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# Vitamin D deficiency and supplementation: are we failing to prevent the preventable?

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## Abstract

Within the UK rickets is emerging as a national public health issue, particularly among at-risk groups. There is concern that health professionals are overlooking recommendations for vitamin supplementation and opportunities for prevention. This paper reports on a study that aimed to identify current knowledge and practice regarding vitamin D deficiency and supplementation among community midwifery and health visiting teams employed in one NHS trust.

A questionnaire was distributed to all health visiting and community midwifery team members (n=96), with a 76% response rate (n=73). Results suggest varying levels of awareness about vitamin D deficiency and groups at increased risk. Only 52% reported that they were aware of health department recommendations for vitamin supplementation. Health visiting teams recommended supplements more frequently than community midwives, but overall the recommendations were implemented inconsistently. Participants identified families eligible for the government Healthy Start scheme, but fewer were recommending Healthy Start vitamins. A deeper understanding of vitamin D deficiency and health department recommendations for vitamin supplementation is required by health professionals to ensure families are advised about appropriate prevention messages and to implement recommendations effectively.

## Key words

Vitamin D deficiency, rickets, Healthy Start, vitamin supplements, health department

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No potential competing interests declared.

## Introduction

Rickets secondary to vitamin D deficiency is not a historical disease. Rickets is re-emerging in population subgroups and research suggests a high prevalence of low vitamin D status throughout the UK population (Ashraf and Mughal, 2002; Callaghan et al, 2006; Ladhani et al, 2004; Mughal et al, 1999; SACN, 2007; Shaw and Pal, 2002). Prevalence is hard to ascertain, predominantly because routine screening is not practised and many cases do not reach clinical attention (SACN, 2007). However, research suggests that incidence of rickets could be as high as one in 100 children in ethnic minority groups (Medical News Today, 2008).

Vitamin D is principally derived from the action of sunlight on exposed skin, though small amounts are also derived from dietary sources such as oily fish, eggs and fortified foods (SACN, 2007). Vitamin D is necessary for adequate bone mineralisation, and a deficiency results in rickets in children and osteomalacia in adults. Research has increasingly linked chronic vitamin D deficiency with serious health consequences including osteoporosis, tuberculosis, type-1 diabetes, cardiovascular disease, multiple sclerosis and several forms of cancer (SACN, 2007).

The causes of vitamin D deficiency are multifactorial, with individuals commonly falling into several at-risk groups. Risk factors include diets low in vitamin D, obesity, living in the north of the UK and being over 65 years. At particular risk are people who are not exposed to much sun (those who are housebound, confined indoors for long periods, or who cover their skin for cultural reasons) and individuals from darker skinned ethnic minority groups (South Asian, African, African Caribbean and Middle Eastern) because their bodies are less able to produce as much vitamin D. Periods of increased demand of vitamin D are early childhood, adolescence, pregnancy and when breastfeeding (DH, 2006; SACN, 2007).

UK public health advice to prevent vitamin D deficiency is 15 minutes daily exposure to the sun and a diet rich in vitamin D.

However, due to seasonal variation in sunlight availability and strength, it can be difficult for people to get enough vitamin D this way, and therefore a daily supplement is recommended for people at risk (DH, 2005, 2006; NICE, 2008; SACN, 2007). The introduction of Healthy Start in 2006 made vitamin supplements widely available to pregnant and breastfeeding women and children under five (DH, 2006). These are available free of charge to beneficiaries of the scheme and at a reduced cost to the general public, but the latest audit showed uptake to be disappointingly low (DH, 2008).

Health visiting and community midwifery teams are uniquely placed to prevent vitamin D deficiency and advise Healthy Start vitamins in accordance with recommendations because they provide a universal service to pregnant women, infants and pre-school children and are a source of information for most families.

However, there is concern that health professionals are not following the national recommendations for vitamin supplementation and that the importance of prevention has been forgotten, particularly for at-risk ethnic minority groups (Callaghan et al, 2006; DH, 1998; SACN, 2007; Shaw and Pal, 2002). Compounding this, government advice pertaining to vitamin D prevention is scattered throughout various documents (DH, 2006; NICE, 2008; SACN, 2007) and discrepancies over vitamin supplementation may have caused confusion and a lack of clarity for professionals. For example, the National Institute for Health and Clinical Excellence (NICE) only endorsed recommendations to advise supplements to pregnant and breastfeeding women in 2008 (NICE, 2008; SACN, 2007).

