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RESEARCH LETTER

Demographic and epidemiological drivers of global burden of psoriasis

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Psoriasis is a chronic, non-communicable skin disease, which affects approximately 100 million people worldwide.[1] Prevalent cases of psoriasis are increasing globally,[2] representing the combined effect of population growth, population ageing and epidemiological changes in prevalent cases of psoriasis.[3] Disentangling these drivers of the observed global trends in prevalent cases of psoriasis and estimating their relative magnitude are vital in formulating tailored policies and planning for the health-care system. Accordingly, we aimed to examine the contribution of changes in these three drivers in the number of prevalent cases of psoriasis using the data obtained from the Global Burden of Disease (GBD) 2019 study.

We retrieved estimated numbers of prevalent psoriasis, age-standardized and age-specific prevalence of psoriasis, and population sizes by age, gender and country between 1990 and 2019 from the GBD 2019.[4] To analyse the drivers of prevalent cases of psoriasis, we used a newly developed decomposition method[5] to attribute changes in the total number of prevalent cases of psoriasis to population growth, population ageing and age-specific prevalent psoriasis rates between 1990 and 2019 for each country and region (Supplementary Material). This approach has been used to quantify the impact of population ageing on mortality for 195 countries or territories and 169 causes of deaths,[5] and to quantify the demographic and epidemiological drivers of the impact of air pollution and high sodium intake.[6–8] We calculated the absolute and relative contributions of the three components to the change in the number of prevalent cases of psoriasis. We used Monte Carlo simulations (1,000 random samples) to calculate their uncertainty intervals (UI),[9] assuming a multivariate normal distribution of the estimated number of prevalent cases of psoriasis. As economic growth might reduce the burden of psoriasis, we also examined the relationship between changes in sociodemographic index (SDI) and percentage change in prevalent cases of psoriasis due to age-specific psoriasis prevalent rates from 1990. SDI was calculated from a combination of per capita income, education rate and fertility rate. We conducted all analyses in R software (version 3.5.3).

Globally the number of prevalent cases of psoriasis in 2019 was 40.8 million (95% UI: 39.4 million to 42.1 million) with an increase of 29.1% (95% UI, 25.7% to 32.8%) from 1990 (31.6 million, 95% UI: 30.5 million to 32.6 million). This increase in number of prevalent cases of psoriasis was driven by the change in the number of psoriasis cases attributed to population growth (42.5%, 95% UI: 42.0% to 43.1%) and population ageing (18.3%, 95% UI: 17.9% to 18.7%), despite a reduction attributed to change in age-specific rates (−31.7%, 95% UI: −34.2% to −28.9%) (Table 1). The contributions of these three components varied substantially by world regions and 204 countries and territories from 1990 to 2019 (Table S1). To best understand the contributions of these three components, we further classified the 21 world regions into four general demographic and epidemic patterns (Table 2). All regions had an increase in SDI and a decline in the number of prevalent cases of psoriasis due to age-specific prevalent cases from 1990 to 2019 (Fig. 1).

Our analysis suggests that without the effects of population growth and population ageing, epidemiological changes would have reduced prevalent cases of psoriasis in all countries and regions. However, the reduction in prevalence in most countries and regions cannot offset the combined effects of population growth and population ageing. This is particularly true in countries with significant population growth or ageing populations in the past three decades, such as India and China, which had the two largest increases in prevalent cases of psoriasis worldwide in 2019 compared to 1990.

Our analysis adds to the perspective of Parisi and colleagues[3] on the effects of population growth and ageing on the prevalence of psoriasis, as they suggested that population growth and ageing may lead to a continued rise in the burden associated with psoriasis.

Our study provides valuable insights to guide health policy development and health system reform, particularly in East Asian countries, such as China, Japan and South Korea with rapidly ageing populations, and in less developed countries, with rapidly growing populations. Population growth and population ageing pose a significant challenge to the burden of psoriasis. Health resources should be allocated to improve psoriasis awareness and enhance treatment to alleviate the severity of psoriasis in countries and territories.

Table 1 Observed and counterfactual changes in global prevalent psoriasis cases, 1990–2019

