

# **THE VITAMIN D DISCONNECT**

**A SPECIAL REPORT**

**WarburtonS**  
*Family  
Bakers*

# THE VITAMIN D DISCONNECT

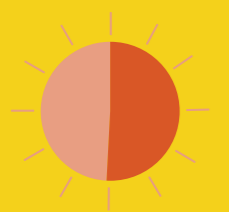
## A SPECIAL REPORT



Two thirds (66%) of **healthcare professionals** say if Vitamin D intake does not improve there will be **increased strain on the NHS**



**1 In 5** at risk because of a lack of **exposure to sunlight**



**1 in 2 (51%)** of UK population fear they are **suffering from Vitamin D**

Healthcare professionals are warning that Vitamin D intake levels across the UK are too low with much of the population having spent a large part of the last 12 months indoors. One in five Brits are now at an increased risk of poor bone and muscle health as a result of a Vitamin D deficiency – particularly between the months of October and April.

With autumn rapidly approaching, the UK population is expected to be at the greater risk from disease and infections than at almost any other time in recent history. Our research shows that 88% of the public feel just as or more anxious about their health and immunity as we enter this winter than they did in the winter of 2019 (40% feel more anxious than the 2019 winter; 48% feel as anxious as the 2019 winter).

Experts warn that the lower exposure to sunlight presents an additional health challenge at a time when individuals will need to depend on good bone and muscle health as playing a critical role in maintaining a strong immune system. Many health experts say they are concerned that vulnerable groups in particular are likely to suffer from insufficient levels of Vitamin D which poses a potentially big public health challenge as the UK moves into the winter months.

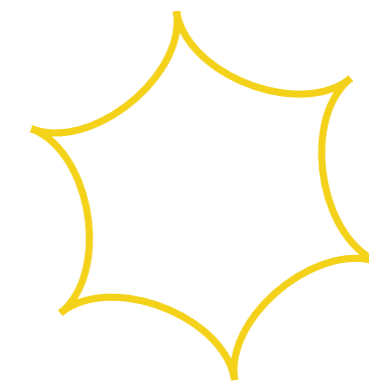
Vitamin D – also known as calciferol – is important for bone and muscle health, as well as for helping the body absorb calcium, magnesium and phosphate.

Normally, the vitamin – known as the sunshine vitamin – is produced naturally as people spend time outside in late spring and summer and their skin is directly exposed to the sun. But our bodies cannot make enough Vitamin D from sunshine in the autumn, winter and early spring, and additional solutions are to ensure intake levels are sufficiently topped up.

The results of our research highlight a low level of public awareness about the benefits of Vitamin D. To increase intake levels, a number of solutions were suggested by the healthcare professionals we surveyed, including educational campaigns, fortification of foods and the use of supplements.



# INSIDE



- 6** Foreword & introductions
- 12** Low Vitamin D levels leave 13 million Brits in danger
- 16** The public & Vitamin D
- 22** Intake levels must rise to protect future generations
- 26** The dark times: The Vitamin D drop
- 28** Does diet play a role?
- 32** Britain: region by region
- 35** Methodology

# A GLARING HEALTH ISSUE

“

The results of this report are **undeniably concerning**. 13 million are at risk of **Vitamin D deficiency** and many of those that make up that figure fall into groups that are already at a **higher risk of other health problems**.



Over the past 18 months we faced one of the most challenging health crises in recent times, a period that changed how we lived on a day-to-day basis and what we constituted as “normal”.

The changes we were forced to go through led many of us to reassess the value we place on the health of ourselves and those closest to us. Whether that’s being more aware and mindful of the food we eat or how much exercise we get.

As a fifth-generation family-run business, providing families with the best quality food to help maintain a balanced diet has always been a priority of ours. Our view is that regardless of who you are, if you feed your body with the right amount of the good stuff, then you’re on the right track.

But while eating the right food is what most of us want to do, it’s not always that easy, particularly for busy families. That’s why we launched our Half White

Half Wholemeal range, a product we knew would give families a way to easily source Vitamin D without needing to change their diets.

It was during our work developing the Half White Half Wholemeal range that we realised that creating an easy way for people to source Vitamin D is one thing, but making sure the public are aware of why it’s so important in the first place is another.

That’s why we launched this investigation. Working with the public, healthcare professionals and academics, we wanted to uncover how much the public know about the ‘sunshine vitamin’, and at the same time, stress how important it is that we all get enough.

The results of this report are undeniably concerning. 13 million are at risk of Vitamin D deficiency and many of those that make up that figure fall into groups that are already at a higher risk of other health problems.

Yet while the results are clearly worrisome, we hope they act as a positive catalyst. A catalyst that not only educates those at risk of Vitamin D deficiency, but also helps us all respond to one of the most challenging and unresolved issues of the pandemic – how can we create a healthier, more resilient nation in the days, months and years ahead.

**Jonathan Warburton**

Chairman, Warburtons

## DR SAM MILLAR, QUALITY DIRECTOR AT WARBURTONS:

“For many decades, our work with food experts has given us an innate understanding of how the food we make can play a role in helping the public’s health. Following strong guidance from the NHS, it’s become increasingly clear that addressing Vitamin D deficiency is one of the best steps we can take to protect the most vulnerable in our society.