If health professionals are considered important to the prevention of vitamin D deficiency, it is imperative that they appreciate the significance of sufficient vitamin D status on overall health and wellbeing, and understand the importance of vitamin supplementation. To date, only one UK study has sought to assess knowledge among health professionals. Cleghorn (2006) administered

### Box 1. Five objectives of the research

- To gauge understanding of vitamin D among health visiting and community midwifery teams
- To gauge understanding of vitamin D deficiency among health visiting and community midwifery teams
- To identify if these professionals are applying health department recommendations for vitamin supplementation
- To identify if these professionals are advising about the Healthy Start scheme to eligible families and recommending Healthy Start vitamins to clients
- To inform the development of future training provision

a questionnaire to health visitors in the London area, assessing knowledge of government vitamin supplement guidelines and ethnic groups at increased risk of rickets. The study, undertaken prior to the implementation of Healthy Start, concluded that health visitors required greater awareness about guidelines for vitamin D supplementation for ethnic minorities and recommended further research to assess advice given by midwives to pregnant and breastfeeding women.

#### Purpose of study

This study sought to develop the work of Cleghorn (2006) against the backdrop of Healthy Start, aiming to provide further regional evidence as to whether health professionals have the appropriate knowledge to prevent vitamin D deficiency. The sample incorporated a greater diversity of professionals, including community midwives and skill-mix team members. Additionally, this study assessed knowledge of vitamin D deficiency among all at-risk groups (not only ethnic groups) and identified whether professionals were advising clients about Healthy Start and recommending Healthy Start vitamins.

The purpose of this study was to provide evidence as to whether health professionals have forgotten the importance of prevention and are failing to prevent the preventable.

#### Methodology

Five research objectives (see Box 1) were established to identify current knowledge and practice regarding vitamin D deficiency and vitamin supplementation among community midwifery and health visiting teams.

#### Sample

The sample (n=96) comprised the total population of health visitors and their team members who work autonomously with families (staff nurses, nursery nurses and assistant practitioners) (n=73) and community midwives (n=23) employed by

the trust. While the small sample size has limitations, the research included the entire study population, giving everyone an opportunity to respond to the questionnaire.

#### Method

A structured questionnaire was designed to collect data that specifically assessed knowledge and current practice in relation to each research objective. Evidence-based literature and health department recommendations for vitamin supplementation were used to assess the objectives and quality of information reported (DH, 2006; NICE, 2008; SACN, 2007). In a small, time-limited project this method was considered economical and

manageable, allowed for inclusive coverage (improving the ability to generalise the results to this group) and had the ability to provide a snapshot of current practice (Denscombe, 2007). Additionally, the questionnaire offered complete anonymity (thereby encouraging honest answers and completion of all questions), avoided interview bias and could collect specific information that could be measured and recorded through standardised answers. The questionnaire was piloted among friends and ex-colleagues to enhance validity and ensure questions were worded clearly, so that information would be collected as intended and not cause bias by directing replies in a certain way. Minor aesthetic alterations were made to the questionnaire as a result.

Questionnaires were administered where possible on a face-to-face basis to maximise response rates. The field work was completed in January 2009.

#### Ethical considerations

Ethical approval was obtained from the NHS and university research ethics committees in October 2008. A participant information sheet was provided with each questionnaire and completion of the questionnaire was taken as implied consent.

Figure 1. Respondents identifying ethnic groups at increased risk

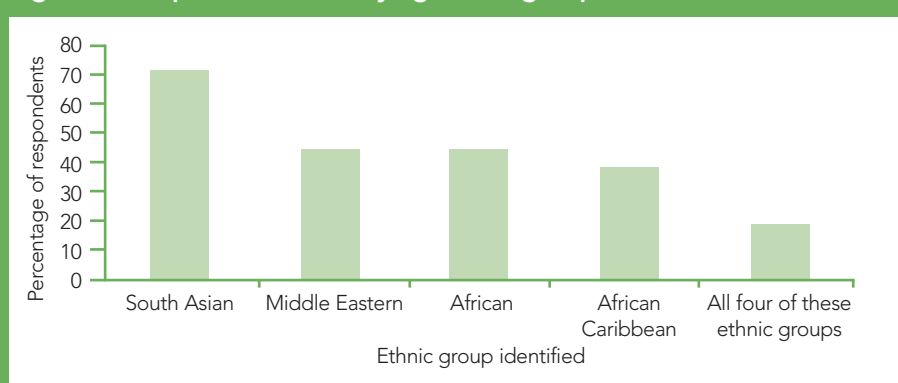
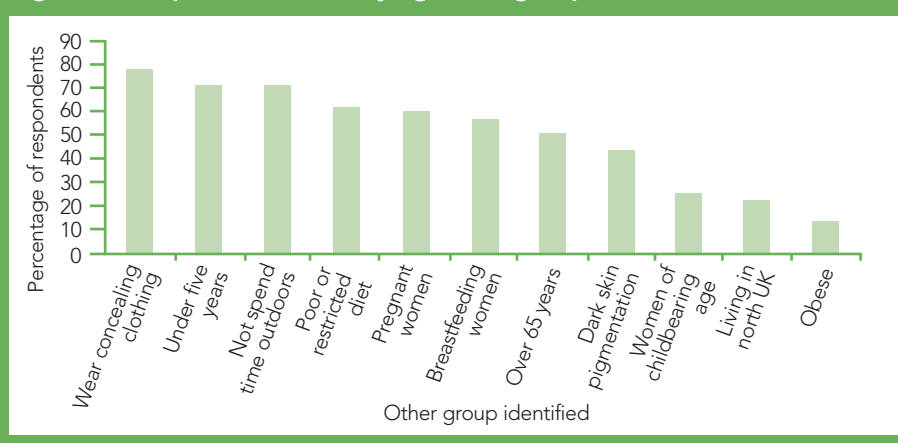


