

Supplementary Table S1**Summary of UK guidance for the management of vitamin D deficiency in children****Supplementary Figure S1****Flowchart of study cohort selection****Supplementary Table S2****Drug code related to single-ingredient vitamin D products****Supplementary Table S3****Read codes related to vitamin D deficiency and 25-hydroxyvitamin D tests****Supplementary Table S4****No. of children with a record of diagnosis Read codes suggestive of vitamin D deficiency in the 90 days prior to or on the date of the incident prescription, stratified by pre-supplementation 25-hydroxyvitamin D concentrations****Supplementary Table S5****Multivariable Poisson regression models of incidence of vitamin D supplementation prescribing in children stratified by sex (Complete-cases only).****Supplementary Figure S2****Time trends in vitamin D supplementation prescribing in children by product types****Supplementary Table S6****Doses of vitamin D supplementation prescribed stratified by age group****Supplementary Table S7****Vitamin D supplementation dosing frequencies observed in the study cohort**

Supplementary Table S1

Summary of UK guidance for the management of vitamin D deficiency in children

Guideline	Definition of vitamin D deficiency	Recommendations on supplementation for primary prevention	Recommendations on supplement for treatment of vitamin D deficiency
SACN (2007)	<25 nmol/L	0-6 months: 340 IU daily; 7 months to 3 years: 280 IU daily	No recommendations
NICE (2008)	<25 nmol/L	6 months to 4 years: 300 IU daily	No recommendations
DHSC (2012)	Not explicitly defined	6 months to 5 years: 280 - 340 IU daily Those infants who are fed infant formula will not need vitamin drops until they are receiving less than 500ml of infant formula a day. Breastfed infants from one month of age if their mother has not taken vitamin D supplements throughout pregnancy.	No recommendations
BPABG (2012)	<25 nmol/L 25-50 nmol/L defined as insufficiency	6 months to 5 years: as per DHSC (2012) recommendations Exclusively breastfed infants receive vitamin D supplements from soon after birth.	No recommendations
RCPCH (2012)	Not explicitly defined	As per NICE (2008) and DHSC (2012) recommendations	No recommendations
RCPCH (2013)	<25 nmol/L 25-50 nmol/L defined as insufficiency	Newborn up to 1 month: 300 - 400 IU daily 1 month - 18 years: 400 - 1,000 IU daily	Up to 6 months: 1,000 - 3,000 IU daily* 6 months - 12 years: 6,000 IU daily* 12 - 18 years: 10,000 IU daily* *For 4 - 8 weeks
NICE (2014)	<25 nmol/L	0 - 6 months: 340 IU daily Older infants and children up to the age of 5: 280 IU daily	No recommendations
NOS (2015)	<25 nmol/L 25-50 nmol/L defined as insufficiency	As per DHSC (2012) recommendations	1- 6 months: 3,000 IU daily* 6 months - 12 years: 6,000 IU daily* 12 - 18 years: 10,000 IU daily* *For 8 - 12 weeks
SACN (2016)	<25 nmol/L	0 up to 1 year (including exclusively and partially breast-fed infants, from birth): 340 - 400 IU daily 1 year or older: 400 IU daily	No recommendations
NICE CKS (2016)	<25 nmol/L	As per SACN (2016) recommendations	1- 6 months: 3,000 IU daily* 6 months - 12 years: 6,000 IU daily* 12 - 18 years: 10,000 IU daily* *For 8 - 12 weeks

Key:

- SACN (2007): Scientific Advisory Committee on Nutrition - Update on Vitamin D³¹
- NICE (2008): The National Institute for Health and Care Excellence - Improving the nutrition of pregnant and breastfeeding mothers and children in low-income households³²
- DHSC (2012): Department of Health and Social Care - Vitamin D - advice on supplements for at risk groups³³
- BPABG (2012): British Paediatric and Adolescent Bone Group's position statement on vitamin D deficiency³⁴
- RCPCH (2012): Royal College of Paediatrics and Child Health - Vitamin D: Position statement³⁵
- RCPCH (2013): Royal College of Paediatrics and Child Health - Guide for Vitamin D in Childhood³⁶
- NICE (2014): The National Institute for Health and Care Excellence - Vitamin D: increasing supplement use in at-risk groups³⁷
- NOS (2015): National Osteoporosis Society - Vitamin D and Bone Health³⁸
- SACN (2016): Scientific Advisory Committee on Nutrition - vitamin D and health report³⁹
- NICE CKS (2016): The National Institute for Health and Care Excellence - Clinical Knowledge Summaries - Vitamin D deficiency in children⁴⁰