“Despite this, our report shows that a major obstacle stopping the nation address Vitamin D deficiency comes down to the lack of awareness, from where it can be sourced to how it benefits. Almost half of the people that were spoken to for this report don’t think that Vitamin D can help to fend off cold and flu, for example, a stat that is particularly concerning as nine in 10 feel as or more anxious about their health this coming winter.

As we begin a new chapter learning to live with COVID-19, it is more important than ever that we raise awareness about the powerful way Vitamin D can protect and improve our health and wellbeing, something we hope this report will do.

It’s also why we’re committed to launching products that make it easier for everyone to source the most important things they need in their diets, such as our Half White Half Wholemeal range which is fortified with Vitamin D.



As we begin a **new chapter** learning to live with **COVID-19**, it is more important than ever that we raise awareness about the powerful way Vitamin D can **protect and improve our health and wellbeing**, something we hope this report will do.



## PROFESSOR ADRIAN MARTINEAU, CLINICAL PROFESSOR OF RESPIRATORY INFECTION AND IMMUNITY AT QUEEN MARY UNIVERSITY OF LONDON:

Vitamin D is known to be important for bone and muscle health, yet as this report clearly outlines, there is a significant gap in public knowledge about the sunshine vitamin. A particularly concerning finding is that awareness of the importance of vitamin D is low among some groups who are at the highest risk of deficiency.

“As this report argues, there is a clear need for two key actions going forward. Firstly, we need to make information on Vitamin D more widely available, so people can be sure that their intake is adequate. Critically, this information must be accessible and easy-to-understand, so it reaches all demographics regardless of background or age.



There is a clear need for **two key actions** going forward. Firstly, ensuring information on **Vitamin D is more widely available so the public** can ensure it is consuming the right amount. Secondly, we must **continue the focus on increasing** the range of ways we can all source Vitamin D, to make it even easier to incorporate into our **diets**.



“Secondly, we must continue the focus on increasing the range of ways we can all source Vitamin D, to make it easier to incorporate into our diets. As this report points out, fortification of foods with vitamin D can provide a safe and steady, low-level intake: profound Vitamin D deficiency, which is so common in the UK, has effectively been eliminated in countries where fortification of foods with vitamin D is widespread.”

## DR ZOE WILLIAMS, GENERAL PRACTITIONER AND MEDIA MEDIC:

“Addressing Vitamin D deficiency in the UK is clearly of importance to the nation’s health so it’s great to see Warburtons raising the issue with this report. It really highlights how much there is to do to increase the public’s knowledge about Vitamin D - just expecting people to buy over the counter supplements is not sufficient action, especially since those most affected are the least likely to be able to do so.

“More focus needs to be put on education, free access to Vitamin D supplementation and fortification of foods, like the Warburtons Half White Half Wholemeal loaf. These are three very important easily accessible solutions in helping to reduce the deficiency levels in the UK.”



**More focus needs to be put on education, free access to Vitamin D supplementation and fortification of foods**

# LOW VITAMIN D LEVELS LEAVE 13 MILLION BRITS AT RISK

The UK's levels of Vitamin D are among the lowest in Europe - and those groups with the lowest levels of the vitamin are of increasing concern.

Thirteen million Brits face an increased risk of poor bone and muscle health as a result of a Vitamin D deficiency between October and April next year

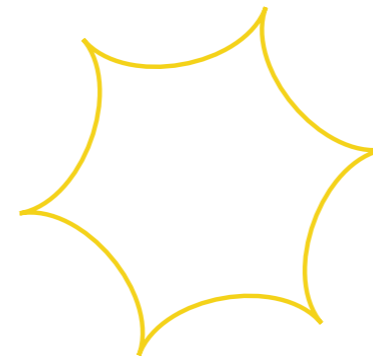
Vitamin D helps our bodies absorb calcium and phosphate, minerals that are important for healthy bones, and muscles. Public Health England and the NHS recently emphasised that all adults should take a daily supplement throughout late autumn, winter and early spring. This is because most people don't generate enough of the vitamin themselves to reach a health level during these periods of reduced sunlight and it is difficult to get enough Vitamin D from foods alone.

Existing research shows that 13 million people are at greater risk of developing health conditions because of a lack of

Vitamin D. Meanwhile, double that number, 26 million, have lower levels of the vitamin than is needed for optimal bone health.

The UK has one of the highest levels of Vitamin D deficiency per person in Europe, higher than Sweden, France, Germany, Hungary, Austria, Belgium, Greece, Spain and Italy, Hungary. On average, the percentage of the population with Vitamin D deficiency across nine EU nations is one in ten (10%), but in the UK it is double that.

There is growing evidence to suggest Nordic nations such as Sweden and Finland have had success in increasing intake levels through fortified food programmes. PHE's recommendation that all British adults consider taking a Vitamin D supplement shows there are solutions that can help address the high deficiency levels that currently exist in the UK.



The UK has one of the **highest** incidences of Vitamin D deficiency **in Europe.**



The risk of deficiency and its associated ailments is higher among certain groups (it is recommended that these groups take a Vitamin D supplement all year round).