Region	Prevalent cases, thousands		Expected cases, 2019, thousands			Change in cases, 1990–2019, %			
	Year 1990	Year 2019	Due to Population growth	Due to Population ageing	Due to change in age-specific rates	Due to Population growth	Due to Population ageing	Due to change in age-specific rates	Overall change, %
Global	31 585.4	40 805.4	45 033.2	37 357.3	21 562.2	42.5 (42.0, 43.1)	18.3 (17.9, 18.7)	−31.7 (−34.2, −28.9)	29.1 (25.7, 32.8)
Western Europe	9193.3	10 236.9	10 419.6	9949.3	8258.7	13.3 (13.2, 13.5)	8.2 (7.9, 8.5)	−10.2 (−12.9, −7.5)	11.4 (8.3, 14.2)
Central Europe	722.9	624.8	673.1	808.4	589.4	−6.9 (−7.0, −6.8)	11.8 (11.5, 12.2)	−18.5 (−20.9, −15.9)	−13.6 (−16.1, −10.9)
High-income North America	3852.4	4693.6	4967.6	4273.5	3157.5	29.0 (28.7, 29.3)	10.9 (10.5, 11.3)	−18.0 (−20.2, −15.8)	21.9 (19.2, 24.5)
Australasia	370.7	509.3	528.3	410.1	312.4	42.5 (41.9, 43.1)	10.6 (10.2, 11.1)	−15.8 (−18.9, −12.5)	37.4 (22.6, 41.3)
Southern Latin America	499.3	650.2	670.3	559.3	419.1	34.2 (33.7, 34.8)	12.0 (11.7, 12.4)	−16.1 (−19.5, −12.5)	30.2 (26.0, 34.5)
Eastern Europe	1213.7	1072.7	1127.0	1316.6	1057.6	−7.1 (−7.3, −7.0)	8.5 (8.1, 8.8)	−12.9 (−15.7, −10.2)	−11.6 (−14.5, −8.8)
High-income Asia Pacific	520.0	613.4	563.2	593.2	497.2	8.3 (8.2, 8.4)	14.1 (13.4, 14.7)	−4.4 (−7.8, −1.1)	18.1 (14.2, 21.6)
Central Asia	346.7	420.5	462.5	391.0	259.9	33.4 (32.8, 33.9)	12.8 (12.3, 13.3)	−25.0 (−28.5, −21.2)	21.2 (16.9, 25.7)
Caribbean	145.3	202.5	195.4	165.8	131.9	34.5 (34.0, 35.1)	14.1 (13.5, 14.7)	−9.2 (−12.9, −5.3)	39.3 (35.0, 44.3)
East Asia	6579.9	7948.3	7927.7	8692.9	4485.6	20.5 (20.2, 20.8)	32.1 (31.2, 33.2)	−31.8 (−34.6, −29.0)	20.8 (17.1, 24.6)
North Africa and Middle East	1587.7	2426.3	2728.7	1947.0	927.8	71.9 (70.8, 72.9)	22.6 (21.9, 23.4)	−41.6 (−45.4, −38.0)	53.0 (47.6, 57.8)
Tropical Latin America	1098.7	1830.3	1643.2	1363.1	1021.6	49.5 (48.8, 50.4)	24.1 (23.2, 24.9)	−7.0 (−10.8, −3.1)	66.6 (61.7, 71.7)
Southern Sub-Saharan Africa	112.2	168.1	168.1	127.7	96.5	49.8 (49.0, 50.7)	13.8 (13.2, 14.4)	−14.0 (−17.9, −9.8)	49.7 (44.7, 55.0)
Eastern Sub-Saharan Africa	269.5	551.2	575.1	287.4	228.0	113.4 (111.5, 115.7)	6.7 (6.4, 6.9)	−15.5 (−20.7, −9.2)	104.6 (97.2, 113.2)
Andean Latin America	275.2	444.5	456.6	327.7	210.5	65.8 (64.7, 67.0)	19.1 (18.3, 19.8)	−23.5 (−27.6, −19.3)	61.5 (55.8, 67.1)
Central Sub-Saharan Africa	223.3	445.7	505.5	235.7	151.0	126.2 (124.3, 128.7)	5.5 (5.3, 5.8)	−32.4 (−37.3, −26.4)	99.3 (92.4, 107.8)
Central Latin America	211.2	334.1	324.3	257.0	174.9	53.5 (52.6, 54.5)	21.7 (20.8, 22.6)	−17.2 (−20.9, −13.2)	58.0 (53.0, 63.6)
Southeast Asia	585.6	887.6	853.4	735.0	471.4	45.7 (44.9, 46.5)	25.5 (24.6, 26.4)	−19.5 (−23.6, −15.4)	51.8 (46.3, 57.2)
South Asia	3311.1	5873.2	5533.1	3892.1	3069.1	67.1 (66.0, 68.2)	17.6 (16.9, 18.1)	−7.3 (−11.5, −3.0)	77.4 (71.8, 83.1)
Oceania	15.5	31.2	31.7	17.2	13.3	104.4 (102.5, 106.3)	11.0 (10.6, 11.4)	−13.9 (−19.3, −8.4)	101.5 (93.9, 109.3)
Western Sub-Saharan Africa	451.0	840.9	1003.5	462.4	277.0	122.4 (120.7 (124.3)	2.5 (2.4, 2.7)	−38.6 (−42.9, −34.0)	86.4 (80.3, 92.9)

Table 2 Patterns of demographic and epidemiological change in global psoriasis prevalent cases

