those who suffer with the disease. The adapted results from the NPF survey provides for an insight into the debilitating effect of psoriasis. Perhaps one of the most poignant aspects from that survey was that 7% of those with psoriasis, over the age of 18, had been excluded from a public facility, such as a swimming pool. This may be a consequence of various misconceptions about the condition, in particular that the

54% said their psoriasis has had an impact on their **love life***

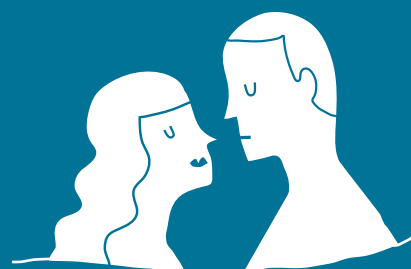


Table 7. Psychological and daily living activities affected in people with psoriasis

	All Ages	18-34	18-34	35-54	35-54	>54	>54
Daily activities affected							
Sleeping	13,595	20%	3,736	22%	5,605	22%	4,253
Sexual activities	14,436	27%	5,043	27%	6,879	13%	2,513
Using hands	9,244	8%	1,494	16%	4,076	19%	3,673
Walking	6,817	7%	1,307	11%	2,802	14%	2,706
Sitting for long periods	7,010	7%	1,307	11%	2,802	15%	2,900
Standing for long periods	6,127	5%	934	9%	2,293	15%	2,900
Performing job duties	6,665	10%	1,868	12%	3,057	9%	1,40
Psychological activities affected							
	All ages		n=18,680		n=25,480		n=19,332
Interacting in workplace	9,241	18%	3,362	17%	4,331	8%	1,547
Interacting with family/spouse	7,661	15%	2,802	13%	3,312	8%	1,547
Making/keeping friends	6,958	15%	2,802	11%	2,802	7%	1,353
Excluded from a public facility	4,506	7%	1,307	8%	2,038	6%	1,160
Getting a job	2,533	5%	934	4%	1,019	3%	580
Contemplated suicide	4,232	10%	1,868	7%	1,783	3%	580

Table adapted from Krueger et al (2001) using CSO 2011 figures.

plaques may be contagious. 57% of the respondents in the survey reported that others had mistaken their psoriasis as being contagious. Incidences such as these are likely to place a heavy burden on the emotional well-being of those with the condition and combined with the reported problems in developing relationships both sexual and in terms making/keeping friends – people with psoriasis may become deeply affected by the disease. As a consequence, nearly 7% of the respondents of the survey reported contemplating suicide because of their condition. Those in the younger age groups experienced feeling the greatest impact, with 10% of those aged 18 to 34, disclosing incidences of suicidal ideation. In this chapter, questionnaire data from a US study was adapted to fit the Irish population. While this offers an insight to the potential burden psoriasis places on QoL, future research would benefit from carefully constructed questionnaire based studies. Research using Irish registry-based data, may offer an ideal approach for such studies.

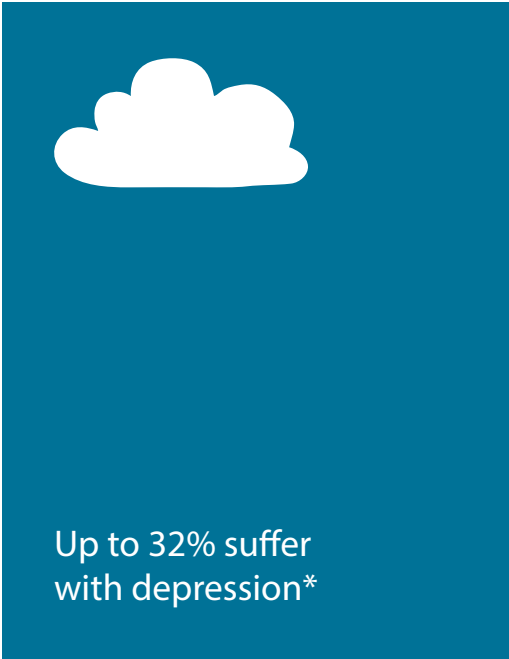
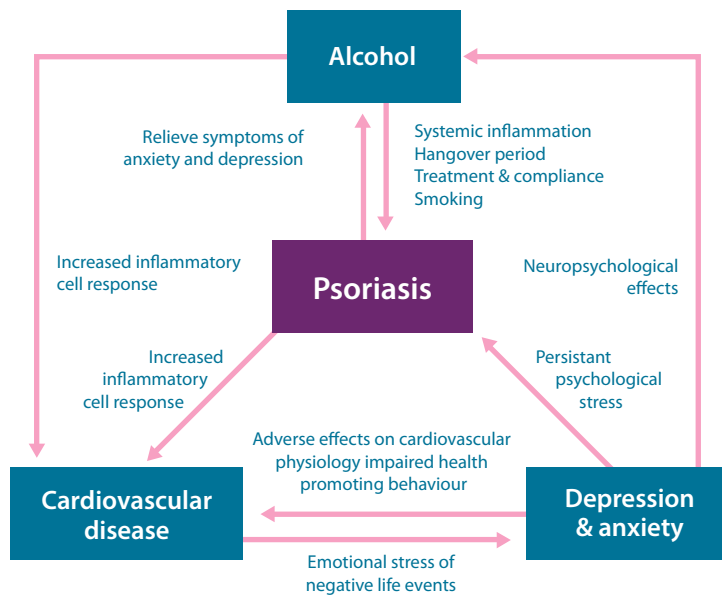
2.4 Depression, Anxiety & Suicidality

To further illuminate the impact of psoriasis on the mental health of those who have the condition, the results from a large UK study were adapted to reflect the Irish setting. In Kurd et al (2010), the clinical diagnosis of depression, anxiety and suicidality were compared among 146,042 mild psoriasis, 3,956 severe psoriasis, and 766,950 control patients. Using the prevalence estimate from the 2005 GPRD study (Gelfand, Weinstein et al. 2005), on which our prevalence estimates are based, the authors hypothesized that in the UK, in excess of 10,400 diagnoses of depression, 7,100 diagnoses of anxiety, and 350 diagnoses of suicidality are directly attributable to psoriasis annually.⁷ Applying these estimates to the Irish setting provides estimates of the excess risk attributable to psoriasis in the Irish setting. Based on the Irish prevalence figures, we estimate that there may be 864 diagnoses of depression, 593 diagnoses of anxiety, and 29 diagnoses of suicidality attributable to psoriasis annually. As the above figures estimate the absolute risk of a diagnosis in one year compared to non-psoriasis patients they do not reflect the prevalence of depression, anxiety and suicidality, and as a result may under-represent the effect of psoriasis on mental health.

The link between psoriasis and mental health issues such as depression, anxiety and suicidality is further confirmed by the results reported in Kurd et al (2010). Furthermore, the authors report that the risk of these psychiatric outcomes are particularly elevated in younger patients with psoriasis, with the highest risk of depression found in young males with severe psoriasis. This result was not expected, as in the general population with few exceptions, the prevalence and incidence of depressive disorders are higher in

7. Attributable risk is the proportion of disease risk or incidence that could be eliminated from the population if exposure were eliminated.

Figure 4. Psoriasis and alcohol – a vicious cycle



Source: Adamzik, McAleer et al. 2013

females than in males, beginning at mid-puberty and persisting through adult life (Piccinelli and Wilkinson 2000). To account for this juxtaposition, the authors point to the high rates of excess alcohol consumption in men with psoriasis, a hypothesis which has been posited in a number of studies (Poikolainen, Reunala et al. 1990, Tobin, Higgins et al. 2009, Hayes and Koo 2010). The suggestion here is that men may be more likely to use alcohol excessively, to cope with the psychosocial burden of psoriasis and consequently are at a higher risk of developing depression – with the alcohol misuse and psoriasis as underlying causes. The relationship between alcohol and psoriasis is frequently discussed in the literature with most of the studies concluding that alcohol consumption is higher in psoriasis patients than in the general population (Brenaut, Horreau et al. 2013). In Kirby and colleagues (2008), the authors discovered, in a cohort of Irish psoriasis patients with moderate to severe psoriasis, that between 17% and 30% of patients were classified as having difficulties with alcohol (Kirby, Richards et al. 2008). The same study also found an association between increased alcohol intake and psoriasis severity. There is also evidence to suggest that this excessive alcohol consumption may be a risk factor for the development of psoriasis (Poikolainen, Reunala et al. 1990). In an Irish study of 100 patients with alcoholic liver disease, the authors found a 9% to 15% prevalence of psoriasis, which is much higher than the prevalence of 1% to 3% in the general population. (Tobin, Higgins et al. 2009). Furthermore, excessive alcohol consumption is associated with cardiovascular disease, an association which further compounds the negative relationship between psoriasis and alcohol (Adamzik, McAleer et al. 2013).

2.5 Impact of psoriasis on work and work related activities

77% said their skin has made them
'hide themselves away'*

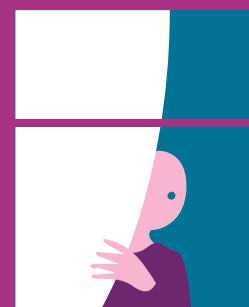


Table 8. Literature review and work days lost

Author / Year	Country	N =	Days lost
Matilda et al (2013)	Finland	262	7
Chan et al (2009)	Canada	79	19.4
Ayala et al (2013)	Italy	787	3 to 5
Finlay & Coles (1995)	UK	369	15.4
Meyer et al (2010)	France	590	3



With respect to psoriasis and QoL a literature review was conducted in relation to the impact of psoriasis on work and work related activities (see Table 8). Particular attention was placed on the number of days of work lost due to the condition.

1. In a Finnish study of 262 moderate to severe psoriasis patients, on average, the patients in active work had had 16.8 hours of sick leave during the previous 4 weeks, and 27.0% of the total hours of sick leave (4.5 hours) were due to psoriasis (Mattila, Leino et al. 2013). The overall “presenteeism”⁸ hours during the same time period was 21.2 hours, of which 39.0% were because of psoriasis. More than a quarter (28.9%) had been forced to modify their work due to psoriasis, most frequently to reduce work induced skin irritation. This was found significantly more often among blue collar than white collar workers. Overall, 8.6% of workers had changed their working place or occupation because of psoriasis (Mattila, Leino et al. 2013).
2. In a Canadian study of 90 subjects diagnosed with psoriasis in three dermatology clinics in British Columbia, Ontario, and Quebec, the mean number of work days missed per subject due to psoriasis (19.4 days) was almost twice the national average for the general population reported in 2007 by Statistics Canada (10.2 days) (Levy, Davie et al. 2012).
3. To assess the impact of psoriasis on work-related problems in Italy, a survey was conducted with 787 patients (64% male, mean age 50 years) from 29 different dermatological centres, evenly distributed around the country (Ayala, Sampogna et al. 2014). In 42% of cases, psoriasis reduced the prospects of improvement in employment status and 35% of patients reported reduced earning potential. Approximately 60% of patients reported that psoriasis localised to their hands or feet caused work limitations, whilst in about 25%, it caused them to quit their job. In the three months prior to the survey, 29.3% of patients lost 3–5 days of work, 7.3% lost 6–10 days and 7.1% more than 10 days, due to clinical check-ups or psoriasis-related therapy (Ayala, Sampogna et al. 2014).
4. Regarding work days lost, a UK study of 369 severe psoriasis patients reported that of the 150 patients in employment, 59.3% had lost a mean of 26 days (SD 21.9) from work during the preceding year because of their psoriasis, and of the 180 not working 33.9% attributed it to their psoriasis (Finlay and Coles 1995).
5. In a French study which evaluated the disease burden in 590 psoriasis patients, over 19% of employed patients with severe psoriasis reported workplace discrimination (10.0% for mild patients; $p = 0.038$) and 24.8% reported that psoriasis affected their choice of career (9.8% for mild patients; $p = 0.002$). Moreover, 11.5% of patients with severe psoriasis thought that psoriasis was the reason for a loss of salary, and patients in employment reported missing an average of three working days per year because of their psoriasis (Meyer, Paul et al. 2010).
6. At the time of this epidemiological evaluation, a German study reported that 39.7% of the patients did not work and 6.8% of the patients were unable to work because of their plaque-type psoriasis. Employed patients ($n=911$) had lost a mean of 4.9 workdays due to psoriasis. Overall, 102 patients (6.8%) were unable to work due to their plaque-type psoriasis for, on average, 101.4 days. Psoriasis severity was associated with increase in the number of working days lost (Augustin, Krüger et al. 2008).
7. In an evaluation of the cost of psoriasis in Spain, a total of 797 patients with varying demographics and severity of psoriasis (mean age 44.3, mild - 70.5%, moderate - 19.1% and severe - 10.4%) were required to record the number of hours and/or days of work that had been lost as a direct result of their psoriasis. The patients reported that at least one lost working day was registered in 52 patients (6.5%) with a mean of 2.3 days (range 0–360) per patient per year (Carrascosa, Pujol et al. 2006).