**The frail or housebound and other individuals who are seldom outdoors.**



**Those living in care homes.**



**People who routinely cover up their skin when outdoors.**



**Anyone with darker skin (e.g. individuals from an African, African-Caribbean or south Asian background) may also not get enough Vitamin D from sunlight.**

## THE RISKS

Those who suffer from Vitamin D deficiency are at greater risk of contracting a wide array of ailments:



Low levels of Vitamin D can lead to brittle bones and an increased risk of falls and fractures.



In children, a Vitamin D deficiency can lead to stunted or delayed growth, as well as rickets, leading to soft bones and occasionally skeletal deformities.



Aching lower back, legs and hips can be another symptom of Vitamin D deficiency, caused by osteomalacia, a condition that causes a softening of bones.



Some studies have shown insufficient Vitamin D can potentially decrease the ability of the immune system to fend off illnesses such as cold and flu.



Some studies have suggested that in children, low calcium levels, caused by a very severe Vitamin D deficiency level can lead to an increased risk of seizures.

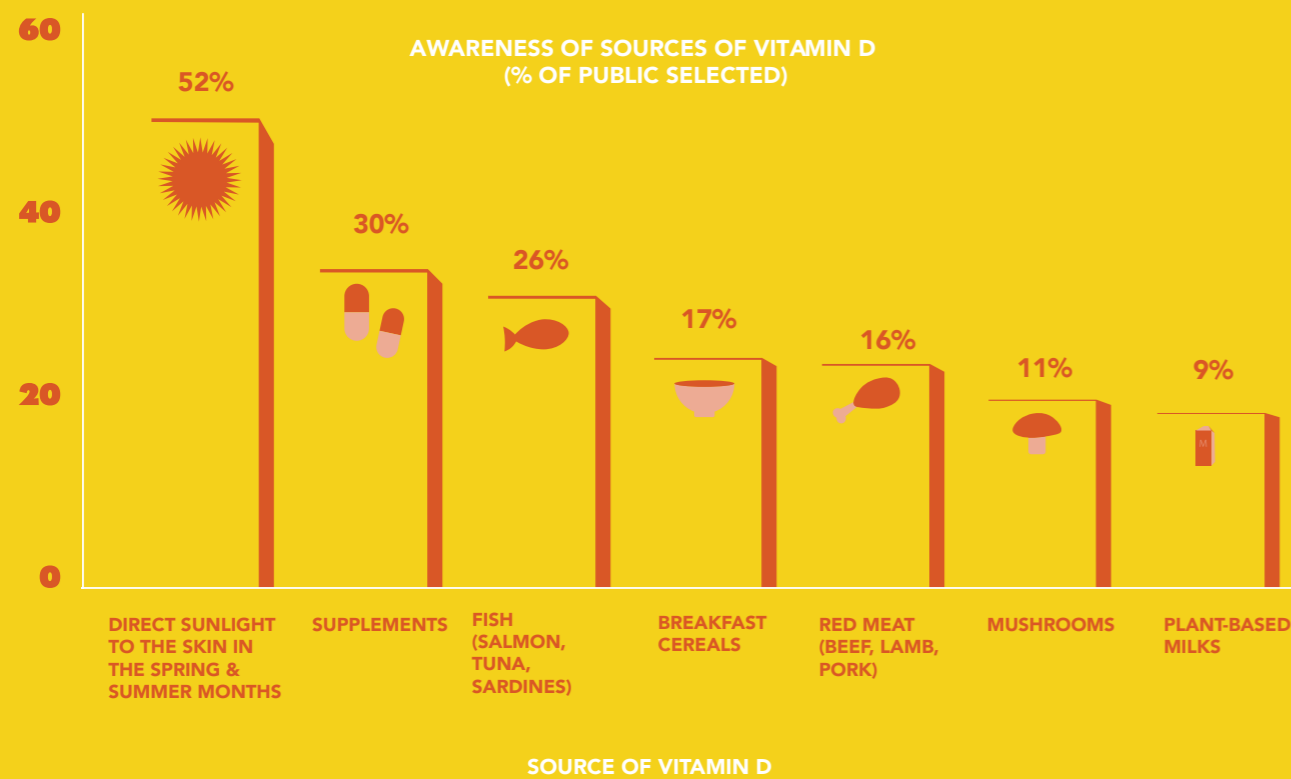


One study has indicated that women who received the government recommended intake for Vitamin D were found to have a 40% reduced risk of developing multiple sclerosis and rheumatoid arthritis.



# THE PUBLIC & VITAMIN D

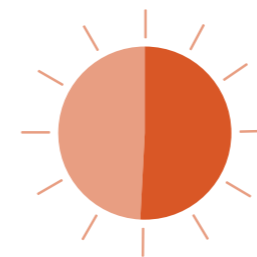
THERE IS A WORRYING LACK OF KNOWLEDGE ABOUT VITAMIN D



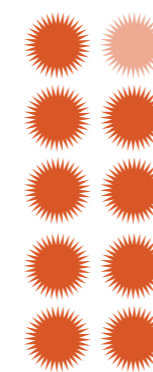
THE CHALLENGE OF TREATING VITAMIN D DEFICIENCY IS COMPOUNDED BY A LACK OF KNOWLEDGE ABOUT WHICH SOURCES PROVIDE VITAMIN D AMONG THE UK PUBLIC.



1 in 5 (21%) failed to identify D as a vitamin type.



Only half (52%) are aware you can get Vitamin D from **direct sunlight** in spring and summer months.