Figure 2. Respondents identifying other groups at increased risk



## Data analysis

Quantitative nominal data was generated and analysed to provide descriptive statistics. Raw data was coded and analysed using SPSS14. Content analysis was used to examine data from open-ended questions before being analysed with the same software.

## Results

There was a response rate of 76% (n=73). Respondents (community midwives, n=14; health visiting teams, n=59) included representation from all health professionals in the sample, negating the risk of serious non-response bias (Denscombe, 2007).

Results are presented for the first four objectives. Interpretation of these results informed the final objective, and will be considered in the discussion.

### Understanding of vitamin D

Of the respondents, 86% (n=63) correctly identified sunlight as the main source of vitamin D and 78% (n=57) identified vitamin D as being necessary for bone health and/or calcium absorption.

### Understanding of vitamin D deficiency

Participants were asked to list conditions or symptoms caused by vitamin D deficiency. Rickets was the most frequently cited (77%, n=56), followed by poor bone health (33%, n=24) and osteoporosis (22%, n=16). Other adverse conditions were each cited by a maximum of 3% of participants.

Knowledge of groups at increased risk of vitamin D deficiency was assessed (see Figures 1 and 2). There was wide variation in knowledge of groups at risk. Over 70% of respondents correctly identified South Asian heritage, aged under five years, wearing concealing clothing and not spending time outdoors as risk factors. Other groups were identified much less frequently (other darker skinned ethnic groups, women of childbearing age, living in the north of the UK and obese people). Only 19% (n=14) of respondents correctly identified all four of the ethnic groups at increased risk.

### Recommended supplementation advice

Current practice regarding vitamin supplementation was assessed by asking participants whether they advised vitamins to recommended groups (see Figure 3).

If UK health department recommendations were implemented as intended, the percentage of responses should be 100% for each group. The results indicate that recommendations are not being implemented consistently to all groups. Overall, health visiting

## KEY POINTS

- Health professionals can do more to prevent vitamin D deficiency
- Significant numbers of pregnant and breastfeeding women, infants and children are not receiving preventive advice
- Health professionals require training to ensure a good understanding of groups at increased risk of deficiency and the health department recommendations for vitamin supplementation
- Health professionals require access to concise information regarding groups at increased risk of deficiency and the UK vitamin supplementation guidelines

teams are more likely to recommend supplements than midwives and most recommend them to breastfeeding women (66%, n=39), breastfed infants (78%, n=46) and children from one to five years (65%, n=38). Fewer health visiting team members recommended supplements for formula-fed infants taking less than 500ml per day or pregnant women. Only 43% (n=6) of midwives recommended vitamins to pregnant women and even fewer to breastfeeding women (36%, n=5). Additionally, up to 77% (n=11) of midwives reported that it was not their role to recommend supplements to infants or children, and 30% (n=18) of health visiting team participants reported likewise in recommending supplements to pregnant women.

Only 52% (n=38) of participants reported that they were aware of current health department guidelines for recommending vitamin supplements.

### Healthy Start and Healthy Start vitamins

In total, 97% (n=71) of respondents stated that they were aware of Healthy Start and 92% (n=67) reported that they were identifying and advising eligible families about the scheme. In contrast, only 38% (n=5) of midwife and 69% (n=41) of health visiting team participants reported that they recommend the Healthy Start branded

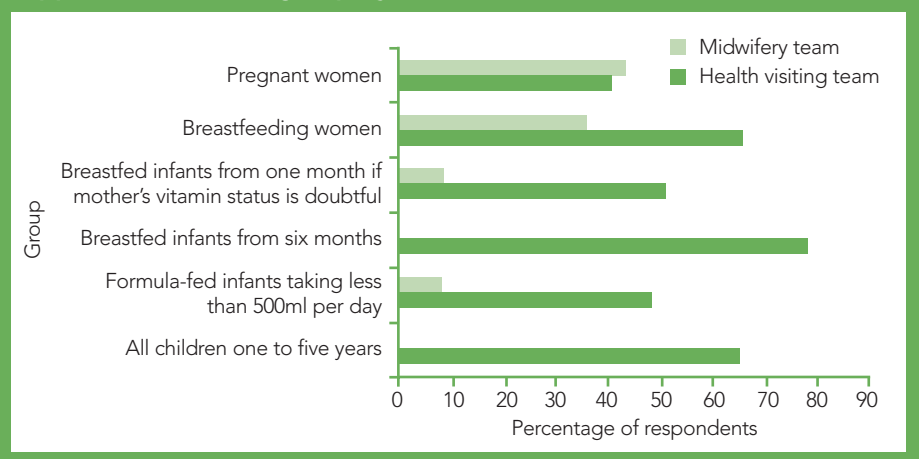
vitamins to clients. Considerably more midwives stated they did not know their nearest supplier of Healthy Start vitamins (42%, n=6) compared to 14% (n=8) of health visiting respondents.

