

**Table S1** Details of the database search strategy (searched on: December 15, 2019)

Search	Query	Results
PubMed		
#1	"Dermatitis, Atopic"[Mesh]	19,244
#2	Atopic dermatitis[Title/Abstract]	19,937
#3	"Eczema"[Mesh]	11,011
#4	Eczema[Title/Abstract]	17,014
#5	#1 OR #2 OR #3 OR #4	41,880
#6	"Bone Density"[Mesh]	51,908
#7	Bone mineral density[Title/Abstract]	39,312
#8	"Bone Diseases, Metabolic"[Mesh]	74,848
#9	Osteopenia[Title/Abstract]	9,298
#10	"Osteoporosis"[Mesh]	54,425
#11	Osteoporosis[Title/Abstract]	66,883
#12	"Fractures, Bone"[Mesh]	179,463
#13	Fracture[Title/Abstract]	167,622
#14	#6 OR #7 OR #8 OR #9 #11 OR #12 OR #13	358,541
#15	#5 AND #14	135
Cochrane		
#1	MeSH descriptor: [Dermatitis, Atopic] explode all trees	1,650
#2	(Atopic dermatitis):ti,ab,kw	4,211
#3	MeSH descriptor: [Eczema] explode all trees	951
#4	(Eczema):ti,ab,kw	3,545
#5	#1 or #2 or #3 or #4	6,174
#6	MeSH descriptor: [Bone Density] explode all trees	4,526
#7	(Bone mineral density):ti,ab,kw	8,041
#8	MeSH descriptor: [Bone Diseases, Metabolic] explode all trees	4,329
#9	(Osteopenia):ti,ab,kw	1,132
#10	MeSH descriptor: [Osteoporosis] explode all trees	3,824
#11	(Osteoporosis):ti,ab,kw	10,093
#12	MeSH descriptor: [Fractures, Bone] explode all trees	5,577
#13	(Fracture):ti,ab,kw	21,383
#14	#6 or #7 or #8 or #9 or #10 or #11 or #12 or #13	31,074
#15	#5 and #14	51
Embase		
#1	'atopic dermatitis'/exp	43,424
#2	'eczema'/exp	33,908
#3	'atopic dermatitis':ti,ab,kw	32,821
#4	eczema:ti,ab,kw	29,957
#5	#1 OR #2 OR #3 OR #4	80,612
#6	'bone density'/exp	89,969
#7	'osteopenia'/exp	18,656
#8	'osteoporosis'/exp	130,081
#9	'fracture'/exp	330,981
#10	'bone mineral density':ti,ab,kw	56,625
#11	osteopenia:ti,ab,kw	15,712
#12	osteoporosis:ti,ab,kw	110,324
#13	fracture:ti,ab,kw	220,411
#14	#6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13	522,926
#15	#5 AND #14	923