For an approximate estimate of the potential levels of absenteeism in Ireland; a simple approach is to use the Spanish estimate

8. “Presenteeism” is defined as lost productivity because of illness or other medical conditions while working.

of 2.3 days per year and on the basis of using the Irish employment rate for the year 2011 (59.2%) (OECD, 2014), apply that figure to the prevalence of the condition in the age group 16 to 64. This would suggest that approximately 75,000 additional days of work are lost due to psoriasis in Ireland annually.

The literature review conducted on the impact of psoriasis on the work-lives of those who have the condition further demonstrates the debilitating impact of the disease. The impact of the disease is multi-faceted in nature with the working lives of those with the condition being affected with respect to absenteeism, presenteeism, work place discrimination and restriction of career choice. In terms of absenteeism, the results vary from 26 days in the UK to 2.3 days in Spain. The variation in the results is largely due to the heterogeneity in the severity of disease experienced by the various study populations. The UK study based its estimate on a population of severe patients hospitalised due to their psoriasis, whereas the Spanish population is more representative of the general population as it enrolled a larger number of patients with varying degrees of psoriasis. Therefore an estimate of the levels of absenteeism in Ireland, based on the Spanish estimate of 2.3 days per year, suggests that approximately 75,000 additional days of work are lost due to psoriasis annually. While this represents a productivity loss to society, it also points to a loss of earnings for the individual person who has the condition. Indeed, multiple studies examine the relationship between psoriasis, symptom severity and income. These studies highlight that income is negatively correlated with psoriasis severity, with people with more severe forms of the condition, on average, earning less than those with mild disease (Horn, Fox et al. 2007, Hawro, Zalewska et al. 2014). This may be in part due to symptom or treatment induced absenteeism; however, it may also be due to a perceived restriction in career choice/trajectory.

Taken individually and together, this literature gives a sense of the wider societal impact of psoriasis, and the resultant reductions in quality of life, and on labour force participation. These effects are likely to have important economic implications for the individual affected, their families, and society as a whole.

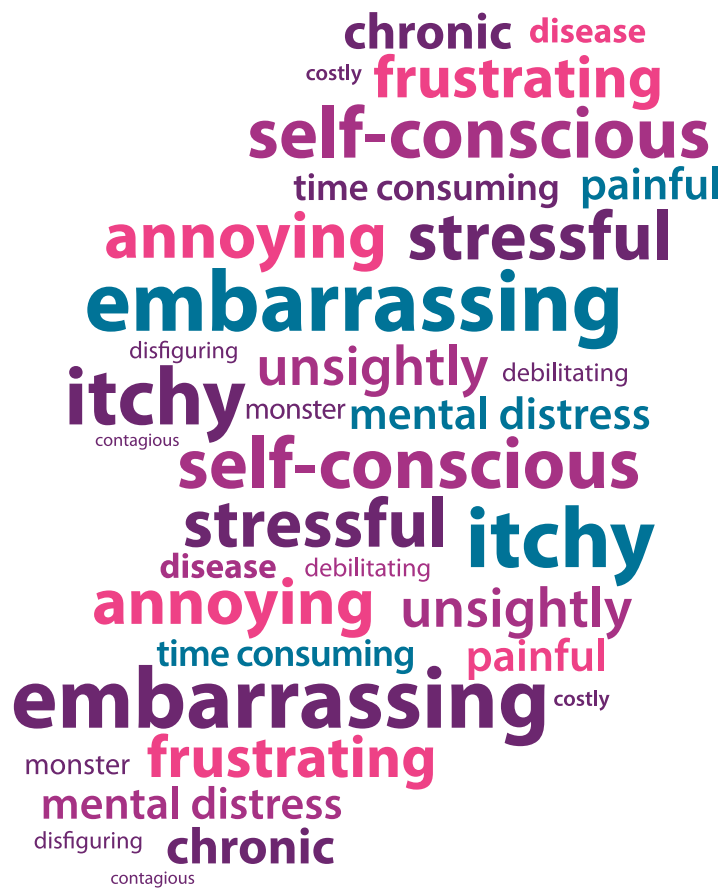
2.6 Conclusion

Psoriasis places a considerable burden on those who have the disease. In this chapter, we examined the impact on the quality of life of the individual. The literature review conducted in this section highlights the impact of psoriasis on HRQoL and on mental health. It seems that these effects manifest due to the physical factors associated with the disease and on the location and visibility of the body involvement, causing self-consciousness, embarrassment and stigmatisation which can ultimately lead to depression and in some cases suicidal ideation. Psoriasis also impacts on the work-lives of those who have the condition with reports of absenteeism, presenteeism, work place discrimination and restriction of career choice all associated with psoriasis. These effects are likely to have important economic implications for the individual affected, their families, and society as a whole.



Living with psoriasis – an Irish perspective

A recent survey, conducted amongst people living with psoriasis in Ireland during March and April 2015, investigated the effect their psoriasis has on their day-to-day lives.**



The findings illustrate the wide-reaching impact that this skin disease can have on all aspects of patients' lives, and the negative emotions that can be felt by those living with psoriasis. Of the 119 respondents, the majority were female (77%), and the largest group to answer the survey were those aged 34 to 41 years of age.

An overwhelming number of those affected (93%) have felt embarrassed by their psoriasis, with 58% admitting their psoriasis has stopped them from doing activities they enjoy. 73% agreed that their psoriasis has negatively impacted on their social life, and social isolation was further highlighted with 77% admitting their skin has made them 'hide themselves away'.

Interestingly, the results also highlighted the impact psoriasis can have on consumer behaviour. 89% of patients confirmed that their psoriasis determines the products they buy. The vast majority (86%) agreed their psoriasis affects the choice of clothing they wear, as many people with psoriasis avoid wearing dark clothing due to flaky skin becoming more visible.

With regard to personal life, the survey revealed that over half (54%) confirmed that their psoriasis has had an impact on their love life, and a third (33%) of respondents admitted that their skin has prevented them from dating.

One in five (21%) admitted that their psoriasis has stopped them from applying for a job – clearly demonstrating the destructive effect that the skin disease can have on a person's career prospects.

Worryingly, 56% of those asked have been the target of negative comments from other people. This statistic highlights the lack of awareness and ignorance surrounding psoriasis and the impact this can have on a sufferer's confidence in social situations.

Finally, the survey investigated how people feel about their psoriasis and what words they would use to describe it. The four most common descriptions are: embarrassing (44%); itchy (41%); self-conscious (39%); and annoying (32%).

“

I realised that there was so much happening in the world of psoriasis – so much that the average patient knew nothing about

”



Case study 1

I have an actor friend, a fellow psoriasis sufferer, who often jokes 'eczema has a better agent'. He has a point, as until I was diagnosed I had never heard of psoriasis. When I went to my GP with a strange rash on my leg almost twenty years ago, I certainly never thought that this was to be the start of a long and often soul destroying battle with my skin.

Psoriasis impacts every area of life. Physically it can be sore and itchy, not to mention disruptive on a day to day basis. There's the time-consuming application of creams and emollients each day: the fatigue from sleepless nights due to inflamed skin; choosing clothes that will be gentle on angry plaques; the constant battle against the flaking - that tell-tale sign of our condition. And then there are the flare-ups! Psoriasis on the inside of my ear caused months of partial deafness – frustrating and incredibly difficult to get rid of. Some years later, it appeared on the soles of my feet, which caused me to limp for months on end and also meant I could no longer exercise properly. There was the occasion when I got sunburnt in my own back garden – oh the irony! Sunburn in Ireland. This resulted in a flare up that was so severe, I was forced to miss three weeks of work.

Yet quite often it is the emotional impact of this disease that really affects patients. With skin that is flaking, inflamed and unsightly, dressing becomes an exercise in comfort and concealment. The fear of people staring leads to avoidance of places like the gym or swimming pool. Social situations can make a sufferer feel self-conscious. In essence, psoriasis can drag you down. It is a disease that is certainly more than skin deep.

The problem was that for so long I thought of it as a skin disease. I didn't realise that it is so much more than that; an inherited autoimmune disorder. I was convinced that if I could just get the right combination of ointments and balms, I would win this battle. I left no stone unturned, going down the road of both conventional and alternative medicines. I applied every known steroid cream to my skin. I spent a small fortune on lotions and potions in the local health stores. I travelled to the International Psoriasis Clinic in the Dead Sea. I did the UVB phototherapy treatment four times. I took every mineral, vitamin and fish oil supplement imaginable. I even flew to Paris to meet a doctor who claimed diet was the answer. And so for the next few years, I embarked upon a dairy-free diet, a gluten-free diet, a salt-free diet, a processed-free diet and an organic only diet.

But still the psoriasis remained. And with it, the cycles of hope and disappointment. Hope that the next 'cure' would work. Disappointment when yet again the 'cure' failed. But at the same time, I was one of the lucky ones! I may have had psoriasis, but it didn't lead to depression. I have never been so embarrassed by my skin that I have refused to leave my house. I have never felt that people have shunned me because of my skin. I have never been hospitalised. I have never been at such a despairing level that I have had suicidal thoughts. Unlike many other sufferers, I have not endured the extreme mental anguish that this disease can cause.

But I read of others who had and so, spurred on by my belief that fashion can positively impact how you feel about yourself, I started my blog *The Flaky Fashionista* in 2012. This was born out of a personal frustration at the lack of available advice on how to dress around a skin disease, but also a desire to show fellow sufferers that psoriasis does not need to define us. It is but a small part of our far more interesting lives.

When I went online to research psoriasis I had been shocked by how relentlessly miserable each site was. Every page I clicked on repeated the same message 'Psoriasis Cannot be Cured'. There was no hope, no optimism. And patients need to have hope! So I decided that I would try and counter this negativity; that from my little corner of the internet I would bring some levity, some humour and some optimism to what is a rather depressing subject. I gave myself some rules that I never wavered from. There would be no pictures of my skin, or indeed of anyone's skin. I would always stay positive. I would keep the tone light. I would try and bring hope to others. And I would always, always be honest.

When I started my blog, my message was clear. We have this disease but we must not let it define us! This is how we disguise it! As someone who had almost become resigned to never having clear skin, I was focused on how to live a normal life despite it. But as time passed, I began to learn more about psoriasis. Because of my blog, I was invited to events; I spoke to other sufferers; I spoke to pharmaceutical companies; I spoke to dermatologists. And I realised that there was so much happening in the world of psoriasis – so much that the average patient knew nothing about. From a strong anti-medication stance, I was persuaded to change dermatologist and to embark upon a course of biologics. I became educated on the pros and cons of medication and of the variety of options open to patients. I became convinced that it is no longer acceptable for psoriasis patients to have to suffer with their skin.