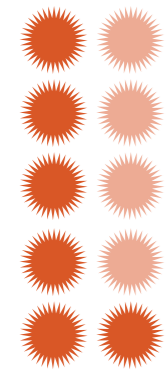


Only 1 in 10 (12%) say they are **very familiar** with the sources they can get Vitamin D from.

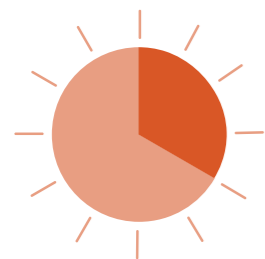
**OUR RESEARCH ALSO FOUND THAT THE PUBLIC ARE UNAWARE OF HOW MUCH VITAMIN D IS NEEDED, AND THE ADVERSE EFFECTS OF CONSUMING TOO MUCH OR TOO LITTLE:**



**Only half (50%)** are aware of the government recommended daily intake of Vitamin D (**400 international units or 10 micrograms**).



**4 in 10 (39%)** do not realise that **overconsumption of vitamins** can have adverse health effects.



**Just over a third (37%)** do not realise that **under consumption of vitamins** can have adverse health effects.

**THE HEALTH V WEALTH GAP**

Our study shows a clear health v wealth divide that means those on the lowest incomes are among the least well informed about the importance of Vitamin D.

- Only a quarter (24%) of lower income earners (<£30k) are concerned about deficiency, while more than half (53%) of higher income earners (>£50k) are concerned.
- Only 37% of lower income earners feel Vitamin D plays a very important role in the proper functioning of the immune system compared to 44% of high-income earners.

- Fewer lower income earners are aware of the potential role Vitamin D could play in fending off illnesses such as cold and flu as suggested by some studies (56% vs 66%).

The National Diet and Nutrition Survey published in 2019 found that Vitamin D intake increased, on average, by 4%-6% for every £10,000 increase in equivalised income, further highlighting the divide by income level.

**FUTURE GENERATIONS NEED TO PROTECT AGAINST LONG-TERM HEALTH ISSUES**

There is an emerging generational divide, with younger people less aware about the importance of Vitamin D:

- Only a third (34%) of 18-24-year-olds feel Vitamin D is very important to health and wellbeing (v 45% nationally).

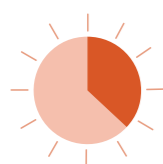
- Only 3 in 10 (29%) of 18-24-year-olds feel that Vitamin D plays a proper role in the functioning of the immune system (v 41% nationally).

## MORE AWARENESS RAISING NEEDED TO PROTECT AT RISK GROUPS

More awareness raising is needed to protect the groups in society who are most risk being Vitamin D deficient. Many vulnerable groups appear to be lacking information about how increased Vitamin D levels can maintain bone and muscle health.



Only 2 in 10 (18%) of those aged 55+ are concerned about having a Vitamin D deficiency



Only 37% of people with dark skin, including South Asian and Afro-Caribbean ethnicities, are aware that they may be at risk from Vitamin D deficiency.



Only 3 in 10 (31%) of those with underlying health conditions are concerned about having a deficiency.

These figures are a warning sign that there is work to do to ensure health advice on Vitamin D is reaching the groups who will benefit the most from it.

## THE SEVEN COMMON MYTHS

The public still believe a number of misconceptions about vitamins, with three quarters of healthcare professionals saying this has negative consequences for health and wellbeing.

MYTH	REALITY
<p><b>Only some people need Vitamin D.</b></p> <p>Over half (52%) feel that if you eat a balanced diet, you don't need supplements, while one third (29%) believe it's only necessary for those with underlying health conditions.</p>	<p>Vitamin D supplements can benefit everyone as outlined in advice by the government and The Scientific Advisory Committee on Nutrition (SACN).</p> <p>Your need is dependent on your intake of Vitamin D from diet and sunlight</p>
<p><b>Vitamin D won't protect you against cold and flu.</b></p> <p>43% of people don't think that Vitamin D can help to fend off cold and flu.</p>	<p>Several scientific studies suggest that sufficient intake of Vitamin D is helpful in fending off illnesses such as cold and flu.</p>
<p><b>You can get Vitamin D through a window</b></p> <p>Almost half (48%) believe you can get Vitamin D by sitting by a sunny window or conservatory.</p>	<p>You cannot get Vitamin D through glass – the UVB rays that deliver the vitamin don't penetrate it.</p>
<p><b>You can get Vitamin D from being outside all year round</b></p> <p>Only 4 in 10 (38%) are aware that you cannot get Vitamin D from the sun all year round in the UK.</p>	<p>You need other sources of Vitamin D between October and April in the UK as it becomes more difficult to get it from direct sunlight.</p>
<p><b>You can never get enough Vitamin D</b></p> <p>3 in 10 (31%) feel that you can never have enough Vitamin D.</p>	<p>Very high levels of overconsumption, whilst rare can lead to headaches, nausea and vomiting, from raised calcium in the blood.</p>
<p><b>The longer you are in the sun, the more Vitamin D you will get</b></p> <p>Almost two thirds (63%) feel that the more you outside in the sun, the more Vitamin D you will produce.</p>	<p>Sunlight exposure only stimulates Vitamin D production for up to 30 minutes spent in the sun.</p>
<p><b>Sun cream stops you getting Vitamin D</b></p> <p>3 in 10 (29%) feel that sun cream stops the production of Vitamin D in the body.</p>	<p>You can still get Vitamin D from the sun if you wear sun cream, though the level of intake may be reduced.</p>