Supplementary Figure S1

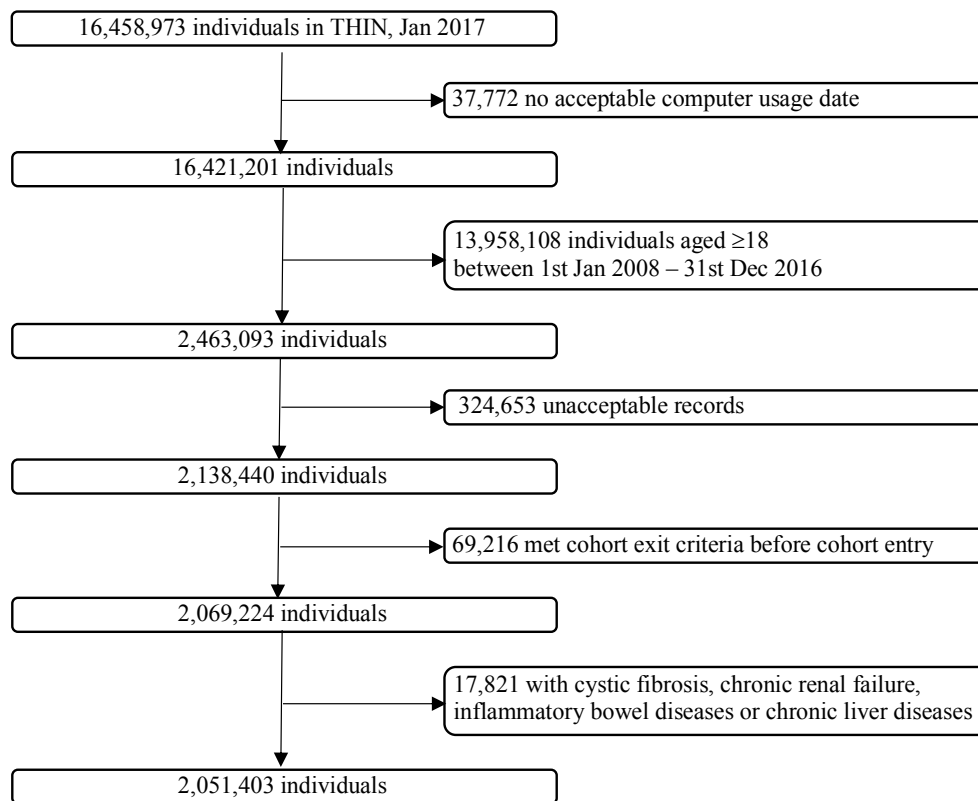


Figure S1: Flowchart of study cohort selection. The diagram displays the numbers of patients excluded from the THIN cohort and reasons for exclusion, leading to selection of the study cohort.

Supplementary Table S2

Drug code related to single-ingredient vitamin D products

2a. Drug code related to single-ingredient vitamin D products

Drug code	Description
29742978	colecalfiferol 800unit capsules
30212978	colecalfiferol 2,500units/drop oral drops sugar free
30582978	colecalfiferol 40,000unit tablets
30643978	colecalfiferol 800unit capsules
32236978	colecalfiferol 4,000unit tablets
32237978	colecalfiferol 4,000unit tablets
32265978	colecalfiferol 4,000unit capsules
32267978	colecalfiferol 1,000unit tablets
32317978	colecalfiferol 50,000unit capsules
34135978	colecalfiferol 3,000unit tablets
34138978	colecalfiferol 800unit capsules
34144978	colecalfiferol 1,000unit capsules
38846978	colecalfiferol 20,000unit tablets
39354978	colecalfiferol 50,000units/1ml oral solution unit dose ampoules sugar free
39355978	colecalfiferol 50,000units/1ml oral solution unit dose ampoules sugar free
47464978	colecalfiferol 2,740units/ml oral drops sugar free
47465978	colecalfiferol 2,740units/ml oral drops sugar free
48011978	colecalfiferol 15,000units/5ml oral solution
51017978	colecalfiferol 15,000units/5ml oral solution
51018978	colecalfiferol 15,000units/5ml oral solution
51473978	colecalfiferol 200units/drop oral drops sugar free
51484978	colecalfiferol 1,000unit capsules
52073979	colecalfiferol 40,000unit capsules
52074979	colecalfiferol 40,000unit capsules
52154979	colecalfiferol 20,000unit capsules
53089979	colecalfiferol 15,000units/5ml oral solution
53090979	colecalfiferol 15,000units/5ml oral solution
53091979	colecalfiferol 15,000units/5ml oral solution
53092979	colecalfiferol 15,000units/5ml oral solution
53321979	ergocalciferol 125microgram tablets
53322979	ergocalciferol 125microgram tablets
53352979	colecalfiferol 20,000unit tablets
53353979	colecalfiferol 5,000unit tablets
53355979	colecalfiferol 400unit tablets
53356979	colecalfiferol 30,000unit capsules
53357979	colecalfiferol 5,000unit capsules
53358979	colecalfiferol 3,000unit capsules
53359979	ergocalciferol 12.5microgram tablets
53362979	colecalfiferol 400unit capsules
53365979	colecalfiferol 1,000unit capsules
53366979	colecalfiferol 600unit capsules
53367979	colecalfiferol 2,200unit capsules
53368979	colecalfiferol 10,000unit capsules
53369979	colecalfiferol 20,000unit capsules
53370979	colecalfiferol 20,000unit capsules
53371979	colecalfiferol 50,000unit capsules
53377978	colecalfiferol 2,400units/ml oral drops sugar free
53378978	colecalfiferol 2,400units/ml oral drops sugar free
53461978	ergocalciferol 12.5microgram tablets
53464978	colecalfiferol 20,000unit capsules
53641979	ergocalciferol 250microgram tablets
53650979	ergocalciferol 1.25mg capsules
54637979	colecalfiferol 500unit capsules
54638979	colecalfiferol 500unit capsules
54716979	colecalfiferol 1,000unit capsules
54790979	ergocalciferol 1.25mg capsules
54889979	colecalfiferol 3,000units/ml oral solution
54890979	colecalfiferol 2,000units/ml oral solution