The blog that I had started with the aim of changing the opinions of others, had ended up changing me! Because after some trial and error, I found a biologic that began to work. For the first time in 16 years, my skin is almost completely clear. My message has evolved. Yes, I still talk about how to dress to conceal your psoriasis because I continue to believe that if you know you look good, it will have a positive impact on you feel about yourself. And this message will never change, because there will always be psoriasis sufferers who want to hide their skin. But now my message includes a new call to action. It's a call to all sufferers to find the right dermatologist, one who understands psoriasis. I want other patients like me to understand that there is help and that although there is no 'one cure fits all', there are still so many options that can work. In essence, I suppose I want to become that agent; to promote awareness and equip patients with knowledge. I want to share with every patient the fact that having psoriasis no longer has to be the miserable life sentence that it once was.

frustration

HOPE

debilitating

treatment

discomfort

relief

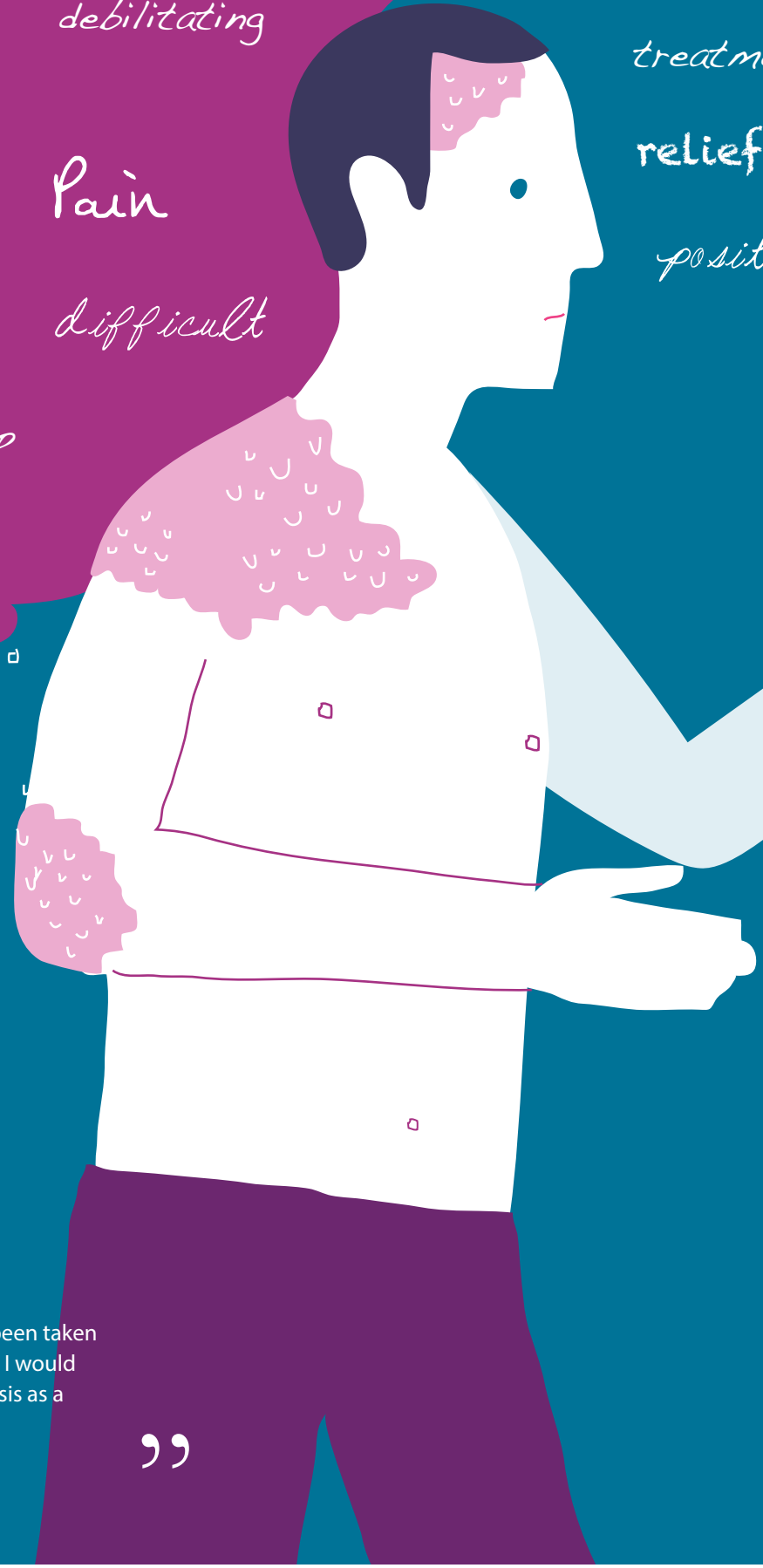
Pain

positive

severe

difficult

flare-up



“

My whole life has been taken up by my psoriasis. I would describe my psoriasis as a monster

”

Case study 2

I was first diagnosed with psoriasis when I was 29, I woke up one morning with an itchy scalp and it got worse and worse so I went to my GP to see what he thought. He told me it was psoriasis. I had heard about psoriasis before and was familiar with the skin condition as my brother had it quite severely.

My own psoriasis progressed very rapidly; it got worse and worse each day, and spread very quickly to the rest of my body until it affected most of my body. Around that time I was working as a general manager in a clothing company, managing 350 staff members and was very successful. But unfortunately I had to leave the job as my psoriasis became worse and I wasn't able to manage. My hands were covered in psoriasis; I had lumps on my face and neck and found it very awkward to hide. I was very aware of it and my skin would flake off everywhere, on my clothes and everywhere around me.

After six to seven months I applied for a trial with a professor in Hume Street Hospital who was studying patients with psoriasis. I went to Hume Street Hospital three days a week for light therapy for three months. At that stage 75% of my body was covered in psoriasis, including my finger and toe nails, and it was very painful. The light therapy annoyed my skin but it did clear up my psoriasis for a short while.

However, it came back even worse and soon afterwards my body was 85-90% covered in plaques. I found it very difficult to sit down and difficult to move as my skin was so sore and tight; my clothes would be blood-stained by the end of the day. I was constantly moisturising my skin as often as I could but nothing helped.

In 2003, my mother passed away and my psoriasis became even worse. I went in to the hospital clinic straight after her funeral and was given light therapy by my dermatologist to control my skin condition.

My dermatologist was involved in a trial for a new treatment at the time and I was put on the trial. After the third injection it started to work and I remained on the drug for three years. It worked very well for me. The treatment cleared my psoriasis, I lost weight and I felt great. However after a while I stopped using the treatment.

Around this time I developed pneumonia and my psoriasis flared up again and became very bad. I continued to use bath treatments and light therapy. I was put on a different treatment and had to use moisturising cream constantly as well. It worked for a while but the treatment gradually stopped working for me.

Over the years I have had to take a lot of time off work due to my psoriasis. I have worked in various industries in a variety of roles but was always terrified that my psoriasis would come back. At home, my clothes and sheets were always ruined. It had a very negative effect on all of my relationships.

I would describe my psoriasis as 'a monster'.

My whole life has been taken up by my psoriasis, constantly trying to manage it and treat it all day long. I have spent the maximum amount of money I could on medication, moisturisers and treatment and at times I have felt very low. At one stage I didn't care if I lived or died, there was no relief from this condition. It was an incredibly debilitating disease for me and when my brother got bowel cancer I compared our situations wishing I had that rather than my psoriasis.

In 2014, I began a new treatment and it started working after just two injections. I had not been on any treatment for seven to eight weeks beforehand so my skin was extremely bad and I felt like I was walking like a robot as my skin was so tight.

My psoriasis has completely cleared up and I don't need to moisturise or take treatment baths with this treatment which is incredible. I have so much more time now without constantly having to look after my skin all day. Before now I was going to the hospital skin clinic five days a week, but now I only need to visit once a month. I am very happy I signed up for the trial and am lucky to be receiving such a good treatment. I am much more positive now about my psoriasis.

3. Co-morbidities

3.1 Introduction

In this chapter, we examine the impact of psoriasis in terms of its relationship with a range of other conditions. Notably, while traditionally viewed exclusively as a skin condition, psoriasis is now recognised as a systematic inflammatory condition associated with a range of related co-morbidities (Coumbe, Pritzker et al. 2014).

We estimate the impact of psoriasis presented in Chapter 1 and Chapter 2 by examining its impact on the number of co-existing co-morbidities in the Irish setting. For example, psoriasis is associated with psoriatic arthritis (PsA) and other co-morbid diseases and risk factors, including obesity, metabolic syndrome, cardiovascular disease (CVD), stroke, and depression; as well as smoking and alcohol abuse. The pathophysiological or genetic association between psoriasis and PsA is considered stronger than that of the other related co-morbidities (Strohal, Kirby et al. 2013). However, there is mounting evidence demonstrating that psoriasis may not only be just associated with the increased prevalence of cardiovascular risk factors, but may also be an independent risk factor for the development of cardiovascular diseases (Coumbe, Pritzker et al. 2014).

The suggestion that psoriasis is associated with obesity, CVD, metabolic syndrome and diabetes, comes in part from chronic Th-1 inflammation that is a shared characteristic of these conditions (Langan, Seminara et al. 2012).

People with psoriasis-related co-morbidities also experience a compounding effect on their quality of life. Furthermore, evidence from an American study suggests that psoriasis patients with co-morbidities are more likely to need urgent care or hospitalisation, compared with patients without co-morbidities (Kimball, Guerin et al. 2011). Moreover, an Italian study reported that the numbers of days lost at work was not only associated with the severity of psoriasis but also with the number of existing co-morbidities (Vena, Altomare et al. 2010).

Taken together, this literature highlights the extent of the issue and informs the motivation to quantify the co-morbidity burden for Ireland. To this end, data estimates from large population-based clinical databases which have formed the basis for much epidemiologic research in psoriasis, co-morbidities were obtained and applied to Irish prevalence estimates in an effort to examine psoriasis-related co-morbidities in the Irish context.

3.2 Psoriatic Arthritis (PsA)

Psoriatic arthritis (PsA) is a chronic systemic inflammatory disease characterized by joint inflammation associated with cutaneous psoriasis. Psoriatic arthritis manifests as tenderness, pain and swelling in tendons and joints which can cause disfigurement, progressive joint damage and may lead ultimately to disability (Gladman, Antoni et al. 2005).

In the few studies examining the epidemiology of PsA in the general population, prevalence estimates range from 0.1% to 0.25% and in population-based studies, the estimated prevalence of PsA among people with psoriasis varies from 6% to 11% (Ogdie, Langan et al. 2013). It is hypothesised, however, that the prevalence of PsA is higher among those with severe psoriasis and it has been shown that PsA can co-exist in up to 30% of certain psoriasis populations, an example of such is a population of people hospitalised due to their psoriasis (Chandran and Raychaudhuri 2010, Haroon, Kirby et al. 2013).

In order to estimate the prevalence of PsA in Ireland, we again turned to our “nearest neighbour” estimates and applied them to the

21% said their psoriasis has stopped them from applying for a job^{**}

staff wanted



Figure 5. PsA population stratified by age & sex

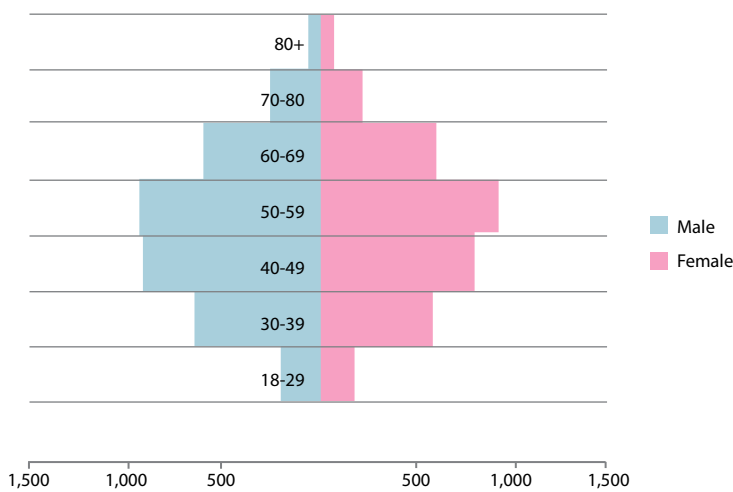
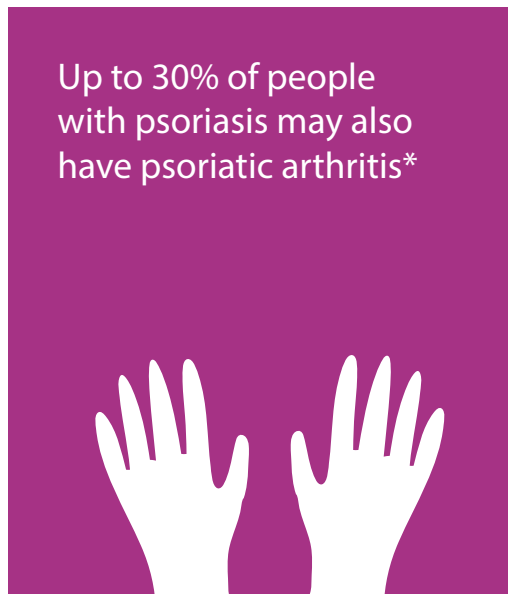


Figure adapted from Ogdie et al (2013) using CSO 2011 figures.



Irish setting. In Ogdie et al (2013), the authors utilized The Health Improvement Network (THIN) database and estimated the prevalence of psoriatic arthritis in the UK, among a population of almost 4.8 million patients between 18 and 90 years of age. 9,045 patients were found to have a diagnostic code for PsA, yielding a prevalence estimate of 0.19%. A breakdown by age and by sex was available in this study, so it was possible to adjust the prevalence rates to fit the Irish age profile consistent with 2011 Irish census figures. **Doing so provided for a prevalence estimate of 0.21% for Ireland. According to this estimate we might reasonably expect there to be 7,133 people living with PsA in Ireland** (Table 9).