**Table S2** Additional details of the included studies

Endpoint	Author	Year	Region	Outcomes	Crude HR/OR/ $\beta$ (95% CI)	Multivariate OR/HR/adjusted $\beta$ (95% CI)	Covariates in a fully adjusted model
Fracture	Garg <i>et al.</i> (11)	2015	USA	Any fracture	OR 1.49 (1.12–1.96)	OR 1.48 (1.10–1.99)	Not available
	Lowe <i>et al.</i> (13)	2019	UK	Any fracture	HR 1.13 (1.11–1.14)	HR 1.07 (1.05–1.09)	Age, sex, general practice, and date of cohort entry, time-updated asthma, index of multiple deprivations, calendar time, BMI, smoking status, harmful alcohol use, oral glucocorticoid exposure
	Garg <i>et al.</i> (10)	2015	USA	Fracture and bone or joint injury	–	OR 2.32 (1.71–3.15)	Age, sex, race/ethnicity, Hispanic origin, household income, highest level of household education, family structure, birthplace in the United States, health insurance coverage
	Garg <i>et al.</i> (11)	2015	USA	Hip or spine fracture	OR 1.80 (1.00–3.24)	OR 1.87 (1.02–3.43)	Not available
	Lowe <i>et al.</i> (13)	2019	UK	Hip fractures	HR 1.11 (1.07–1.16)	HR 1.06 (1.02–1.11)	Age, sex, race/ethnicity, Hispanic origin, household income, highest level of household education, family structure, birthplace in the United States, health insurance coverage
	Lowe <i>et al.</i> (13)	2019	UK	Spine fractures	HR 1.22 (1.14–1.30)	HR 1.14 (1.06–1.23)	Age, sex, race/ethnicity, Hispanic origin, household income, highest level of household education, family structure, birthplace in the United States, health insurance coverage
	Lowe <i>et al.</i> (13)	2019	UK	Pelvic fractures	HR 1.12 (1.04–1.21)	HR 1.06 (0.97–1.16)	Age, sex, race/ethnicity, Hispanic origin, household income, highest level of household education, family structure, birthplace in the United States, health insurance coverage
	Lowe <i>et al.</i> (13)	2019	UK	Wrist fractures	HR 1.09 (1.05–1.13)	HR 1.06 (1.01–1.10)	Age, sex, race/ethnicity, Hispanic origin, household income, highest level of household education, family structure, birthplace in the United States, health insurance coverage
	Lowe <i>et al.</i> (13)	2019	UK	Proximal humeral fractures	HR 1.08 (0.99–1.17)	HR 1.03 (0.94–1.13)	Age, sex, race/ethnicity, Hispanic origin, household income, highest level of household education, family structure, birthplace in the United States, health insurance coverage
Osteoporosis	Garg <i>et al.</i> (11)	2015	USA	Other fracture	OR 1.42 (1.07–1.89)	OR 1.40 (1.04–1.88)	Not available
	Shaheen <i>et al.</i> (14) (NEDS)	2019	USA	Osteoporosis	–	OR 1.31 (1.12–1.54)	Age, sex, race/ethnicity (white, nonwhite), insurance (private, government, self-pay, no charge, other), and household income quartile
	Shaheen <i>et al.</i> (14) (NIS)	2019	USA	Osteoporosis	–	OR 1.25 (1.24–1.26)	Age, sex, race/ethnicity (white, nonwhite), insurance (private, government, self-pay, no charge, other), and household income quartile
Osteopenia	Wu <i>et al.</i> (12)	2017	Taiwan	Osteoporosis	HR 8.01 (6.32–10.16)	HR 4.72 (3.68–6.05)	Age, sex, comorbidities (hypertension, diabetes mellitus, hyperlipidaemia, chronic kidney disease, chronic liver disease, chronic obstructive pulmonary disease, depression), and use of systemic corticosteroids
	Garg <i>et al.</i> (11)	2015	USA	Trochanter	OR 1.86 (1.10–3.15)	OR 1.97 (1.14–3.41)	Not available
	Shaheen <i>et al.</i> (14) (NEDS)	2019	USA	Osteopenia	–	OR 1.86 (1.36–2.55)	Age, sex, race/ethnicity (white, nonwhite), insurance (private, government, self-pay, no charge, other), and household income quartile
Bone mineral density	Shaheen <i>et al.</i> (14) (NIS)	2019	USA	Osteopenia	–	OR 1.84 (1.20–2.82)	Age, sex, race/ethnicity (white, nonwhite), insurance (private, government, self-pay, no charge, other), and household income quartile
	Garg <i>et al.</i> (11)	2015	USA	Trochanter	OR 2.03 (1.24–3.33)	OR 2.08 (1.27–3.42)	Not available
	Garg <i>et al.</i> (11)	2015	USA	Total femur	$\beta$ –0.29 (–0.49 to –0.10)	Adjusted $\beta$ –0.27 (–0.46 to –0.08)	Not available
	Silverberg <i>et al.</i> (7)	2015	USA	Total femur	$\beta$ –0.50 (–0.80 to –0.19)	Adjusted $\beta$ –0.42 (–0.68 to –0.16)	Age, gender, race/ethnicity, household income, birthplace in the United States, the highest level of education in the household, body mass index percentile (ordinal), and milk consumption in the past 30 days (binary)
	Garg <i>et al.</i> (11)	2015	USA	Trochanter	$\beta$ –0.26 (–0.43 to –0.09)	Adjusted $\beta$ –0.25 (–0.42 to –0.08)	Not available
	Silverberg <i>et al.</i> (7)	2015	USA	Trochanter	$\beta$ –0.31 (–0.57 to –0.05)	Adjusted $\beta$ –0.29 (–0.54 to –0.05)	Age, gender, race/ethnicity, household income, birthplace in the United States, the highest level of education in the household, body mass index percentile (ordinal), and milk consumption in the past 30 days (binary)
	Garg <i>et al.</i> (11)	2015	USA	Femoral neck	$\beta$ –0.18 (–0.37 to 0.01)	Adjusted $\beta$ –0.13 (–0.31 to 0.04)	Not available
	Silverberg <i>et al.</i> (7)	2015	USA	Femoral neck	$\beta$ –0.31 (–0.60 to –0.02)	Adjusted $\beta$ –0.29 (–0.53 to –0.05)	Age, gender, race/ethnicity, household income, birthplace in the United States, the highest level of education in the household, body mass index percentile (ordinal), and milk consumption in the past 30 days (binary)
	Garg <i>et al.</i> (11)	2015	USA	Total lumbar spine	$\beta$ –0.18 (–0.37 to 0.01)	Adjusted $\beta$ –0.22 (–0.41 to –0.03)	Not available
	Silverberg <i>et al.</i> (7)	2015	USA	Total lumbar spine	$\beta$ –0.51 (–0.86 to –0.17)	Adjusted $\beta$ –0.31 (–0.52 to –0.11)	Age, gender, race/ethnicity, household income, birthplace in the United States, the highest level of education in the household, body mass index percentile (ordinal), and milk consumption in the past 30 days (binary)