2a. Drug code related to single-ingredient vitamin D products - continued

Drug code	Description
54891979	coleciferol 2,000units/ml oral solution
54916979	coleciferol 800unit tablets
54917979	coleciferol 800unit tablets
55053979	coleciferol 3,000unit tablets
55054979	coleciferol 20,000unit tablets
55055979	coleciferol 2,200unit tablets
55056979	coleciferol 10,000unit tablets
55060979	coleciferol 5,000unit tablets
55061979	ergocalciferol 3,000units/ml oral solution
55062979	ergocalciferol 3,000units/ml oral solution sugar free
55064979	coleciferol 3,000units/ml oral solution sugar free
55065979	coleciferol 20,000units/ml oral solution sugar free
55066979	coleciferol 30,000unit capsules
55067979	coleciferol 30,000unit capsules
55068979	coleciferol 5,000unit capsules
55070979	coleciferol 400unit capsules
55072979	coleciferol 1,000unit capsules
55074979	coleciferol 2,200unit capsules
55076979	coleciferol 10,000unit capsules
55077979	coleciferol 20,000unit capsules
55078979	coleciferol 50,000unit capsules
55079979	coleciferol 50,000unit capsules
55194978	coleciferol 10,000units/ml oral solution sugar free
55195978	coleciferol 10,000units/ml oral drops sugar free
55196978	coleciferol 10,000units/ml oral drops sugar free
55197978	coleciferol 10,000units/ml oral drops sugar free
55257978	coleciferol 20,000unit capsules
55558979	ergocalciferol 50,000unit capsules
56123979	ergocalciferol 1.25mg capsules
56242979	coleciferol 3,000unit tablets
56244979	coleciferol 20,000unit tablets
56246979	coleciferol 2,200unit tablets
56248979	coleciferol 10,000unit tablets
56310979	coleciferol 400unit tablets
56313979	coleciferol 1,000unit tablets
56949978	coleciferol 25,000unit tablets
56950978	coleciferol 25,000unit tablets
57024978	coleciferol 1,000unit tablets
57965979	coleciferol 20,000unit capsules
58139979	coleciferol 5,000unit tablets
58209979	ergocalciferol 3,000units/ml oral solution
58346979	coleciferol 800unit capsules
58349979	coleciferol 5,000unit capsules
58353979	coleciferol 1,000unit capsules
58355979	coleciferol 20,000unit capsules
58356979	coleciferol 20,000unit capsules
58768979	coleciferol 2,000units/ml oral solution sugar free
58769979	coleciferol 2,000units/ml oral solution sugar free
58782979	coleciferol 3,000units/ml oral solution sugar free
59522978	coleciferol 2,000unit tablets
59525978	coleciferol 40,000unit capsules
59527978	coleciferol 5,000unit tablets
59528978	coleciferol 20,000unit capsules
59769979	coleciferol 800units/ml oral drops sugar free
59770979	coleciferol 800units/ml oral drops sugar free
59771979	coleciferol 400units/dose oral spray sugar free
59772979	coleciferol 400units/dose oral spray sugar free
59843979	coleciferol 20,000unit capsules
59981979	ergocalciferol 15,000units/5ml oral solution
60056979	ergocalciferol 300,000units/1ml solution for injection ampoules