In Ogdie et al (2013), the authors also measured the impact of psoriasis severity on the prevalence of psoriatic arthritis. The prevalence of PsA in the mild, moderate and severe Irish psoriasis population is presented in Table 10 as per the breakdown in the UK study. At this juncture, an assumption was made that psoriasis severity as a predictor of PsA among patients in the 45 to 65 age group, is generalisable the wider population (ie. 18 to 90). A further assumption here is that those who have PsA must also have psoriasis. There seems to be a level of ambiguity present in the literature in this regard, in relation to this assumption a number of studies posit that, by definition, all patients with PsA must have psoriasis (Gladman, Antoni et al. 2005, Lee, Mendelsohn et al. 2010). However, in Fitzgerald & Winchester (2009), the authors assert that the presence of either psoriasis or PsA in a family member of a patient suspected of having PsA, provides support for the diagnosis. While this assumption does not affect the estimated prevalence of PsA in Ireland, it may have the effect of overestimating the PsA population as a proportion of the psoriasis population.

Table 9. Prevalence of PsA in Ireland

Age Group	Total Irish Males	Total Irish Females	Male %	Female %	Males	Females	Total	Total %
					PsA	PsA	PsA	
18-29	380,218	395,237	0.05%	0.05%	190	198	388	0.050%
30-39	377,011	381,195	0.17%	0.16%	641	610	1,251	0.165%
40-49	317,846	318,151	0.29%	0.26%	922	827	1,749	0.275%
50-59	260,050	260,050	0.36%	0.36%	936	936	1,872	0.360%
60-69	196,167	196,257	0.31%	0.32%	608	628	1,236	0.315%
70-80	110,107	123,119	0.23%	0.20%	253	246	499	0.214%
80+	46,909	81,620	0.12%	0.10%	56	82	138	0.107%
Total	1,688,308	1,755,629	0.21%	0.20%	3,607	3,527	7,133	0.21%

Table adapted from Ogdie et al (2013) using CSO 2011 figures.

Table 10. PsA population as a % of Pso population

Column 1	Mild	Moderate	Severe	Total
Psoriasis Population (18+)	32684	22588	7824	63096
PsA Population (18+)	1997	2782	2354	7133
% Mild, Moderate & Severe with PsA	28%	39%	33%	100%
PsA Population as a % of the Pso population (18+)	6.11%	12.32%	30.09%	11.30%

Table adapted from Ogdie et al (2013) using CSO 2011 figures

In Ogdie et al (2013), the authors also considered predictors of prevalent PsA among psoriasis patients in the 45 to 65 age category. Having controlled for BMI, duration of psoriasis, smoking, age and sex, patients with more extensive skin psoriasis had a significantly higher prevalence of PsA: those with severe and moderate psoriasis had 3.34 and 1.49 times increased odds respectively of having PsA compared with those with mild disease.

People with PsA, typically demonstrate poorer HRQoL scores than those with psoriasis alone. A Canadian study reported that patients with PsA had a poorer QoL compared with psoriasis patients, as measured with the HAQ, SF-36, EQ-5D, and Fatigue Severity Scale (Rosen, Mussani et al. 2012). In addition to skin and joint involvement, patients with PsA are also at greater risk for osteoporosis resulting in further deterioration of bone tissue and a consequent increase in bone fragility and susceptibility to fracture, and inflammatory bowel disease than the general population (Cashman 2007, Lee, Mendelsohn et al. 2010). There is also evidence that those with PsA experience a greater burden on their work-lives than the general population and those with psoriasis alone. A German study of 2,009 patients with psoriasis included data on 338 PsA patients. 50% of those with PsA were working vs. 60% of those with psoriasis. Of those working, significantly more patients in the PsA group had taken time off work during the preceding year (25% vs. 12%) (Radtko, Reich et al. 2009).

While there are no Irish based studies which examine the burden that psoriatic arthritis places on patients' lives, there is no reason to expect that the impact of the condition differs significantly for the estimated 7,133 people living with psoriatic arthritis in Ireland, to those who have the condition elsewhere. In short, the evidence presented here makes clear the heavy impact of the disease. More specifically, the evidence reported here, also clearly suggests that this burden may manifest in the form of diminished quality of life due to pain or disability or both, and reduce employment opportunities.

3.3 Psoriasis and Cardiovascular Risk Factors

The existing international epidemiological literature also suggests that obesity, hypertension, dyslipidemia, and insulin resistance are all associated with psoriasis (Armstrong, Harskamp et al. 2013). The association between psoriasis and cardiovascular risk factors has been examined in multiple observational studies and furthermore, there is mounting evidence to suggest that psoriasis may even be an independent risk factor for cardiovascular events such as myocardial infarction and stroke (Gelfand, Neimann et al. 2006, Gelfand, Dommasch et al. 2009); this process, which has been coined the psoriatic march (Boehncke, Boehncke et al. 2011), is illustrated in Figure 6. While the concept of the psoriatic march is controversial in nature, there appears to be consensus with respect to the strong associations that exist between psoriasis and obesity (Armstrong, Harskamp et al. 2012).

73% said their psoriasis has negatively impacted on their **social life****



Table 11. Estimate prevalence of overweight and obesity in the Irish psoriasis population

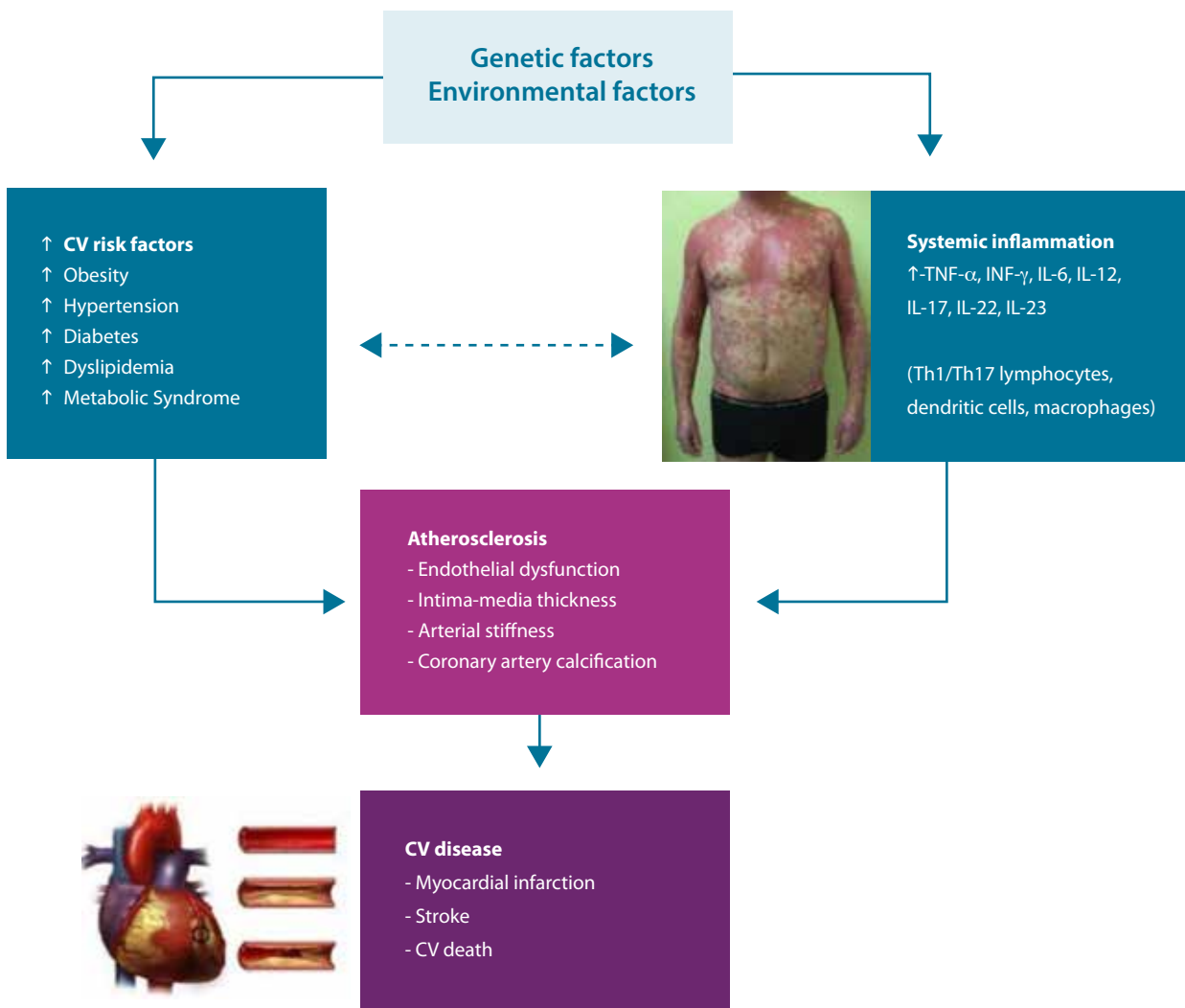
CV Risk Factor	Control	Psoriasis	% Difference	Prevalence within Psoriasis Population
BMI 25-30* Overweight	32%	38%	6%	23,547
BMI > 30 Obese	13%	17%	4%	10,680

Table adapted from Neiman et al (2006) using CSO 2011 figures

3.3.1 Obesity

Perhaps the strongest association between psoriasis and a single cardiovascular risk factor is found with obesity and understanding the epidemiological relationship between psoriasis and obesity is also important for delineating risk factors for other co-morbid diseases that may result from obesity. In their 2011 paper entitled: *“The association between psoriasis and obesity: a systematic review and meta-analysis of observational studies,”* Armstrong et al (2012) analysed the results from 16 observational studies with a total of 2.1 million study participants. In their analysis the authors assert that psoriasis patients have a greater than 50% increase odds of being obese compared with the general population. The study with the largest patient population (n=610,877) in the 2011 systematic review, used the GPRD to examine the prevalence of overweight subjects and obesity in a control group and in a group of psoriasis patients (Neimann, Shin et al. 2006). The prevalence rates reported were subsequently adapted to represent the Irish psoriasis population.

Figure 6. The Psoriatic March



The adaptation of these results provide for an estimate of the adult psoriasis population that are either overweight or obese. In reality, however, the absolute figures of overweight and obesity levels in the Irish psoriasis population are likely to be higher, as based on the findings from the 2008-10 National Adult Nutrition Survey (NANS), the estimated prevalence of overweight in adults is 37%, with a further 24% meeting current body mass index (BMI) criteria for obesity (Perry 2012). Applying the incremental differences that exists between psoriasis patients and controls from Neiman and colleagues (2006), to the Irish prevalence figures from NANS, provides for a figure of 71% of the adult psoriasis population – who may be overweight or obese, in comparison to 61% of the non-psoriasis population. A number of studies have also demonstrated that there is a positive association between the severity of psoriasis and levels of obesity. In Langan and colleagues (2012), the authors report that in comparison with controls, those with mild, moderate and severe psoriasis had their respective odds of being obese increased by 14%, 31% and 66%. While in an Irish study conducted in 2014, the authors reported that within a population of 103 psoriasis patients, 30% were found to be obese, and that the severity of psoriasis was significantly associated with BMI and waist circumference (Tobin, Hackett et al. 2014).

Although the exact mechanism underlying the epidemiological association between psoriasis and obesity is uncertain, researchers have theorized that the chronic inflammation present in adipose tissue may, in fact, exacerbate psoriasis (Armstrong, Harskamp et al. 2012). This hypothesis suggests that it is obesity which is causing psoriasis. However, it is reasonable to suggest that there is a complex multi-directional process inherent in the relationship between psoriasis and obesity, as some people with psoriasis may be reluctant to engage in physical activities where their skin disease may be visible to others, leading to an increased risk of being overweight or obese. Thus, in addition to genetic and immune-mediated mechanisms, behavioural factors may have an additional role in explaining the relationship that exists between psoriasis and obesity (Armstrong, Harskamp et al. 2012).

3.4 Metabolic Syndrome

The metabolic syndrome is a clustering of cardiovascular risk factors, specifically obesity, hypertension, dyslipidemia, and insulin resistance (Langan, Seminara et al. 2012). When these conditions occur together, they confer a significantly elevated risk for development of subsequent cardiovascular disease that may be greater than the attributable risk of each component risk factor. Metabolic syndrome is thought to arise from insulin resistance and abnormal adipose tissue function (Armstrong, Harskamp et al. 2013). Multiple observational studies have reported strong links between psoriasis and the metabolic syndrome and it may be the case that genetic susceptibility and overlapping inflammatory pathways may be potential biologic links that underpin this association (Sales and Torres 2014).

In their 2013 paper entitled: *“Psoriasis and metabolic syndrome: A systematic review and meta-analysis of observational studies”* Armstrong and colleagues analysed the results from 12 observational studies with a total of 1.4 million study participants. In their analysis the authors assert that psoriasis patients have in excess of two-fold the odds of having metabolic syndrome compared with the general population. The largest UK study population and the research which was assigned the largest weight in the meta-analysis, was conducted by Langan and Colleagues in 2012. In the UK study, the authors, using data from THIN, matched 4,065 psoriasis patients with 40,650 controls. The prevalence of metabolic syndrome was calculated for the psoriasis population and for the non-psoriasis controls. These prevalence figures were adjusted in our analysis to fit the Irish psoriasis prevalence figures for the age group 45 to 65 and by disease severity defined by BSA criteria (Table 12).