Category	Criteria	Regions
Category 1 – Population growth: Regions with increases in the number of psoriasis prevalent cases due to substantial increase in population growth.	1) Sum of the percentage increase due to change in population growth and ageing larger than a twofold reduction due to change in age-specific rates; 2) Percentage increase due to change in population growth larger than population ageing; 3) Percentage increase due to change in population growth ≥50%	North Africa and Middle East, Eastern Sub-Saharan Africa, Andean Latin America, Central Sub-Saharan Africa, Central Latin America, South Asia, Oceania and Western Sub-Saharan Africa
Category 2 – Population growth: Regions with increases in the number of psoriasis prevalent cases due to moderate increase in population growth.	1) Sum of the percentage increase due to change in population growth and ageing larger than a twofold reduction due to change in age-specific rates; 2) Percentage increase due to change in population growth larger than population ageing; 3) Percentage increase due to change in population growth <50%	Western Europe, High-income North America, Australasia, Southern Latin America, Caribbean, Tropical Latin America, Southern Sub-Saharan Africa, Southeast Asia
Category 3 – Population ageing: Regions with increases in the number of psoriasis prevalent cases due to increase in population ageing.	1) Sum of the percentage increase due to change in population growth and ageing larger than a twofold reduction due to change in age-specific rates; 2) Percentage increase due to change in population ageing larger than population growth	High-income Asia Pacific
Category 4 – Improved health moderating effect of population growth and ageing: Regions with increases in the number of psoriasis prevalent cases due to increase in population growth and ageing were moderated by a fall in age-specific prevalent rates.	Sum of the percentage increase due to change in population growth and ageing less than a twofold reduction due to change in age-specific rates	Central Europe, Eastern Europe, Central Asia, East Asia

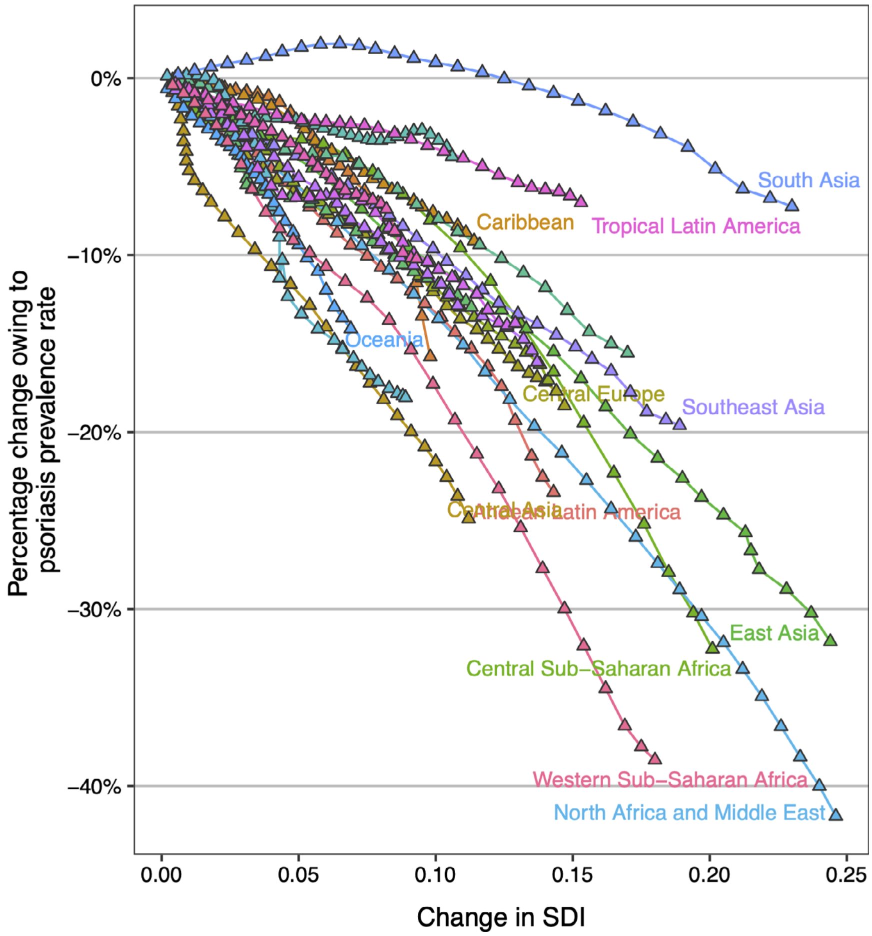

Figure 1 The relationship between changes in sociodemographic index (SDI) and percentage change in the number of prevalent cases of psoriasis owing to age-specific prevalent psoriasis rates from 1990.

The study limitations include the validity of psoriasis prevalence estimates and general limitations described by the GBD collaboration,[10] such as the lack of data in less developed countries.

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ETHICS APPROVAL

We used publicly available data and thus, IRB is waived.

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Supporting Information

Additional Supporting Information may be found online in Supporting Information:

Supplementary Material