2a. Drug code related to single-ingredient vitamin D products - continued

Drug code	Description
60224979	coleciferol 300,000units/1ml solution for injection ampoules
60225979	ergocalciferol 300,000units/1ml solution for injection ampoules
60373979	fulfium-d3 800unit capsules
60374979	coleciferol 800unit capsules
60566979	vitamin d2 3,000units/ml oral solution sugar free
60568979	ergocalciferol 20,000units/ml oral solution sugar free
60572979	coleciferol 20,000units/ml oral solution sugar free
60594979	coleciferol 1,000unit tablets
61563979	coleciferol 30,000units/5ml oral solution
61592979	coleciferol 2,000units/ml oral drops sugar free
61593979	coleciferol 2,000units/ml oral drops sugar free
61910979	coleciferol 400unit tablets
61911979	coleciferol 400unit tablets
62001979	coleciferol 1,000units/ml oral solution
62002979	coleciferol 1,000units/ml oral solution
62087979	coleciferol 10,000units/ml oral solution
62088979	coleciferol 10,000units/ml oral solution
62116979	coleciferol 5,000unit capsules
62118979	coleciferol 3,000unit capsules
62152979	coleciferol 6,000units/5ml oral suspension
62324979	coleciferol 20,000units/ml oral drops
62356979	ergocalciferol 12.5microgram tablets
62357979	ergocalciferol 12.5microgram tablets
62536979	coleciferol 400unit capsules
62622979	coleciferol 1,000unit tablets
62626979	coleciferol 1,000unit capsules
62643979	coleciferol 600unit capsules
62645979	coleciferol 2,200unit capsules
62986979	coleciferol 20,000unit capsules
63201979	coleciferol 2,000unit capsules
64131979	coleciferol 4,000units/5ml oral suspension
68364979	ergocalciferol 400units/5ml oral solution
68382979	ergocalciferol 20,000units/5ml oral suspension
68384979	ergocalciferol 20,000units/5ml oral solution
68392979	ergocalciferol 120units/5ml oral solution
68396979	ergocalciferol 100,000units/5ml oral solution
68780978	coleciferol 20,000unit capsules
68781978	coleciferol 20,000unit capsules
69915979	coleciferol 400units/5ml oral suspension
69917979	coleciferol 20,000units/5ml oral suspension
69920979	coleciferol 1,000units/5ml oral suspension
70249978	ergocalciferol 1.25mg capsules
73011978	coleciferol 25,000units/1ml oral solution unit dose ampoules sugar free
73012978	coleciferol 25,000units/1ml oral solution unit dose ampoules sugar free
73102978	coleciferol 3,200unit capsules
73128978	coleciferol 10,000unit capsules
73129978	coleciferol 20,000unit capsules
73301978	coleciferol 20,000units/ml oral solution
73391978	coleciferol 3,200unit capsules
73392978	coleciferol 3,200unit capsules
77093978	coleciferol 15,000units/5ml oral solution
78387978	coleciferol 500unit orodispersible tablets sugar free
78388978	coleciferol 500unit orodispersible tablets sugar free
78389978	coleciferol 2,000unit orodispersible tablets sugar free
78390978	coleciferol 2,000unit orodispersible tablets sugar free
78426978	coleciferol 2,200unit tablets
78428978	coleciferol 5,000unit tablets
78441978	coleciferol 1,000unit capsules
78719978	coleciferol 2,000unit tablets
78720978	coleciferol 2,000unit tablets

2a. Drug code related to single-ingredient vitamin D products - continued

Drug code	Description
79321978	coleciferol 200units/drop oral drops sugar free
79322978	coleciferol 200units/drop oral drops sugar free
79338978	ergocalciferol 6,000units/5ml oral solution
79340978	ergocalciferol 10,000units/5ml oral solution
79935978	ergocalciferol 600,000units/1.5ml solution for injection ampoules
79960978	coleciferol 280unit chewable tablets
79961978	coleciferol 280unit chewable tablets
79993978	coleciferol 20,000unit tablets
80016978	coleciferol 400unit capsules
80018978	coleciferol 1,000unit tablets
80019978	coleciferol 1,000unit capsules
80022978	coleciferol 20,000unit capsules
80147979	ergocalciferol 800units/5ml oral suspension
80151979	ergocalciferol 6,000units/5ml oral suspension
80153979	ergocalciferol 50,000units/5ml oral suspension
80157979	ergocalciferol 30,000units/5ml oral suspension
80159979	ergocalciferol 3,000units/5ml oral suspension
80169979	ergocalciferol 10,000units/5ml oral suspension
80416979	coleciferol 15,000units/5ml oral suspension
80883998	coleciferol 3,000units/ml oral solution sugar free
80885998	coleciferol 3,000units/ml oral solution sugar free
80886998	coleciferol 20,000units/ml oral solution sugar free
80887998	coleciferol 20,000units/ml oral solution sugar free
80914998	coleciferol 2,000units/ml oral drops sugar free
80915998	coleciferol 2,000units/ml oral drops sugar free
80947998	ergocalciferol 20,000units/ml oral solution sugar free
80952998	coleciferol 800unit capsules
80958998	coleciferol 20,000unit capsules
81004998	coleciferol 30,000unit capsules
81007998	coleciferol 30,000unit capsules
81009998	coleciferol 10,000unit capsules
81010998	coleciferol 10,000unit capsules
81011998	coleciferol 2,500unit capsules
81012998	coleciferol 2,500unit capsules
81013998	coleciferol 1,000unit capsules
81014998	coleciferol 1,000unit capsules
81015998	coleciferol 400unit capsules
81074998	coleciferol 5,000unit capsules
81138998	coleciferol 500 units tablets
81252998	coleciferol 1,000unit tablets
81253998	coleciferol 1,000unit tablets
81328998	coleciferol 800unit capsules
81329998	coleciferol 800unit capsules
81335998	coleciferol 20,000unit capsules
81464998	coleciferol 400unit capsules
81568998	coleciferol 10000units/ml oral solution
81612998	coleciferol 1,000unit tablets
81624998	coleciferol 10,000units/5ml oral suspension
81631998	coleciferol 2,200unit capsules
81710998	coleciferol 50,000unit capsules
82283998	coleciferol 15,000units/5ml oral solution
82513998	coleciferol 20,000unit capsules
82514998	ergocalciferol 1.25mg capsules
82946978	coleciferol 20,000unit tablets
82956978	coleciferol 20,000unit capsules
83392978	coleciferol 50,000unit tablets
83393978	coleciferol 50,000unit tablets
83468978	coleciferol 20,000unit tablets
83469978	coleciferol 10,000unit tablets
83480978	coleciferol 800unit capsules