Table 12. Excess prevalence of metabolic syndrome in the Irish psoriasis population aged 45-65

	Metabolic Syndrome	Pso pop by severity 45 to 65	Prevalence in control	PrePrevalence in Psoriasis pop 45 to 64	Excess prevalence
Control	26%	n/a			
Mild psoriasis	32%	13,483	3,506	4,261	755
Moderate psoriasis	36%	9,318	2,423	3,308	885
Severe psoriasis	40%	3,228	839	1,282	442
Total	Control - 26% Psoriasis -34%	26,029	6,768	8,850	2,082

Table adapted from Langan et al (2012) using CSO 2011 figures



risk of stroke

People with more severe forms of psoriasis have a 43% increased risk of stroke*

In the above table a comparison is made between the prevalence of metabolic syndrome in people with psoriasis and in their matched non-psoriasis controls. In the controls, 26% of the population had metabolic syndrome whereas in the psoriasis population this proportion was 34%. When taking this 8% differential and adapting it to the Irish psoriasis prevalence figures, we can estimate that there may be 2,193 people with psoriasis and metabolic syndrome, who would be free of this particular co-morbidity, if the prevalence rate was identical for both groups.

3.5 Cardiovascular events

As previously discussed and as demonstrated by Figure 6 the inflammatory processes which take place as a result of psoriatic disease are being independently linked with cardiovascular events such as stroke and MI. In the section that follows, estimates of attributable risk (AR), from two large UK epidemiological studies with this hypothesis, are applied to the Irish setting. While the concept of the psoriatic march remains controversial, applying these AR estimates provides for the potential impact of psoriasis on CV events in Ireland.

3.5.1 Stroke

In Gelfand et al (2009), the authors’ aim was to determine the risk of stroke in patients with psoriasis. A population-based cohort study was conducted of patients seen by general practitioners participating in the GPRD in the UK (n = 644,012). This study found that after adjusting for major risk factors for stroke (age, sex, diabetes, history of stroke or transient ischemic attack, hyperlipidemia, hypertension, smoking), both mild (HR 1.06; 95% CI 1.0–1.1) and severe (HR 1.43; 95% CI 1.1, 1.9) psoriasis were independent risk factors for stroke. Possibly the most striking result from this analysis, is that those with severe psoriasis have a 43% increased risk of having a stroke. Converting the reported hazard ratios into estimates of attributable risk, the authors estimate that each year there is approximately one excess stroke per 4,115 or 530 mild or severe psoriasis patients, respectively. Applying these estimates to the Irish psoriasis population, we can estimate that each year there may be 18 excess strokes in Ireland attributable to psoriasis (see Table 13).

Table 13. Estimated excess strokes in the ROI attributable to psoriasis

	Mild	Severe	Total
Pso population >18	61,315	1,760	63,075
Excess risk	1 in 4,115 per year	1 in 530 per year	1 in 3,461 per year
Excess strokes attributable to psoriasis	15	3	18

Table adapted from Gelfand et al (2006) using CSO 2011 figures.

Table 14. Estimated excess risk of MI attributable to psoriasis patients aged 30 to 60

	Mild psoriasis	Severe psoriasis
Aged 30 - 40		
Attributable risk	1,068 per 10,000 person-years	2,743 per 10,000 pys
Excess risk	1 MI per 9365 patients per year	1 MI per 1385 patients per year
Aged 40 - 50		
Attributable risk	2,743 per 10,000 person-years	16,060 per 10,000 person-years
Excess risk	1 MI per 3646 patients per year	1 MI per 623 patients per year
Aged 50 - 60		
Attributable risk	4,658 per 10,000 person-years	23,250 per 10,000 person-years
Excess risk	1 MI per 2147 patients per year	1 MI per 430 patients per year

Young people with more severe forms of psoriasis have 3 times the increased risk of having a cardiac event*




Table adapted from Gelfand et al (2006) using CSO 2011 figures.

3.5.2 Myocardial infarction

In Gelfand et al (2006) the authors set out to determine, if within a population-based cohort, psoriasis was an independent risk factor for MI (n = 687,971). After controlling for confounding factors, the authors calculated adjusted HRs and estimated the excess risk of myocardial infarction attributable to psoriasis in patients with mild and severe disease in the 30 to 60 age group (Table 14). Applying these attributable risk estimated to the Irish psoriasis population, we can estimate that each year, in the age group 30 to 60, there may be twelve excess MIs in Ireland attributable to psoriasis (Table 15).

While the attributable and excess risk of MI due to psoriasis increases with age (due to the fact that the baseline risk of MI increases with age), it is the younger people with psoriasis who have the highest relative risk of having such a CV event. For example, for a 30 year old patient with mild or severe psoriasis, the relative risk of having an MI is 1.29 (95% confidence interval [CI], 1.14-1.46) and 3.10 (95% CI, 1.98-4.86), respectively. That is, a 30 year old with severe psoriasis is 3 times more likely to have an MI compared to non-psoriasis controls.

Recent observational studies suggest an association between psoriasis and the incidence of stroke or myocardial infarction (MI). However, whether psoriasis is an independent risk factor for these two vascular events remains controversial. In Xu and colleagues (2012), the authors conducted a meta-analysis on seven studies which evaluated the association of psoriasis with incidence of stroke, or MI, or both. They subsequently reported that psoriasis significantly increases the risk of stroke (RR 1.21; 95% CI 1.04-1.4) and MI (RR 1.22; 95% CI 1.05-1.42). The authors conclude that psoriasis significantly increases the risk of stroke and MI and that the increase is probably independent of conventional cardiovascular risk factors. In Mehta and colleagues (2010), the authors take the hypothesis a step further and report that severe psoriasis may be an independent risk factor for CV mortality (HR 1.57; 95% CI 1.26, 1.96) when

56% have been the target of **negative, unpleasant comments** because of their psoriasis*



Table 15. Estimated excess risk of MI attributable to psoriasis in the ROI

Age group	Pso population 30 - 60	Mild	Severe	Mild	Severe	Total
30 - 39	13,497	13,105	391	1	0	2
40 - 49	12,938	12,563	375	3	1	4
50 - 59	11,560	11,225	335	5	1	6
Total	37,995	36,894	1101	10	2	12

Table adapted from Gelfand et al (2006) using CSO 2011 figures.

adjusting for age, sex, smoking, diabetes, hypertension, and hyperlipidaemia. In their study, those with severe psoriasis experienced one extra CV death per 283 patients per year, even when adjusting for major CV risk factors. Using the same methodology as in sections 3.5.2 and 3.5.2, we estimate that each year there may be 6 excess CV deaths in Ireland attributable to psoriasis. Furthermore, in Gelfand and colleagues study (2007), while no overall effect of mild psoriasis on mortality was found, after adjusting for risk factors for mortality, male and female patients with severe psoriasis died 3.5 (95% CI, 1.2-5.8) and 4.4 (95% CI, 2.2-6.6) years younger, respectively, than patients without psoriasis.

The significant associations between psoriasis and the vascular events in question, however, are not ubiquitous in the literature. For example, in Schmitt & Ford (2010), the analysis suggests an association between psoriasis and *cardiovascular risk factors*, but not with MI (OR 1.14; 95% 0.81–1.62) or stroke (OR 0.97; 95% CI 0.61–1.54). While in Horreau and colleagues (2013), the authors report a small, but significant increased risk of CVE, but not of CV mortality in people with psoriasis. The controversy continues in this area, and it is apparent that while studies exist which report that psoriasis is an independent risk factor for CV events such as stroke and MI; it is important to note that there still remains a debate on the pathogenic mechanisms which links these events with psoriatic disease (Maybury, Barker et al. 2013).

3.6 Conclusion

Psoriasis affects people in different ways and is often accompanied by a range of co-morbidities. It can present as a mild co-morbidity-free disease that most people have some experience of either directly or indirectly. However, the occurrence of severe psoriasis is not uncommon and its manifestation as lesions on the skin may only represent a portion of the health risks and complications present.

This analysis highlights the potentially high number of Irish patients with psoriasis that may also bear the burden of PsA (7,133). Compounding this is the apparent risk of cardiovascular disease and events such as stroke and myocardial infarction which in some cases may lead to CV mortality. While there is still some debate regarding how exactly these associations manifest, a growing consensus within the published literature suggests that there is an increased risk of CV disorders, particularly when psoriasis is severe, possibly due to shared inflammatory pathways (Boehncke, Boehncke et al. 2011, Khalid, Hansen et al. 2013).

As a consequence of these associated co-morbidities, psoriasis patients are likely to experience diminished QoL and are more likely to require urgent medical care, hospital admission, and outpatient specialist care than those without these co-morbidities.

89% said their psoriasis has an impact on the **products** they buy**



4. Treatment Goals

Current European guidelines define treatment success for moderate to severe psoriasis as achieving a PASI 75 response (that is achieving a 75% clearance of psoriasis symptoms as per the PASI criteria). This clinical endpoint may, however, be out of date. The majority of psoriasis patients now achieve PASI 90 responses in randomised trials of the latest-generation biologic agents (Puig 2014). Over the past 20 years, because of genetic and immunological techniques, significant advances have been made with respect to understanding the pathogenesis of psoriasis (Griffiths and Barker 2007). This better understanding has facilitated vast improvements in the treatments available for psoriasis, with newer medicines providing high levels of skin clearance. This signifies a significant leap forward in the evolution of medicines available to treat psoriasis, as for the majority of patients, attaining a PASI 90 response had not been a realistic therapeutic option. For example, in a published trial of methotrexate (a drug which was first used to treat psoriasis fifty years ago (Flytström, Stenberg et al. 2008)) – after 12 weeks of treatment, only 9.1% of patients had reached a stage where they had experienced a 90% reduction in the extent of disease, (as per the PASI 90 criteria) (Saurat, Stingl et al. 2008). The first-generation of biologic treatments increased this figure to 21% (Woolacott, Hawkins et al. 2005). As newer, more targeted treatments are developed, the numbers achieving such high levels of skin clearance have continued to increase. Results from clinical trials for treatments which target the Interleukin (IL)-12 and 23 pathways, show more than 50% of people achieving a PASI 90 response or greater after 12 weeks (Papp, Langley et al.). Results from clinical trials for treatments which target the IL-17 pathway, show more than 70% of people achieving a PASI 90 response (Puig 2014). In addition to this, studies report that the complete visible clearance of psoriasis (as per the PASI criteria) is now becoming a realistic therapeutic outcome. A recent study reports that 24.1% of patients achieved PASI 100 (completely clear skin) after 12 weeks, efficacy which increased close to 40% after 52 weeks (Puig 2014).

Clinical improvements identified by objective measures such as PASI are, however, only one side of the coin and are especially meaningful if they correspond with significant improvements in HRQoL and particularly with achieving a DLQI score of 0 or 1, signifying no effect of the disease on patients quality of life (Puig 2014). European guidelines also define achieving a DLQI score of 0 or 1 as a treatment goal for psoriasis (Torii, Sato et al. 2012). While PASI 75 responses meet the therapeutic expectations of the majority of patients, PASI responses of 90 to 100 have a significantly higher impact on DLQI improvement and are associated with significantly higher DLQI scores of 0 or 1 (Puig 2014). A number of studies demonstrate the association between clearer skin and significantly larger gains in HRQoL; a summary of three such studies is outlined below.