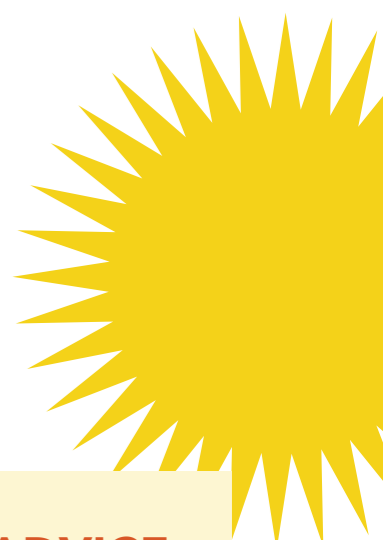
WHAT HEALTHCARE PROFESSIONALS SAY:

# INTAKE LEVELS MUST RISE TO PROTECT FUTURE GENERATIONS

- Our research shows that two-thirds (66%) of healthcare professionals feel that if the public do not increase their Vitamin D intake it could potentially lead to added strain on the NHS and care workers.
- Over half (55%) think there will be a greater incidence of childhood growth problems which poses a risk that high levels of deficiency within the population could become an ongoing generational cycle as younger people have some of the lowest awareness levels of Vitamin D.
- Almost half (47%) surveyed thought there may be the potential for low levels of Vitamin D to contribute to the UK population being more vulnerable to future epidemics.



“If the public don't increase their Vitamin D intake two thirds of health professionals believe it could lead to an added strain on the NHS.”



## COVID-19 AND VITAMIN D: THE OFFICIAL ADVICE

With more people staying indoors than usual, the NHS say taking Vitamin D is more important than ever. However, reports that suggest Vitamin D could help patients respond to Covid-19 are still scientifically unproven. The NHS gives the following advice.

**“There have been some reports about Vitamin D potentially reducing the risk of Covid-19. As yet there is insufficient evidence to prove that it helps people respond to Covid-19, but as more evidence is accumulated, our understanding may change. Public Health England (PHE) and National Institute for Health and Care Excellence (NICE) are working together to re-review the evidence.”**

## AN OPPORTUNITY TO EDUCATE THE PUBLIC

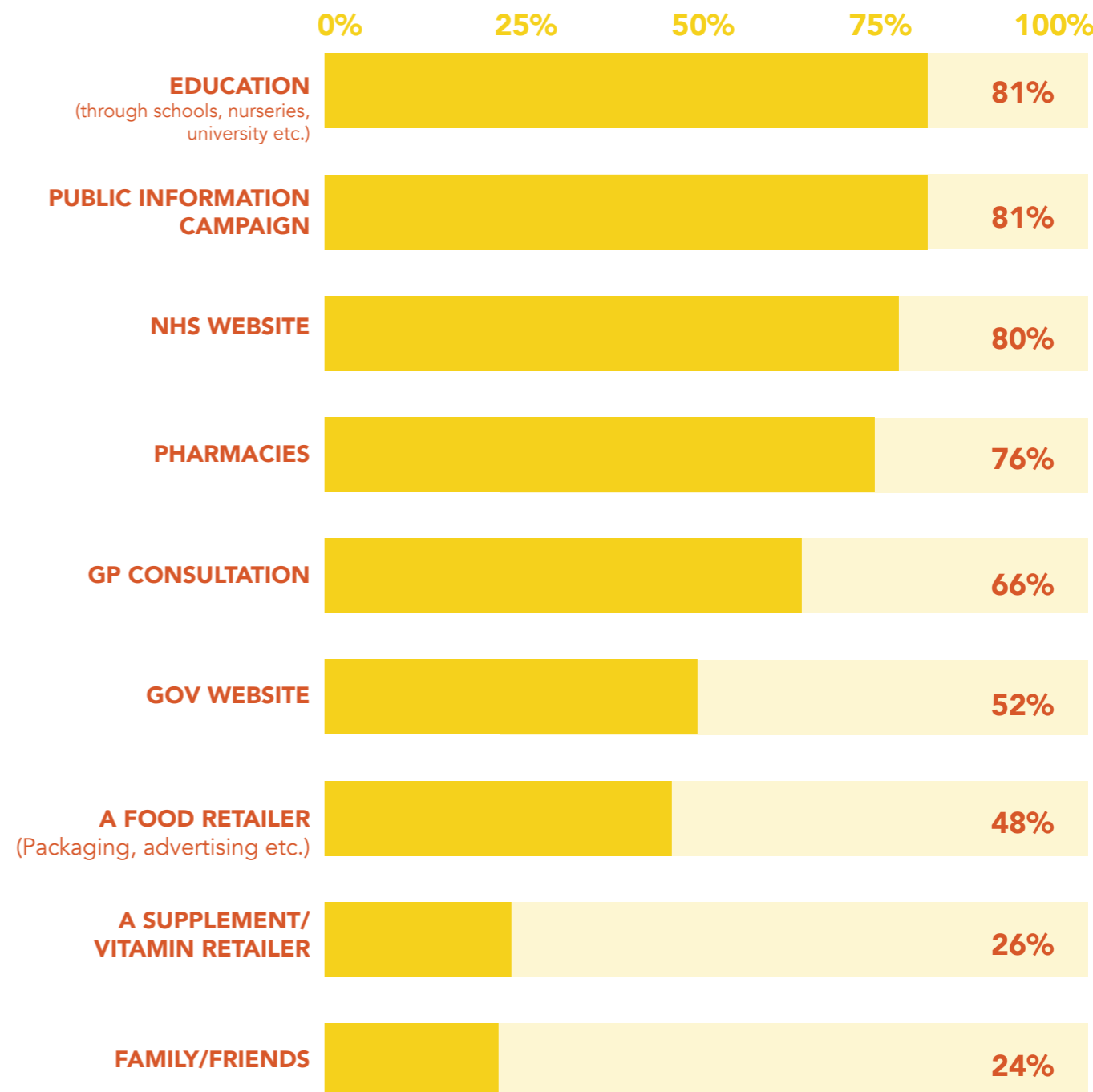
The British public has a worrying lack of understanding of the importance of Vitamin D, UK healthcare professionals believe. Just 17% believe the public understands the importance of Vitamin D for a healthy lifestyle and only one in ten (10%) says the public have a good understanding of its role in supporting immunity.