2a. Drug code related to single-ingredient vitamin D products - continued

Drug code	Description
83743978	ergocalciferol 1,000units/5ml oral solution
83744978	colecalfiferol 5,000units/5ml oral solution
83746978	colecalfiferol 5,000units/5ml oral solution
83747978	colecalfiferol 10,000units/5ml oral solution
83748978	colecalfiferol 10,000units/5ml oral solution
83750978	colecalfiferol 10,000units/5ml oral solution
84072978	colecalfiferol 5,000unit tablets
84414978	ergocalciferol 1,500units/ml oral solution sugar free
84586978	colecalfiferol 20,000unit tablets
84592978	colecalfiferol 400unit tablets
84600978	colecalfiferol 1,000unit tablets
84680998	colecalfiferol oral liquid
85005998	ergocalciferol oral liquid
85220998	ergocalciferol 600,000units/2ml solution for injection ampoules
85224998	ergocalciferol 300,000units/1ml solution for injection ampoules
85329978	colecalfiferol 1,000unit tablets
86614979	ergocalciferol 300,000units/1ml solution for injection ampoules
86615979	ergocalciferol 300,000units/1ml solution for injection ampoules
93163990	ergocalciferol 600,000units/2ml solution for injection ampoules
93164990	ergocalciferol 300,000units/1ml solution for injection ampoules
93384992	calciferol 10 mcg tab
93390992	calciferol 1,000 iu i/u tab
93401992	calciferol 5000 i/u tab
94809990	ergocalciferol 1.25mg tablets
94810990	ergocalciferol 250microgram tablets
95606992	ergocalciferol 600ku/1.5ml solution
95872992	calciferol 3,000 iu tab
95873992	calciferol 30,000 iu/ml inj
95875992	calciferol soln 400u/5ml in arachis oil sol
95877992	calciferol 40,000 iu/ml inj
95878992	calciferol 400 iu/ml sol
96131992	calciferol 400 iu/ml i/u syr
96132992	calciferol .25 mg cap
96133992	calciferol 1 mg cap
96134992	calciferol 1,000 iu i/u cap
96599992	calciferol 75 mcg inj
96600992	ergocalciferol 250microgram tablets
96601992	calciferol 20,000 iu cap
96788998	ergocalciferol 400000units/ml oral solution
97023992	calciferol 100,000 iu/ml inj
97024992	calciferol 600,000 iu/ml inj
97032992	calciferol 300 iu/ml i/u syr
97033992	calciferol drops liq
97034992	calciferol 400 i/u inj
97035992	calciferol 9,000 iu/ml liq
97036992	calciferol 1,000 iu/5ml sol
97037992	calciferol 300 mg tab
97038992	calciferol 15 mcg tab
97238989	ergocalciferol 1.25mg tablets
97238990	ergocalciferol 250microgram tablets
97767998	calciferol bp 3000units/ml solution
98374992	vitamin d2 tab
98421997	ergocalciferol 1.25mg tablets
98421998	ergocalciferol 250microgram tablets
98422997	ergocalciferol 1,000units/5ml oral suspension
98422998	ergocalciferol 3,000units/ml oral solution sugar free
98925998	ergocalciferol 600,000units/2ml solution for injection ampoules
99762990	ergocalciferol 250microgram tablets
99763988	ergocalciferol 250microgram tablets
99763990	ergocalciferol 300,000units/1ml solution for injection ampoules