Figure 7. Percentage of patients achieving DLQI score of >2 after achieving a PASI 75 response

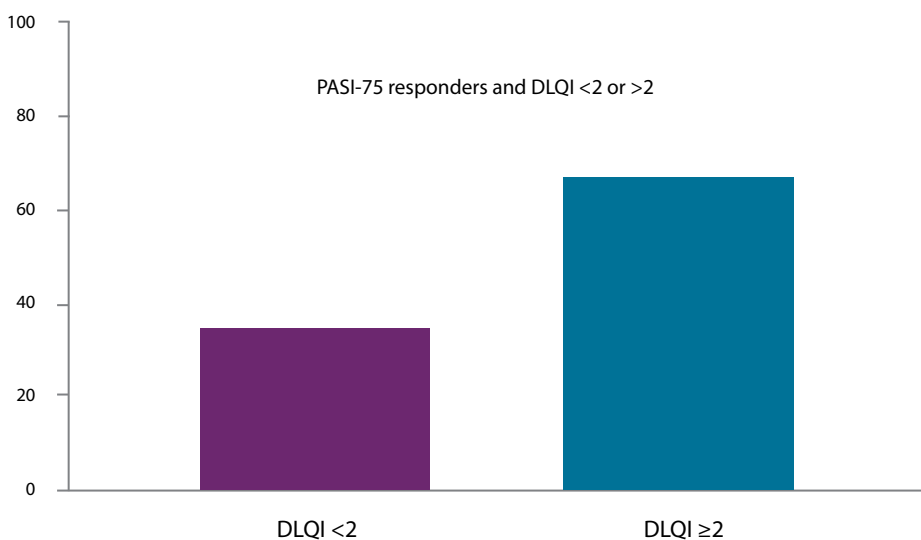
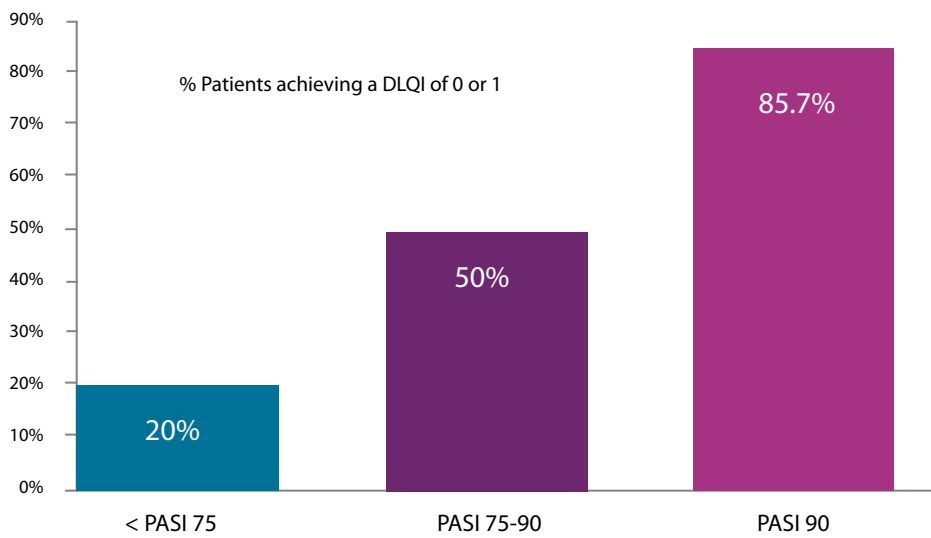


Figure 8. Percentage of patients achieving DLQI score of 0 or 1 among PASI 90 responders



Source: Tori et al (2012)

In Schafer et al (2010) the authors examine the relationship between PASI and the DLQI. Their results intimate that in many cases, achieving a PASI-50 or PASI-75 responses was not associated with meaningful improvements in QoL. For example, in the groups PASI-50 and PASI-75, 62.5% and 42.3% of the patients, respectively, did not attain an improvement of their DLQI score of at least 5 score points. According to European guidelines the failure to reach this endpoint is an indication of treatment failure and thus criteria for therapy change (Mrowietz, Kragballe et al. 2011). It was also the case, as illustrated by Figure 7, that 65.4% of people who achieved a PASI 75 response did not attain sufficient improvements in DLQI scores to the effect that the disease had no longer any effect on their QoL.

In Takeshita et al (2014), the authors undertook a study to determine if physician-reported differences in patients with clear versus almost clear skin (as defined by PGA) are associated with significant differences in patient-reported HRQoL as measured by the DLQI in the routine clinical practice setting. The study reported significantly different DLQI scores of patients with clear versus almost clear skin. The median DLQI score for patients with clear skin was 0 corresponding to their psoriasis having no effect on their QoL, whereas patients with almost clear skin the median score was 2, corresponding to having a small effect on QoL. Similarly, a higher proportion of patients with clear (76.3%) versus almost clear (44.2%) skin had DLQI scores less than or equal to 1, corresponding to having no effect on QoL.

Similarly, in Torii et al (2012), the authors analysed the relationship between the baseline PASI score and DLQI in the analysis set of 114 patients, with the results demonstrating a positive correlation. There was no statistical significance in the difference in baseline PASI score and DLQI between the PASI 90 responders and PASI 75–90 responders. In the relationship of the percent improvement in PASI and DLQI at the complete assessment, there was a negative correlation between these two variables, the DLQI score decreased progressively with the increasing percent improvement in PASI. The percentage of patients achieving a DLQI of 0 or 1 among PASI 90 responders was significantly higher compared to the PASI 75–90 responders (see Figure 8).

From the above analysis, it is apparent that not only does achieving a PASI 90 response significantly improve the visible symptoms of psoriasis, it also goes above and beyond the QoL gains achievable from attaining lower clinical responses. For example, moving from PASI-75 to PASI-90 represents a 15% clinical improvement; however, as illustrated by Figure 8, this 15% clinical improvement was associated with a 35.7% increase in patients reporting that psoriasis had no longer an effect on their QoL.

4.1 Conclusion

Achieving a PASI 75-90 response has been accepted as a reasonable therapeutic goal for the treatment of psoriasis. Achieving this clinical endpoint is associated with improving the quality of life of those with the condition and also daily, social and productive functioning (Shikiar, Willian et al. 2006, Revicki, Willian et al. 2008). However, there are still significant gains to be made. Newer therapies are now potentially able to achieve PASI-90 in the majority of patients and wedded with the clear links between PASI-90 and improved HRQoL, it may now be pragmatic to reevaluate the therapeutic gold standard for people who are treating or are being treated for psoriasis.

5. Conclusion

The paucity of Irish specific data in this particular medical space, has consequently led to policymakers and other stakeholders in Ireland requiring better information to address the problems associated with the disease. This report aims to address this imbalance. To this end, evidence is required on the extent of psoriasis and its impact in the Irish setting. Hence, the goals of this report can be framed as follows:

- To estimate the prevalence, incidence and severity of psoriasis in Ireland
- To examine the impact of psoriasis on quality of life
- To estimate the impact of psoriasis on co-morbidity
- To highlight the achievable quality of life gains associated with newer treatments

The new estimates generated in this study indicate that psoriasis affects a large number of people in Ireland. In terms of prevalence, the estimate reported here provides for a figure of 73,205 people living in Ireland with psoriasis. The incidence of the disease is estimated as being 13.5 per 10,000 person years. Within the psoriasis population an estimated 12.4% suffer with severe levels of disease. Furthermore, these numbers are likely to increase in the coming years as an upward trend has been identified in the prevalence and incidence of the disease internationally (Icen, Crowson et al. 2009). Large population based epidemiological studies which might include registries are the gold-standard for estimating the prevalence and incidence of a particular disease. However, in the absence of such, this research fills a gap in the information base, and due to the close genetic and socio-cultural links between Ireland and the UK, the results reported here should offer a good guide to the burden of psoriasis in Ireland.

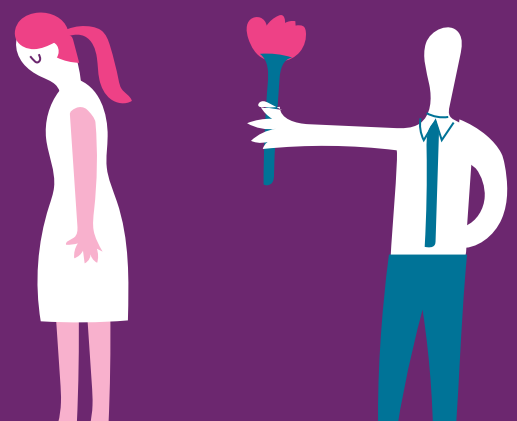
Psoriasis is not just a skin disease. Evidence suggests that psoriasis places a significant burden on HRQoL and on the mental health of those who have the condition. It seems that this burden manifests due to the physical factors associated with the disease and on the location and the visibility of the lesions, causing self-consciousness, embarrassment and stigmatisation which can ultimately lead to depression and in some cases suicidal ideation (Schmitt and Ford 2007).

Psoriasis also impacts on the work-lives of those who have the condition with reports of absenteeism, presenteeism, work place discrimination and restriction of career choice all being associated with the psoriasis (Armstrong, Schupp et al. 2012). These effects are likely to have important economic implications for the individual affected, their families, and the society as a whole.

Psoriasis affects people in different ways and is often accompanied by a range of co-morbidities. For the majority, psoriasis presents as a mild co-morbidity-free disease. However, occurrences of severe psoriasis are not uncommon and its manifestation as lesions on the skin may only represent a portion of the health risks and complications present. In particular, this analysis highlights the potentially high number of Irish patients (7,133) with psoriasis that may also bear the burden of PsA.

Compounding this is the apparent risk of cardiovascular disease and events such as stroke and myocardial infarction. While there is still some debate regarding how exactly these associations manifest, a growing consensus within the published literature suggests that there is an increased risk of CV disorders, in particular, in individuals with severe psoriasis, probably due, in part, to shared inflammatory pathways (Boehncke, Boehncke et al. 2011, Khalid, Hansen et al. 2013).

33% said their skin condition has prevented them from **dating****



As a consequence of these associated co-morbidities, people with psoriasis are likely to experience diminished QoL and are more likely to require urgent medical care, hospital admission, and outpatient specialist care than those without these co-morbidities.

Achieving a PASI 75-90 response has been accepted as a reasonable therapeutic goal for the treatment of psoriasis (Puig 2014). Achieving this clinical endpoint is associated with improving the quality of life of those with the condition and also daily, social and productive functioning (Shikiar, Willian et al. 2006, Revicki, Willian et al. 2008). However, there are still significant gains to be made. Newer therapies are now potentially able to achieve PASI-90 in the majority of patients and wedded with the clear links between PASI-90 and improved HRQoL, it may now be pragmatic to reevaluate the therapeutic gold standard for people who are treating or are being treated for psoriasis.

5.1 Limitations and Implications for Future Research

Due to the paucity of Irish specific data in this particular research area, throughout this report it was necessary to transpose data from external sources to the Irish setting. In particular, information was adopted and adapted from two large GP databases from the UK, namely the GPRD and THIN. The methodological approach adopted, is open to some criticism. While every effort was taken for consistent age and sex adjustment throughout, there remains the issue of transferability of data from external sources to the Irish setting. The practice of transposing 'nearest neighbour' estimates is a commonly applied solution, however, true estimates of prevalence and incidence of psoriasis and its related co-morbidities could only be known with a carefully constructed population based epidemiologic studies, which might include registry-based data.

This particular research conservatively estimates the prevalence of the psoriasis at 1.6% of the Irish population. This provides for an estimate of 73,205 people in Ireland with psoriasis. Notwithstanding the economic burden placed on those who have the condition, one would expect such a sizable number to place a significant economic burden on the Irish health system and society as a whole. Future research may benefit from formally quantifying these costs in a cost of illness study for the ROI. A number of equivalent studies have already been published, including those for the following countries: US, Canada, Spain, Germany and Italy. For readers interested in the respective costs reported in these studies; a table which presents their top line results is located in the appendix section of this report (Table 17).

86% said their psoriasis affects their
choice of clothing**



6. Appendix

Table 16. Prevalence Estimate Adjusted for Ethnicity

Ethnic groups, UK, 2011	%	Total pop. by ethnicity	Prevalence rate by ethnicity	Psoriasis population		
White	86.0%	54,336,520	1.64%	893,027		
Mixed/Multiple Ethnic Groups	2.2%	1,390,004	0.89% ⁹	12,371		
Asian/Asian British	7.5%	4,738,650	0.47% (Ding, Wang et al, 2012)	22,271		
Black/African/Caribbean/Black British	3.3%	2,085,006	1.30% (Gelfand, Stern et al. 2005)	27,105		
Other Ethnic Group	1.0%	631,820	0.89%	5,591		
Total	100%	63,182,000	1.52%	960,366		
Ethnic groups, Ireland, 2011						
White (including Travelling community)	95.70%	4,390,957	1.64%	72,012		
Mixed/Multiple Ethnic Groups	0.90%	41,294	0.89%	368		
Asian	1.90%	87,177	0.47%	410		
African	1.30%	59,647	1.30%	775		
Other ethnic group	0.20%	9,177	0.85%	78	Age and sex adj	Total
Total	100%	4,588,252		73,205	5.20%	77,012

9. This calculation is based on an average of the prevalence estimates reported in two studies mentioned above (Ding, Wang et al, 2012, Gelfand, Stern et al. 2005)

Table 17. Cost of Illness Studies

Country	Study Design	Study population	Costs due to psoriasis per patient
United States	Project report (evaluated the data from National Surveys)	Mild, moderate and severe psoriasis	Direct cost: \$1,244 Indirect cost due to productivity losses: \$144 Intangible cost because of QoL impact: \$2,300
Canada	Questionnaire based survey	Moderate to severe	Lost mean patient wages due to absence from work = 2,2270.84 Canadian dollars/person/year
Spain	Longitudinal observational study	Mild, moderate and severe	Direct costs per patient: €890.50 Indirect cost due to productivity losses: €188.5
Italy	Cost of illness analysis	Moderate to severe plaque psoriasis	Direct cost per patient: €5,690 Indirect cost due to productivity losses: €2,682
Germany	Cost of illness analysis	Moderate to severe plaque psoriasis	Direct costs: €5,397 Indirect costs/loss of productivity: €1,310

7. References

*References on page 9 of this report.