Fewer than **one in five** health professionals (17%) say the public has enough information about Vitamin D deficiency.

Public information campaigns, education in schools, NHS and pharmacies are felt by healthcare professionals to be the most effective channels for raising awareness around Vitamin D.

**EFFECTIVE CHANNELS FOR RAISING AWARENESS OF VITAMIN D**  
(% OF HCPS WHO SELECTED EACH)





## DARK TIMES:

# THE VITAMIN D DROP

Our bodies create enough Vitamin D when we have direct sunlight on our skin, but in the darker months from the October to April we need to find it from other sources. That's because the intensity and duration of daily sunlight is reduced which causes less UV to be absorbed by our skin.

The UVB radiation we get is also influenced by the time of the day, the latitude, the amount of cloud cover, air pollution, and the clothes we wear. The pigment of your skin also reduces the amount of UVB radiation.



### IN LIGHTER MONTHS

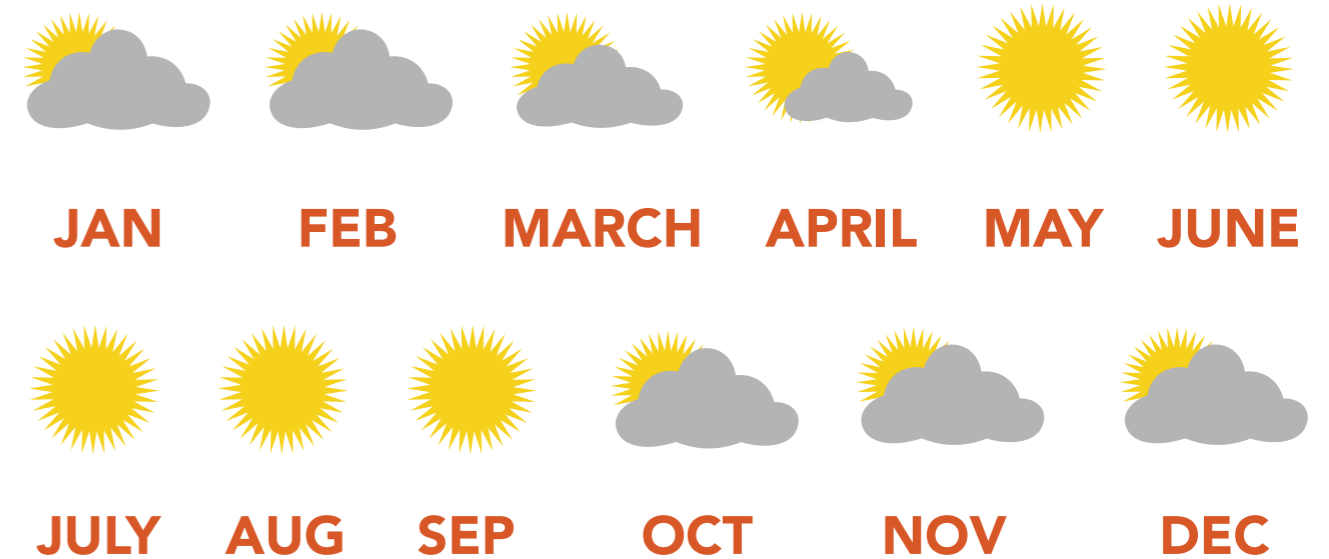
PHE, the NHS and The National Institute for Health and Care Excellence (NICE) all advise that most people can make enough Vitamin D for their needs by going out for short periods of time and leaving only forearms, hands or lower legs uncovered.

People with dark skin are advised to consider taking a supplement all year round. In addition, they can benefit from more sunlight exposure to produce the same amount of Vitamin D as people with lighter skin. The advice for people with naturally very light skin is that they do not need much time in the sun but that they are at greater risk of sunburn and skin cancer than people with darker skins.