2a. Drug code related to combination vitamin D products

Drug code	Description
34026978	colecalfiferol 1,000unit / calcium carbonate 2.5g chewable tablets
34027978	colecalfiferol 1,000unit / calcium carbonate 2.5g chewable tablets
52015979	colecalfiferol 800unit / calcium carbonate 1.25g chewable tablets
52016979	colecalfiferol 800unit / calcium carbonate 1.25g tablets
56947978	colecalfiferol 800unit / calcium carbonate 2.5g chewable tablets
56948978	colecalfiferol 800unit / calcium carbonate 2.5g chewable tablets
58270979	generic caldrink d3 liquid
60543979	colecalfiferol 100unit / calcium carbonate 400mg chewable tablets
60544979	colecalfiferol 100unit / calcium carbonate 400mg chewable tablets
61594979	colecalfiferol 150unit / calcium 250mg tablets
61595979	colecalfiferol 150unit / calcium 250mg tablets
64223979	calcium carbonate 400mg / ergocalciferol 2.5microgram tablets
64224979	calcium carbonate 400mg / ergocalciferol 2.5microgram tablets
64830979	calcium and ergocalciferol tablets
64831979	colecalfiferol 100unit / calcium carbonate 400mg tablets
68756978	colecalfiferol 880unit / calcium carbonate 2.5g chewable tablets
68757978	colecalfiferol 880unit / calcium carbonate 2.5g chewable tablets
73294978	generic healthy start children's vitamin drops
73598978	colecalfiferol 100unit / calcium carbonate 400mg tablets
80849998	calcium carbonate 400mg with colecalciferol 100 units chewable tablets
81191998	colecalfiferol 400unit / calcium carbonate 1.5g tablets
81268998	colecalfiferol 200unit / calcium carbonate 750mg tablets
81269998	colecalfiferol 200unit / calcium carbonate 750mg tablets
81655998	colecalfiferol 800unit / calcium carbonate 1.25g chewable tablets
81656998	colecalfiferol 800unit / calcium carbonate 1.25g chewable tablets
82214998	colecalfiferol 400unit / calcium carbonate 1.25g tablets
82215998	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
82229978	generic littlevit multivitamin drops
82344998	colecalfiferol 400unit / calcium carbonate 1.5g tablets
82429979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
82483998	colecalfiferol 400unit / calcium carbonate 1.5g chewable tablets
82546978	colecalfiferol 400unit / calcium carbonate 1.5g chewable tablets
82752998	generic sandocal+d 1200 effervescent tablets
82753998	calcium lactate gluconate with calcium carbonate and colecalciferol 1200mg calcium with 800iu effervescent tablets
82966998	generic sandocal+d 600 effervescent tablets
82967998	calcium lactate gluconate with calcium carbonate and colecalciferol 600mg calcium with 400iu effervescent tablets
83420998	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
83638978	colecalfiferol 1,000unit / folic acid 400microgram capsules
83639978	colecalfiferol 1,000unit / folic acid 400microgram capsules
84212998	risedronate sodium 35mg with calcium carbonate 2500mg & colecalciferol 22micrograms tablets and granules
84286998	colecalfiferol 400unit / calcium carbonate 1.5g effervescent tablets
84287998	colecalfiferol 400unit / calcium carbonate 1.5g chewable tablets
84292998	colecalfiferol 400unit / calcium carbonate 1.5g chewable tablets
84362998	vitamins c & d3 with folic acid tablets
84363998	vitamins c & d3 with folic acid tablets
86598998	alendronic acid 70mg / colecalciferol 70microgram tablets
86599998	alendronic acid 70mg / colecalciferol 70microgram tablets
88002998	dolomite with vitamin d tablets
88144997	calcium carbonate 600mg with vitamin d % micrograms with minerals chewable tablets
88144998	calcium carbonate 600mg with vitamin d and minerals 5 micrograms tablets
88225998	calcium carbonate 600mg with vitamin d and 5 micrograms tablets
88233979	generic abidec multivitamin drops
89183998	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
89439998	colecalfiferol 440unit / calcium carbonate 1.25g effervescent granules sachets
89637998	colecalfiferol 400unit / calcium carbonate 1.5g chewable tablets
89647998	colecalfiferol 400unit / calcium carbonate 1.5g chewable tablets
89828997	multivitamin and mineral chewable tablets

2a. Drug code related to combination vitamin D products - continued

Drug code	Description
89828998	calcium carbonate 600mg with vitamin d and minerals 5 micrograms tablets
90498998	nicotinic acid with colecalciferol and calcium gluconate tablet
91053998	colecalfiferol 800unit / calcium phosphate 3.1g oral powder sachets
91526998	calcium carbonate 600mg with vitamin d and 5 micrograms tablets
91987979	colecalfiferol 400unit / calcium carbonate 1.5g chewable tablets
91989979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
91990979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
91991979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
91993979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
91994979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
91995979	colecalfiferol 200unit / calcium carbonate 1.25g chewable tablets
91996979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
91997979	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
91998979	colecalfiferol 200unit / calcium carbonate 1.25g chewable tablets
92000979	colecalfiferol 200unit / calcium carbonate 1.25g chewable tablets
92001979	colecalfiferol 200unit / calcium carbonate 1.25g chewable tablets
92004979	calcium and ergocalciferol tablets
93127992	calcium 500mgs & vitamin d 400iu tab
93276998	generic abidec multivitamin drops
94021990	calcium and ergocalciferol tablets
94089992	calcium + vitamin d 300 mg tab
94756992	calcium & vitamin d 6000 i/u tab
96015992	vit.a /vit.b1 /vit.b2 /vit.c /vit.d2 /ni pow
96020992	calcium and ergocalciferol tablets
96737998	calciferol with calcium tablets
96789998	calcium and ergocalciferol tablets
96897998	calcium and ergocalciferol tablets
96920998	colecalfiferol 800unit / calcium phosphate 3.1g oral powder sachets
96959996	colecalfiferol 440unit / calcium carbonate 1.25g effervescent granules sachets
96959997	colecalfiferol 400unit / calcium carbonate 1.25g chewable tablets
96959998	colecalfiferol 200unit / calcium carbonate 1.25g chewable tablets
97031992	calciferol/calcium gluconate tab
97064992	calcium 500mgs & vitamin d 200iu i/u tab
97138998	calcium and ergocalciferol tablets
97248990	calcium and ergocalciferol tablets
97780990	calcium and ergocalciferol tablets
97815990	calcium and ergocalciferol tablets
97935998	generic abidec multivitamin drops
98247992	vit.a /vit.b1 /vit.b2 /vit.c /vit.d2 /ni eli
98249990	calcium and ergocalciferol tablets
98581990	calcium and ergocalciferol tablets
98700997	colecalfiferol 200unit / calcium carbonate 1.25g chewable tablets
98700998	colecalfiferol 200unit / calcium carbonate 1.25g chewable tablets
99018990	calcium and ergocalciferol tablets
99733992	ascorbic acid/vitamin a/vitamin d 2 25 mg tab