** Psoriasis Patient Survey, Ireland, April 2015

Retrieved 07/06/14, 2014, from <http://www.ons.gov.uk/ons/guide-method/census/2011/uk-census/index.html>.

(2011). Central Statistics Office. Retrieved 26/06/14, from <http://www.cso.ie/en/census/>.

(2014). Retrieved 29/08/14, from <http://www.oecd.org/els/emp/keyemploymentstatistics.htm>.

Adamzik, K., M. A. McAleer and B. Kirby (2013). "Alcohol and psoriasis: sobering thoughts." *Clinical and Experimental Dermatology* 38(8): 819-822.

Armstrong, A., C. Harskamp and E. Armstrong (2012). "The association between psoriasis and obesity: a systematic review and meta-analysis of observational studies." *Nutrition & diabetes* 2(12): e54.

Armstrong, A. W., C. T. Harskamp and E. J. Armstrong (2013). "Psoriasis and metabolic syndrome: A systematic review and meta-analysis of observational studies." *Journal of the American Academy of Dermatology* 68(4): 654-662.

Armstrong, A. W., C. Schupp, J. Wu and B. Bebo (2012). "Quality of life and work productivity impairment among psoriasis patients: findings from the National Psoriasis Foundation survey data 2003-2011." *PLoS One* 7(12): e52935.

Armstrong, A. W., C. Schupp, J. Wu and B. Bebo (2012). "Quality of life and work productivity impairment among psoriasis patients: findings from the National Psoriasis Foundation survey data 2003-2011." *PloS one* 7(12): e52935.

Augustin, M., K. Krüger, M. Radtke, I. Schwippel and K. Reich (2008). "Disease severity, quality of life and health care in plaque-type psoriasis: a multicenter cross-sectional study in Germany." *Dermatology* 216(4): 366-372.

Augustin, M. and M. A. Radtke (2014). "Quality of life in psoriasis patients." *Expert Review of Pharmacoeconomics & Outcomes Research* 14(4): 559-568.

Ayala, F., F. Sampogna, G. V. Romano, R. Merolla, G. Guida, G. Gualberti, U. D. Paparatti, P. Amerio, N. Balato and C. Potenza (2014). "The impact of psoriasis on work-related problems: a multicenter cross-sectional survey." *J Eur Acad Dermatol Venereol* 28(12): 1623-1632.

Bell, L. M., R. Sedlack, C. M. Beard, H. O. Perry, C. J. Michet and L. T. Kurland (1991). "Incidence of psoriasis in Rochester, Minn, 1980-1983." *Arch Dermatol* 127(8): 1184-1187.

Boehncke, W. H., S. Boehncke, A. M. Tobin and B. Kirby (2011). "The 'psoriatic march': a concept of how severe psoriasis may drive cardiovascular comorbidity." *Experimental dermatology* 20(4): 303-307.

Brenaut, E., C. Horreau, C. Pouplard, T. Barnette, C. Paul, M. A. Richard, P. Joly, M. Le Maitre, S. Aractingi, F. Aubin, B. Cribier, D. Jullien, J. P. Ortonne and L. Misery (2013). "Alcohol consumption and psoriasis: a systematic literature review." *J Eur Acad Dermatol Venereol* 27 Suppl 3: 30-35.

Carrascosa, J., R. Pujol, E. Dauden, J. Hernanz-Hermosa, X. Bordas, J. Smandia and C. Ferrandiz (2006). "A prospective evaluation of the cost of psoriasis in Spain (EPIDERMA project: phase II)." *Journal of the European Academy of Dermatology and Venereology* 20(7): 840-845.

Cashman, K. D. (2007). "Diet, nutrition, and bone health." *The Journal of nutrition* 137(11): 2507S-2512S.

Chandran, V. and S. P. Raychaudhuri (2010). "Geoepidemiology and environmental factors of psoriasis and psoriatic arthritis." *Journal of autoimmunity* 34(3): J314-J321.

Coumbe, A. G., M. R. Pritzker and D. A. Duprez (2014). "Cardiovascular risk and psoriasis: beyond the traditional risk factors." *Am J Med* 127(1): 12-18.

Danielsen, K., A. O. Olsen, T. Wilsgaard and A. S. Furberg (2013). "Is the prevalence of psoriasis increasing? A 30-year follow-up of a population-based cohort." *Br J Dermatol* 168(6): 1303-1310.

Ding, X., T. Wang, Y. Shen, X. Wang, C. Zhou, S. Tian, Y. Liu, G. Peng, J. Zhou, S. Xue, R. Wang, Y. Tang, X. Meng, G. Pei, Y. Bai, Q. Liu, H. Li and J. Zhang (2012). "Prevalence of psoriasis in China: a population-based study in six cities." *Eur J Dermatol* 22(5): 663-667.

Dubertret, L., U. Mrowietz, A. Ranki, P. C. van de Kerkhof, S. Chimenti, T. Lotti and G. Schafer (2006). "European patient perspectives on the impact of psoriasis: the EUROPSO patient membership survey." *Br J Dermatol* 155(4): 729-736.

Finlay, A. Y. and E. C. Coles (1995). "The effect of severe psoriasis on the quality of life of 369 patients." *British Journal of Dermatology* 132(2): 236-244.

FitzGerald, O. and R. Winchester (2009). "Psoriatic arthritis: from pathogenesis to therapy." *Arthritis Res Ther* 11(1): 214.

Flytström, I., B. Stenberg, Å. Svensson and I. M. Bergbrant (2008). "Methotrexate vs. ciclosporin in psoriasis: effectiveness, quality of life and safety. A randomized controlled trial." *British Journal of Dermatology* 158(1): 116-121.

Gelfand, J. M., E. D. Dommasch, D. B. Shin, R. S. Azfar, S. K. Kurd, X. Wang and A. B. Troxel (2009). "The risk of stroke in patients with psoriasis." *J Invest Dermatol* 129(10): 2411-2418.

Gelfand, J. M., A. L. Neimann, D. B. Shin, X. Wang, D. J. Margolis and A. B. Troxel (2006). "Risk of myocardial infarction in patients with psoriasis." *Jama* 296(14): 1735-1741.

Gelfand, J. M., R. S. Stern, T. Nijsten, S. R. Feldman, J. Thomas, J. Kist, T. Rolstad and D. J. Margolis (2005). "The prevalence of psoriasis in African Americans: results from a population-based study." *Journal of the American Academy of Dermatology* 52(1): 23-26.

Gelfand, J. M., A. B. Troxel, J. D. Lewis, S. K. Kurd, D. B. Shin, X. Wang, D. J. Margolis and B. L. Strom (2007). "The risk of mortality in patients with psoriasis: results from a population-based study." *Archives of Dermatology* 143(12): 1493-1499.

Gelfand, J. M., R. Weinstein, S. B. Porter, A. L. Neimann, J. A. Berlin and D. J. Margolis (2005). "Prevalence and treatment of psoriasis in the United Kingdom: a population-based study." *Archives of Dermatology* 141(12): 1537-1541.

- Gladman, D., C. Antoni, P. Mease, D. Clegg and P. Nash (2005). "Psoriatic arthritis: epidemiology, clinical features, course, and outcome." *Annals of the Rheumatic Diseases* 64(suppl 2): ii14-ii17.
- Gladman, D. D., C. Antoni, P. Mease, D. O. Clegg and P. Nash (2005). "Psoriatic arthritis: epidemiology, clinical features, course, and outcome." *Annals of the Rheumatic Diseases* 64(suppl 2): ii14-ii17.
- Griffiths, C. E. and J. N. Barker (2007). "Pathogenesis and clinical features of psoriasis." *The Lancet* 370(9583): 263-271.
- Griffiths, C. E. and J. N. Barker (2007). "Pathogenesis and clinical features of psoriasis." *Lancet* 370(9583): 263-271.
- Haroon, M., B. Kirby and O. FitzGerald (2013). "High prevalence of psoriatic arthritis in patients with severe psoriasis with suboptimal performance of screening questionnaires." *Annals of the rheumatic diseases* 72(5): 736-740.
- Hawro, T., A. Zalewska, M. Hawro, A. Kaszuba, M. Krolikowska and M. Maurer (2014). "Impact of psoriasis severity on family income and quality of life." *J Eur Acad Dermatol Venereol*.
- Hayes, J. and J. Koo (2010). "Psoriasis: depression, anxiety, smoking, and drinking habits." *Dermatol Ther* 23(2): 174-180.
- Horn, E. J., K. M. Fox, V. Patel, C. F. Chiou, F. Dann and M. Lebwohl (2007). "Association of patient-reported psoriasis severity with income and employment." *J Am Acad Dermatol* 57(6): 963-971.
- Horreau, C., C. Pouplard, E. Brenaut, T. Barnetche, L. Misery, B. Cribier, D. Jullien, S. Aractingi, F. Aubin, P. Joly, M. Le Maitre, J. P. Ortonne, C. Paul and M. A. Richard (2013). "Cardiovascular morbidity and mortality in psoriasis and psoriatic arthritis: a systematic literature review." *J Eur Acad Dermatol Venereol* 27 Suppl 3: 12-29.
- Huerta, C., E. Rivero and L. A. Rodriguez (2007). "Incidence and risk factors for psoriasis in the general population." *Arch Dermatol* 143(12): 1559-1565.
- Icen, M., C. S. Crowson, M. T. McEvoy, F. J. Dann, S. E. Gabriel and H. Maradit Kremers (2009). "Trends in incidence of adult-onset psoriasis over three decades: a population-based study." *J Am Acad Dermatol* 60(3): 394-401.
- Khalid, U., P. R. Hansen, G. H. Gislason, J. Lindhardsen, S. L. Kristensen, S. A. Winther, L. Skov, C. Torp-Pedersen and O. Ahlehoff (2013). "Psoriasis and new-onset diabetes: a Danish nationwide cohort study." *Diabetes Care* 36(8): 2402-2407.
- Kimball, A., C. Jacobson, S. Weiss, M. Vreeland and Y. Wu (2005). "The Psychosocial Burden of Psoriasis." *American Journal of Clinical Dermatology* 6(6): 383-392.
- Kimball, A. B., A. Guerin, M. Tsaneva, A. P. Yu, E. Q. Wu, S. R. Gupta, Y. Bao and P. M. Mulani (2011). "Economic burden of comorbidities in patients with psoriasis is substantial." *J Eur Acad Dermatol Venereol* 25(2): 157-163.
- Kirby, B., H. L. Richards, D. L. Mason, D. G. Fortune, C. J. Main and C. E. Griffiths (2008). "Alcohol consumption and psychological distress in patients with psoriasis." *Br J Dermatol* 158(1): 138-140.
- Krueger, G., J. Koo, M. Lebwohl, A. Menter, R. S. Stern and T. Rolstad (2001). "The impact of psoriasis on quality of life: results of a 1998 National Psoriasis Foundation patient-membership survey." *Archives of Dermatology* 137(3): 280-284.
- Kurd, S. K. and J. M. Gelfand (2009). "The prevalence of previously diagnosed and undiagnosed psoriasis in US adults: results from NHANES 2003-2004." *Journal of the American Academy of Dermatology* 60(2): 218-224.
- Kurd, S. K., A. B. Troxel, P. Crits-Christoph and J. M. Gelfand (2010). "The risk of depression, anxiety, and suicidality in patients with psoriasis: a population-based cohort study." *Arch Dermatol* 146(8): 891-895.
- Langan, S. M., N. M. Seminara, D. B. Shin, A. B. Troxel, S. E. Kimmel, N. N. Mehta, D. J. Margolis and J. M. Gelfand (2012). "Prevalence of metabolic syndrome in patients with psoriasis: a population-based study in the United Kingdom." *J Invest Dermatol* 132(3 Pt 1): 556-562.
- Langley, R. G., B. E. Elewski, M. Lebwohl, K. Reich, C. E. Griffiths, K. Papp, L. Puig, H. Nakagawa, L. Spelman and B. Sigurgeirsson (2014). "Secukinumab in Plaque Psoriasis—Results of Two Phase 3 Trials." *New England Journal of Medicine* 371(4): 326-338.
- Langley, R. G., G. G. Krueger and C. E. Griffiths (2005). "Psoriasis: epidemiology, clinical features, and quality of life." *Ann Rheum Dis* 64 Suppl 2: ii18-23; discussion ii24-15.
- Lee, S., A. Mendelsohn and E. Sarnes (2010). "The burden of psoriatic arthritis: a literature review from a global health systems perspective." *P t* 35(12): 680-689.
- Levy, A. R., A. M. Davie, N. C. Brazier, F. Jivraj, L. E. Albrecht, D. Gratton and C. W. Lynde (2012). "Economic burden of moderate to severe plaque psoriasis in Canada." *International Journal of Dermatology* 51(12): 1432-1440.
- Linder, D., E. Dall'Olio, P. Gisondi, E. Berardesca, E. De Gennaro, A. R. Pennella, A. Giannetti, A. Peserico and G. Girolomoni (2009). "Perception of disease and doctor-patient relationship experienced by patients with psoriasis." *American Journal of Clinical Dermatology* 10(5): 325-330.
- Mattila, K., M. Leino, A. Mustonen, L. Koulu and R. Tuominen (2013). "Influence of psoriasis on work." *European Journal of Dermatology* 23(2): 208-211.
- Maybury, C. M., J. N. Barker and C. H. Smith (2013). "Psoriasis and cardiovascular disease: where is the risk?" *J Invest Dermatol* 133(10): 2308-2311.
- Mehta, N. N., R. S. Azfar, D. B. Shin, A. L. Neimann, A. B. Troxel and J. M. Gelfand (2010). "Patients with severe psoriasis are at increased risk of cardiovascular mortality: cohort study using the General Practice Research Database." *Eur Heart J* 31(8): 1000-1006.
- Meier, M. and P. Sheth (2009). "Clinical spectrum and severity of psoriasis."
- Meyer, N., C. Paul, D. Feneron, I. Bardoulat, C. Thiriet, C. Camara, D. Sid-Mohand, C. Le Pen and J. Ortonne (2010). "Psoriasis: an epidemiological evaluation of disease burden in 590 patients." *Journal of the European Academy of Dermatology and Venereology* 24(9): 1075-1082.
- Mrowietz, U., K. Kragballe, K. Reich, P. Spuls, C. E. M. Griffiths, A. Nast, J. Franke, C. Antoniou, P. Arenberger, F. Balieva, M. Bylaite, O. Correia, E. Daudén, P. Gisondi, L. Iversen, L. Kemény, M. Lahfa, T. Nijsten, T. Rantanen, A. Reich, T. Rosenbach, S. Segaert, C. Smith, T. Talme, B. Volc-Platzer and N. Yawalkar (2011). "Definition of treatment goals for moderate to severe psoriasis: a European consensus." *Archives of Dermatological Research* 303(1): 1-10.
- Neimann, A. L., D. B. Shin, X. Wang, D. J. Margolis, A. B. Troxel and J. M. Gelfand (2006). "Prevalence of cardiovascular risk factors in patients with psoriasis." *J Am Acad Dermatol* 55(5): 829-835.