CI, confidence interval; HR, hazard ratio; OR, odds ratio; RR, relative risk.

**Table S3** Methodological quality assessment (risk of bias) of included studies by Newcastle-Ottawa Scales (NOS)

Study	Selection				Comparability	Outcome			Total score
	Case definition	Representativeness	Control selection	Control definition		Assessment of outcome	Length of follow-up	Adequacy of follow-up	
Wu <i>et al.</i> (12), 2017	*	*	*	*	**	*	*	–	8
Lowe <i>et al.</i> (13), 2019	*	*	*	*	**	*	*	–	8
Shaheen <i>et al.</i> (14), 2019 (NEDS)	*	*	*	*	**	*	–	–	7
Shaheen <i>et al.</i> (14), 2019 (NIS)	*	*	*	*	**	*	–	–	7

The asterisks represent a score, each asterisk represents one star.

**Table S4** Quality assessment (risk of bias) of included studies by the Agency for Healthcare Research and Quality (AHRQ) checklist

Item	Pedreira <i>et al.</i> (5), 2007	Penterich <i>et al.</i> (6), 2012	Silverberg <i>et al.</i> (7), 2015	Leung <i>et al.</i> (8), 2017	Aalto-Korte <i>et al.</i> (9), 1997	Garg <i>et al.</i> (10), 2015	Garg <i>et al.</i> (11), 2015
1) Define the source of information (survey, record review)	R	R	R	R	R	R	R
2) List inclusion and exclusion criteria for exposed and unexposed subjects (cases and controls) or refer to previous publications	R	U	R	R	R	R	R
3) Indicate time period used for identifying patients	R	U	R	R	Q	R	R
4) Indicate whether or not subjects were consecutive if not population-based	U	U	R	U	U	R	R
5) Indicate if evaluators of subjective components of study were masked to other aspects of the status of the participants	Q	Q	Q	Q	U	R	R
6) Describe any assessments undertaken for quality assurance purposes (e.g., test/retest of primary outcome measurements)	R	U	R	R	Q	R	R
7) Explain any patient exclusions from analysis	R	U	R	R	Q	R	R
8) Describe how confounding was assessed and/or controlled	Q	U	R	R	U	R	R
9) If applicable, explain how missing data were handled in the analysis	Q	U	R	Q	U	R	R
10) Summarize patient response rates and completeness of data collection	Q	Q	R	Q	Q	R	Q
11) Clarify what follow-up, if any, was expected and the percentage of patients for which incomplete data or follow-up was obtained	Q	Q	Q	Q	Q	Q	Q

ARHQ methodology checklist for cross-sectional study (<http://www.ncbi.nlm.nih.gov/books/NBK35156/>). R, yes; Q, no; U, unclear.