Supplementary Table S3**Read codes related to vitamin D deficiency and 25-hydroxyvitamin D tests**

Read code	Description
C28..00	vitamin d deficiency
C28..11	osteomalacia
C28..12	rickets
C280.00	active rickets
C282.00	osteomalacia unspecified
C28z.00	avitaminosis d nos
C2B..00	vitamin d insufficiency
J690.11	coeliac rickets
K080300	renal rickets
44LA.00	serum vitamin d
44LM.00	plasma 25-hydroxyvitamin d3 level
44LP.00	serum 25-hydroxy vitamin d3 level
44Lg.00	serum vitamin d2 level
44Ln.00	serum 25-hydroxyvitamin d2 level
4QB4.00	vitamin d level
4QB4000	vitamin d2 level
4QB4100	vitamin d3 level
4QB4200	25-hydroxyvitamin d2 level
4QB4300	25-hydroxyvitamin d3 level
4QB4400	combined total vitamin d2 and d3 level
4QB4500	25-hydroxyvitamin d level
4QB4600	total 25-hydroxyvitamin d level
4QB4700	serum total 25-hydroxy vitamin d level
5788	radioassay - vitamin d

Supplementary Table S4

No. of children with a record of diagnosis Read codes suggestive of vitamin D deficiency in the 90 days prior to or on the date of the incident prescription, stratified by pre-supplementation 25-hydroxyvitamin D concentrations

	25-hydroxyvitamin D concentrations at initiation of supplementation (nmol/L)							Total (n=12,277)
	<10 (n=3,738)	10 - 20 (n=3,898)	>20 - 30 (n=441)	>30 - 50 (n=31)	>50 (n=9)	No test (n=3,986)	Undetermined (n=174)	
No. of children with symptoms, n								
Musculoskeletal and non-specific pain	750	769	67	4	0	340	23	1,953
Tiredness and fatigue	556	547	46	3	0	106	5	1,263
Failure to thrive	25	33	7	1	0	36	3	105
Bone fracture	13	15	2	1	0	42	6	79
Skeletal deformity	15	26	8	1	0	35	2	87
Numbness or paraesthesia	14	9	1	0	0	7	0	31
Hypocalcaemia	9	2	2	0	0	16	0	29
Seizure or tetany	1	3	0	0	0	16	1	21
Abnormal gait	4	9	1	0	0	6	1	21
Muscle weakness	9	7	2	0	0	3	0	21
Delay in motor development	0	0	0	0	0	5	0	5
Cardiomyopathy	0	0	0	0	0	2	0	2
Total, n (%)	1,396 (37.3)	1,420 (36.4)	136 (30.8)	10 (32.3)	0 (0)	614 (15.4)	41 (23.6)	3,617 (29.5)

Supplementary Table S5

Multivariable Poisson regression models of incidence of vitamin D supplementation prescribing in children stratified by sex (complete-case analysis)