- Ogdie, A., S. Langan, T. Love, K. Haynes, D. Shin, N. Seminara, N. N. Mehta, A. Troxel, H. Choi and J. M. Gelfand (2013). "Prevalence and treatment patterns of psoriatic arthritis in the UK." *Rheumatology* 52(3): 568-575.
- Papp, K. A., R. G. Langley, M. Lebwohl, G. G. Krueger, P. Szapary, N. Yeilding, C. Guzzo, M.-C. Hsu, Y. Wang, S. Li, L. T. Dooley and K. Reich "Efficacy and safety of ustekinumab, a human interleukin-12/23 monoclonal antibody, in patients with psoriasis: 52-week results from a randomised, double-blind, placebo-controlled trial (PHOENIX 2)." *The Lancet* 371(9625): 1675-1684.
- Parisi, R., D. P. Symmons, C. E. Griffiths and D. M. Ashcroft (2013). "Global epidemiology of psoriasis: a systematic review of incidence and prevalence." *J Invest Dermatol* 133(2): 377-385.
- Pearce, D. J., S. Singh, R. Balkrishnan, A. Kulkarni, A. B. Fleischer and S. R. Feldman (2006). "The negative impact of psoriasis on the workplace." *Journal of Dermatological Treatment* 17(1): 24-28.
- Perry, J. I., Dee, Staines (2012). "<Perry-2012-The cost of overweight and obesity on the Island of Ireland.pdf>".
- Piccinelli, M. and G. Wilkinson (2000). "Gender differences in depression Critical review." *The British Journal of Psychiatry* 177(6): 486-492.
- Poikolainen, K., T. Reunala, J. Karvonen, J. Lauharanta and P. Kärkkäinen (1990). "Alcohol intake: a risk factor for psoriasis in young and middle aged men?" *BMJ: British Medical Journal* 300(6727): 780.
- Puig, L. (2014). "PASI90 response: the new standard in therapeutic efficacy for psoriasis." *J Eur Acad Dermatol Venereol*.
- Radtke, M. A., K. Reich, C. Blome, S. Rustenbach and M. Augustin (2009). "Prevalence and clinical features of psoriatic arthritis and joint complaints in 2009 patients with psoriasis: results of a German national survey." *J Eur Acad Dermatol Venereol* 23(6): 683-691.
- Rapp, S. R., S. R. Feldman, M. L. Exum, A. B. Fleischer Jr and D. M. Reboussin (1999). "Psoriasis causes as much disability as other major medical diseases." *Journal of the American Academy of Dermatology* 41(3): 401-407.
- Revicki, D. A., M. K. Willian, A. Menter, J. H. Saurat, N. Harnam and M. Kaul (2008). "Relationship between clinical response to therapy and health-related quality of life outcomes in patients with moderate to severe plaque psoriasis." *Dermatology* 216(3): 260-270.
- Rosen, C. F., F. Mussani, V. Chandran, L. Eder, A. Thavaneswaran and D. D. Gladman (2012). "Patients with psoriatic arthritis have worse quality of life than those with psoriasis alone." *Rheumatology (Oxford)* 51(3): 571-576.
- Sales, R. and T. Torres (2014). "Psoriasis and metabolic syndrome." *Acta Dermatovenerol Croat* 22(3): 169-174.
- Saurat, J. H., G. Stingl, L. Dubertret, K. Papp, R. Langley, J. P. Ortonne, K. Unnebrink, M. Kaul and A. Cezem (2008). "Efficacy and safety results from the randomized controlled comparative study of adalimumab vs. methotrexate vs. placebo in patients with psoriasis (CHAMPION)." *British Journal of Dermatology* 158(3): 558-566.
- Schafer, I., J. Hacker, S. J. Rustenbach, M. Radtke, N. Franzke and M. Augustin (2010). "Concordance of the Psoriasis Area and Severity Index (PASI) and patient-reported outcomes in psoriasis treatment." *Eur J Dermatol* 20(1): 62-67.
- Schmitt, J. and D. E. Ford (2010). "Psoriasis is independently associated with psychiatric morbidity and adverse cardiovascular risk factors, but not with cardiovascular events in a population-based sample." *J Eur Acad Dermatol Venereol* 24(8): 885-892.
- Schmitt, J. M. and D. E. Ford (2007). "Role of depression in quality of life for patients with psoriasis." *Dermatology* 215(1): 17-27.
- Shikar, R., M. K. Willian, M. M. Okun, C. S. Thompson and D. A. Revicki (2006). "The validity and responsiveness of three quality of life measures in the assessment of psoriasis patients: results of a phase II study." *Health and quality of life outcomes* 4(1): 71.
- Strohal, R., B. Kirby, L. Puig and P. the Psoriasis Expert (2013). "Psoriasis beyond the skin: an expert group consensus on the management of psoriatic arthritis and common co-morbidities in patients with moderate-to-severe psoriasis." *J Eur Acad Dermatol Venereol*.
- Takeshita, J., K. Callis Duffin, D. B. Shin, G. G. Krueger, A. D. Robertson, A. B. Troxel, A. S. Van Voorhees and J. M. Gelfand (2014). "Patient-reported outcomes for psoriasis patients with clear versus almost clear skin in the clinical setting." *J Am Acad Dermatol*.
- Tobin, A. M., C. B. Hackett, S. Rogers, P. Collins, H. L. Richards, D. O'Shea and B. Kirby (2014). "Body mass index, waist circumference and HOMA-IR correlate with the Psoriasis Area and Severity Index in patients with psoriasis receiving phototherapy." *British Journal of Dermatology* 171(2): 436-438.
- Tobin, A. M., E. M. Higgins, S. Norris and B. Kirby (2009). "Prevalence of psoriasis in patients with alcoholic liver disease." *Clin Exp Dermatol* 34(6): 698-701.
- Torii, H., N. Sato, T. Yoshinari, H. Nakagawa and I. Japanese Influximab Study (2012). "Dramatic impact of a Psoriasis Area and Severity Index 90 response on the quality of life in patients with psoriasis: an analysis of Japanese clinical trials of infliximab." *J Dermatol* 39(3): 253-259.
- Torres, Tiago, and Nuno Bettencourt. "Psoriasis: The visible killer." *Revista Portuguesa de Cardiologia (English Edition)* 33.2 (2014): 95-99.
- Vena, G. A., G. Altomare, F. Ayala, E. Berardesca, P. Calzavara-Pinton, S. Chimenti, A. Giannetti, G. Girolomoni, T. Lotti, P. Martini, G. Mazzaglia, A. Peserico, A. Puglisi Guerra, G. Sini, N. Cassano and C. Cricelli (2010). "Incidence of psoriasis and association with comorbidities in Italy: a 5-year observational study from a national primary care database." *Eur J Dermatol* 20(5): 593-598.
- Woolacott, N., N. Hawkins, A. Mason, M. A. Kainth, M. Z. Khadjesari, M. Y. B. Vergel, M. K. Misso, M. K. Light, R. Chalmers and M. Sculpher (2005). "Efalizumab and etanercept for the treatment of psoriasis." CRD technology assessment group University of York on behalf of NICE 356.
- Xu, T. and Y. H. Zhang (2012). "Association of psoriasis with stroke and myocardial infarction: meta-analysis of cohort studies." *British Journal of Dermatology* 167(6): 1345-1350.
- Yeung, H., J. Takeshita, N. N. Mehta, S. E. Kimmel, A. Ogdie, D. J. Margolis, D. B. Shin, R. Attor, A. B. Troxel and J. M. Gelfand (2013). "Psoriasis severity and the prevalence of major medical comorbidity: a population-based study." *JAMA Dermatology* 149(10): 1173-1179.

8. Tables & figures

Table 1	Estimated prevalence of psoriasis in Ireland	14
Table 2	Estimated incidence of psoriasis in Ireland	15
Table 3	Estimated prevalence stratified by disease severity	16
Table 4	Examples of HRQoL instruments used in psoriasis management	19
Table 5	Key elements that determine HRQoL in patients with psoriasis	19
Table 6	Impact of moderate or severe psoriasis	20
Table 7	Psychological and daily living activities affected by psoriasis	21
Table 8	Literature review and work days lost	23
Table 9	Estimated prevalence of PsA in Ireland	26
Table 10	PsA population as a % of psoriasis population	27
Table 11	Estimated prevalence of overweight and obese patients in the Irish psoriasis population	28
Table 12	Excess prevalence of metabolic syndrome in the Irish psoriasis population aged 45-65	29
Table 13	Estimated excess strokes in the ROI attributable to psoriasis	30
Table 14	Excess risk of MI attributable to psoriasis patients aged 30 to 60	31
Table 15	Excess risk of MI attributable to psoriasis in the ROI	32
Table 16	Prevalence Estimate Adjusted for Ethnicity	37
Table 17	Cost of Illness Studies	47
Figure 1	Estimated prevalence of psoriasis in Ireland stratified by age & sex	14
Figure 2	The incidence of psoriasis in Ireland stratified by age & sex	15
Figure 3	Body Surface Area	16
Figure 4	Psoriasis and alcohol – a vicious cycle	22
Figure 5	Estimated PsA population stratified by age & sex	26
Figure 6	The Psoriatic March	28
Figure 7	Percentage of patients achieving DLQI score of <2 after achieving a PASI 75 response	33
Figure 8	Percentage of patients achieving DLQI of 0 or 1 among PASI 90 responders	34

Glossary

AR	Attributable Risk	MI	Myocardial Infarction
BMI	Body Mass Index	NANS	National Adult Nutrition Survey
BSA	Body Surface Area	PASI	Psoriasis Area and Severity Index
CV	Cardiovascular	PGA	Physician's Global Assessment
DLQI	Dermatology Life Quality Index	PsA	Psoriatic Arthritis
GPRD	General Practice Research Database	THIN	The Health Improvement Network
HRQoL	Health Related Quality of Life		