### IN DARKER MONTHS

The UK Government recommends that all adults and children over five years should consider additional solutions to boost their intake such as a daily supplement during the autumn and winter and early spring. It is very difficult to get enough Vitamin D to compensate for this from foods alone.

## SUNLIGHT OVER THE YEAR:



## THERE IS CONFUSION AMONGST THE UK PUBLIC REGARDING WHEN YOU CAN GET VITAMIN D FROM SUNLIGHT THROUGHOUT THE YEAR.

- Only 4 in 10 (38%) realise that late April to September are the months you get Vitamin D from sunlight.
- Only half (52%) are aware you can get Vitamin D from direct sunlight to the skin during spring and summer months, and men are less aware of this than women (43% vs 60%).



# DOES DIET PLAY A ROLE?

## DO I GET VITAMIN D THROUGH MY DIET?

Yes, you can get Vitamin D through eating some types of food, including red meat and oily fish, like salmon, mackerel, sardines and herring. We also get it from egg yolks and liver, but this isn't enough to supply all our needs.

## WHAT ARE FORTIFIED FOODS?

Half (50%) of healthcare professionals say fortified foods are an important source of Vitamin D. These are foods that have nutrients added that aren't already naturally present in the food. They improve nutrition, and provide various health benefits, including as a source of dietary Vitamin D.



One in two (50%) healthcare professionals see the value of increased access to fortified food, but only 16% of the public say they are likely to add them to their diet.



## HOW MUCH VITAMIN D DO I GET IN MY DAILY DIET?

It's very difficult to get the Vitamin D you need through a standard diet during the months of low light. Figures for the UK show that many people get far less Vitamin D than they need between the key months of October and April. (Source Dietary Vitamin D intake, UK (Whiting & Calvo, Vitamin D, 2018))

## WHICH FOODS PROVIDE US WITH VITAMIN D?


Milk and dairy products can often be fortified with Vitamin D, including yoghurts, and spreads. There are also examples of fortified breakfast cereals, breads, eggs and meat alternatives.

## ARE ATTITUDES CHANGING?

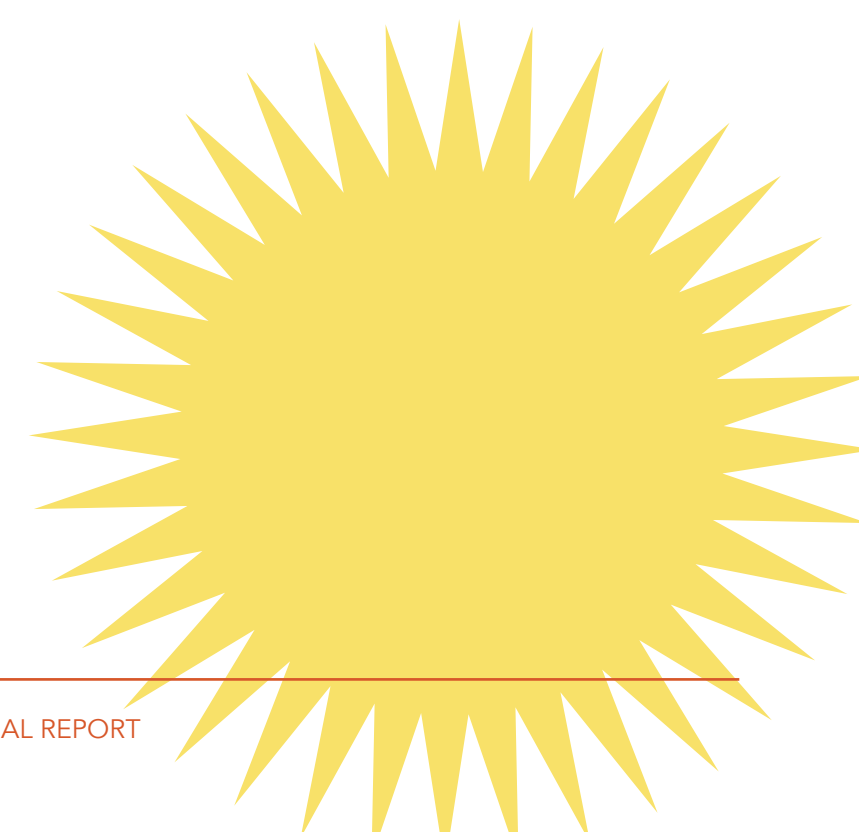
**Yes. Evidence is increasing that food fortification can be an important strategy to improve Vitamin D status amongst the UK population.** A recent study which focussed on ready to eat breakfast cereals, a common fortified food, found that cereals fortified with Vitamin D contributed significantly to the daily intake of Vitamin D, especially in the elderly.

## IS IT COMMON ELSEWHERE?

Yes, The US, Canada and Finland have implemented systematic Vitamin D fortification. There is evidence to suggest these programmes have been successful and could potentially be applied in the UK as one of the solutions for increasing Vitamin D intake levels.



“Taking **too high a dosage** of Vitamin D supplements by tablets or sprays can raise blood calcium and headaches, nausea and vomiting, and in severe cases of vitamin D toxicity, **it can cause kidney damage.**”



#### WHAT DO HEALTHCARE PROFESSIONALS SAY?

Yes, The US, Canada and Finland have implemented systematic Vitamin D fortification. There is evidence to suggest these programmes have been successful and could potentially be applied in the UK as one of the solutions for increasing Vitamin D intake levels.