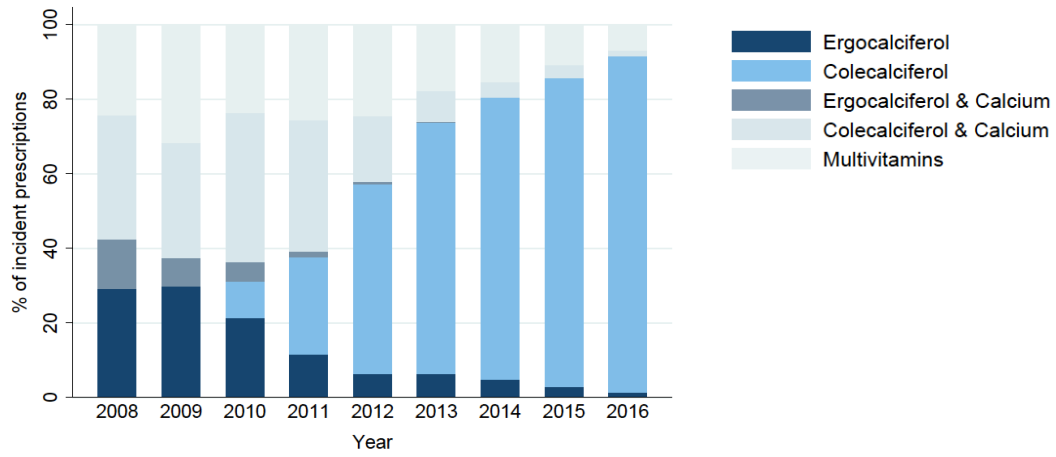
	Male	Female
	IRR ^a (95% CI)	IRR ^a (95% CI)
Age group		
Up to 6 months	1.00 (Reference)	1.00 (Reference)
6 months - 4 years	2.33 (1.11 – 4.92)	1.37 (0.73 – 2.56)
5 - 11 years	3.08 (1.47 – 6.49)	2.42 (1.30 – 4.51)
12 - 17 years	5.35 (2.54 – 11.24)	8.15 (4.38 – 15.17)
Ethnicity		
White	1.00 (Reference)	1.00 (Reference)
Asian	6.59 (5.92 – 7.33)	6.24 (5.71 – 6.82)
Black	3.67 (3.21 – 4.19)	3.63 (3.26 – 4.05)
Others	3.47 (2.79 – 4.32)	3.79 (3.18 – 4.51)
Mixed	2.32 (1.88 – 2.86)	2.31 (1.94 – 2.75)
Townsend index		
1 (least deprived)	1.00 (Reference)	1.00 (Reference)
2	1.03 (0.88 – 1.21)	0.97 (0.85 – 1.11)
3	1.14 (0.98 – 1.33)	1.12 (0.98 – 1.27)
4	1.32 (1.14 – 1.53)	1.31 (1.16 – 1.49)
5 (most deprived)	1.33 (1.13 – 1.56)	1.41 (1.24 – 1.61)
Country		
England	1.00 (Reference)	1.00 (Reference)
Wales	0.28 (0.18 – 0.42)	0.31 (0.21 – 0.45)
Scotland	0.31 (0.23 – 0.40)	0.23 (0.17 – 0.30)
Northern Ireland	0.37 (0.23 – 0.61)	0.22 (0.13 – 0.38)
Year		
2008	1.00 (Reference)	1.00 (Reference)
2009	2.06 (1.30 – 3.26)	3.03 (1.98 – 4.66)
2010	2.88 (1.87 – 4.45)	4.68 (3.11 – 7.04)
2011	4.70 (3.11 – 7.11)	7.87 (5.30 – 11.68)
2012	9.62 (6.46 – 14.34)	15.19 (10.32 – 22.37)
2013	14.37 (9.68 – 21.32)	20.84 (14.18 – 30.63)
2014	17.62 (11.87 – 26.16)	26.00 (17.69 – 38.22)
2015	18.02 (12.10 – 26.85)	29.35 (19.92 – 43.25)
2016	20.07 (13.43 – 29.98)	31.74 (21.49 – 46.88)

Abbreviations: CI, confidence interval; IRR = incidence rate ratio.

^aAdjusted for all variables listed in the table. The multilevel models included the general practice as a random effect.

Supplementary Figure S2

Time trends in vitamin D supplementation prescribing in children by product types (n=11,743)



Supplementary Table S6**Doses of vitamin D supplementation prescribed stratified by age group**

	Age group			
	Up to 6 months (n = 29)	6 months – 4 years (n = 1,670)	5 - 11 years (n = 3,504)	12 - 17 years (n = 6,540)
Equivalent daily dose, n (%)	25 (86.2%)	1,460 (87.4%)	3,193 (91.1%)	5,929 (90.7%)
≤400 IU/day	8	707	1,110	640
401 – 1,000 IU/day	1	178	625	2,012
1,001 – 3,000 IU/day	15	170	437	1,073
3,001 – 6,000 IU/day	1	377	869	1,082
6,001 – 10,000 IU/day	0	25	129	1,016
>10,000 IU/day	0	3	23	106
Stoss therapy, n (%)	0	24 (1.7%)	94 (2.7%)	437 (6.7%)
<150,000 IU	0	10	32	86
150,000 – 300,000 IU	0	14	61	290
>300,000 IU	0	0	1	61
Undetermined, n (%)	4 (13.8%)	186 (11.1%)	217 (6.2%)	174 (2.7%)

Supplementary Table S7**Vitamin D supplementation dosing frequencies observed in the study cohort (n=11,743)**

Dosing Frequencies	n (%)
Once daily	7,376 (62.8)
Once every 7 days	1,337 (11.4)
Twice a day	1,012 (8.6)
Undetermined	581(5)
Stoss	555 (4.7)
Once 2 times a week	267 (2.3)
Once every 14 days	227 (1.9)
Once 3 times a week	157 (1.3)
Once every 2 days	93 (0.8)
Once every 28 days	41 (0.4)
3 times a day	35 (0.3)
Once every 42 days	19 (0.2)
Others	43 (0.4)