#### HOW AWARE IS THE PUBLIC OF THE BENEFITS?

Public awareness is still low. Our results show only 16% of the public are likely to add fortified foods to their diet to improve Vitamin D intake.

#### WHERE CAN I BUY FORTIFIED FOODS?

Fortified foods such as bread, cereals, dairy products are available to buy in most UK supermarkets. The specific amount of Vitamin D in fortified foods differs from product to product, and the details are available to find on food packaging and online.

**Warburtons Half White Half Wholemeal bread** contains Vitamin D

**Kellogg's** fortify many of their breakfast cereals with Vitamin D

**Yoplait** fortify many of their products with Vitamin D such as their fromage frais

### YORKSHIRE & THE HUMBER

Most likely to agree that Vitamin D is very important for their own health and wellbeing (52% v 45% nationally).

**Londoners are the most concerned that lockdown has caused them to suffer from a lack of Vitamin D.**

### SCOTLAND:

**Only 9%** are aware of how to check for a vitamin/mineral deficiency (vs 16% nationally).

### WALES:

- 52% think you can get Vitamin D from sunlight all year round (v 43% nationally).
- More likely to think Vitamin D plays a role in the proper functioning of the immune system (47% v 41% nationally).

**Yorkshire and Humber have the highest levels of appreciation of the health benefits of Vitamin D**

### NORTH EAST:

- **Least aware of the role of Vitamin D** in the body (to help regulate the amount of calcium in the body) (29% v 38% nationally).
- **Less aware of the importance of Vitamin D** for their own health and wellbeing (36% v 45% nationally)

### EAST OF ENGLAND:

Least likely to agree that their intake of Vitamin D is in line with what is recommended by government (45% v 53% nationally).

### WEST MIDLANDS:

- 36% concerned about potential deficiency of Vitamin D (v 29% nationally).
- Only 39% believe direct exposure to sunlight on bare skin during the spring and summer months is a source of Vitamin D (v 52% nationally).

### NORTH WEST:

**Only 1 in 10 (10%)** know how to check for Vitamin D deficiency (vs 16% nationally).

### LONDON:

- Most concerned about the impact of lockdown on their health due to a lack of Vitamin D from sunlight (50% v 41% nationally).
- 63% believe you can get Vitamin D by sitting next to a sunny window (v 48% nationally).

### EAST MIDLANDS:

- 64% say Vitamin D is not very important for your own health and wellbeing (v 55% nationally).
- Under half (47%) realise that vitamins and supplements protect heart health (v 60% nationally).

### SOUTH EAST:

38% believe that you can never have enough Vitamin D (v 31% nationally).

### SOUTH WEST:

- Only 19% believe that fortified foods provide an adequate source of Vitamin-D (v 33% nationally).
- Only 9% know how to check for Vitamin D deficiency (v 16% nationally).

## NORTHERN IRELAND:

- Most likely to add fortified foods to their daily diet to improve Vitamin D intake (24% v 16% nationally).
- Only 44% agree that through food, supplements or elsewhere - little and often is better than large infrequent doses (v 54% nationally).



## METHODOLOGY

The research results are based on two surveys:

- A nationally representative online survey conducted with 2,000 members of the UK public
- An online survey conducted with 105 UK healthcare professional

Leading academics were consulted with on the questionnaire design for both surveys. The project was undertaken by an independent agency, Republic (<https://republic-london.com/>), on behalf of Warburtons.

## REFERENCE LIST

1. National Diet and Nutrition Survey; Public Health England (2017)
2. Vitamin D and Health; SACN (2016)
3. Vitamin D Deficiency: a worldwide problem with health consequences; Holick and Chen (2008)
4. COVID-19 rapid guideline: Vitamin D; NICE (2020)
5. Vitamin D deficiency in Europe, Pandemic?; Cashman et al (2016) – 9 EU Countries: Greece, Spain, Italy, Hungary, Austria, France, Belgium, Germany, Sweden.
6. Hypovitaminosis in British Adults aged 45; Hypponen and Power (2007)
7. The Economic Case for Prevention of Population Vitamin D deficiency; Aguiar et al (2019)
8. Vitamin D Deficiency in UK South Asian Women of Childbearing Age: a comparative longitudinal investigation with UK Caucasian women; (Darling et al 2013)
9. Vitamin D Concentrations in a UK Inner-city Multicultural Outpatient Population; (Ford et al, 2016)
10. Vitamin D; NHS (2021)
11. Meeting Vitamin D Requirements in White Caucasians at UK Latitudes: Providing a choice; Webb et al (2018)
12. Vitamin D: an overview of vitamin D status and intake in Europe; Spiro and Buttriss (2014)
13. Vitamin D Serum Levels in the UK Population, including a Mathematical Approach to Evaluate the Impact of Vitamin D Fortified Ready-to-Eat Breakfast Cereals: Application of the NDNS database; Calame (2020)
14. Rationale and Plan for Vitamin D Food Fortification: A Review and Guidance Paper; Pilz et al (2018)
15. Statement from PHE and NICE on Vitamin D Supplementation (2020)
16. Vitamin D; Whiting and Calvo (2018)



*Family  
Bakers*  
**WarburtonS**