## Discussion

This study aimed to identify current knowledge and practice regarding vitamin D deficiency and vitamin supplementation within one particular NHS trust. The findings, which support those of Cleghorn (2006), identified important gaps in knowledge among community midwifery and health visiting teams in relation to vitamin D deficiency and vitamin supplementation. The discussion will highlight how these findings are supported in the literature and recommends how issues arising might be addressed.

The results established that professionals were aware that the sun provides our main source of vitamin D and is a requirement for bone health and calcium absorption. However, there were differing levels of knowledge about conditions caused by vitamin D deficiency – 77% (n=56) of respondents cited rickets, but there was considerably less awareness of other adverse consequences. Research is accumulating to establish relationships between vitamin D deficiency and an increasing range of

Figure 3. Respondents reporting that they do recommend vitamin supplements to each group by team



diseases, but this is recent (SACN, 2007). In contrast, rickets is a disease that has caused morbidity for centuries and has led to previous public health campaigns (DH, 1998; SACN, 2007), which might explain why rickets was most frequently identified.

There have been calls for vigilance in primary care to identify those at particular risk of vitamin D deficiency, (DH, 1998, 2005; SACN, 2007) and yet results suggest that knowledge of at-risk groups was variable. If professionals do not have a good understanding of those at risk, these individuals will not be identified and prevention advice will not be implemented, which in turn has implications for health outcomes (Cleghorn, 2006; DH, 1998; SACN, 2007).

Current public health practice to prevent vitamin D deficiency is to promote Healthy Start vitamins in line with health department recommendations (DH, 2006; NICE, 2008). However, there is concern that professionals have forgotten the prevention guidelines and that uptake of vitamins is low (Callaghan et al, 2006; DH, 1998, 2008; SACN, 2007, 2008; Shaw and Pal, 2002). This study supports these concerns and highlights inconsistency in professionals routinely recommending Healthy Start vitamins as per national recommendations. This inconsistency is perhaps not surprising given that only 52% (n=38) of professionals were familiar with the guidelines. It is possible that the discrepancies between previous health department recommendations (NICE, 2008) may have led to confusion about when to advise supplements and to whom (SACN, 2007). Additionally, in the absence of a definitive document about the importance of vitamins in the prevention of vitamin D deficiency, professionals do not have easy access to consolidated information, and therefore will not routinely promote the vitamins (DH, 2008; SACN, 2008).

Of further relevance to the implementation of national recommendations, this study highlighted that a significant proportion of respondents reported that it was not their role to advise supplements to certain groups. It is understandable given the vast amount of information to be imparted and complex issues that can arise out of a consultation, that the opportunity to emphasise vitamin D prevention and the importance of vitamin supplementation may not be a high priority. However, situations can arise when opportunistic advice can be offered (for example, community midwives could advise supplements for pre-school siblings during a postnatal visit and a nursery nurse is well placed to advise supplements to the pregnant mother who brings her two-year-old for their

routine development assessment). If professionals have increased awareness and knowledge of the recommendations and prevention messages, more opportunistic preventive advice might take place.

### Implications and recommendations

This study was successful in achieving its objectives and has provided further evidence-based information about current knowledge and practice of vitamin D deficiency and vitamin supplementation among community midwifery and health visiting teams. While the results can not be generalised beyond the study population, the findings can inform and improve public health practice within the locality. The inclusion of community midwives in the sample added valuable depth in identifying the quality of advice being given to pregnant and breastfeeding women.

This study identified multiple training issues. The results highlighted that professionals have gaps in their knowledge in relation to vitamin D deficiency, at-risk groups and recommendations for vitamin supplementation. At a local level, training workshops are proposed for community midwifery and health visiting teams to address this, which will enable at-risk groups to be identified and appropriate prevention advice given. It is also recommended that the profile of Healthy Start vitamins among professionals is raised through collaborative working with Healthy Start and the trust to increase the awareness and availability of these supplements.

The findings suggest that health departments have been slow to promote and disseminate guidance effectively. In the absence of a definitive document emphasising the importance of prevention of vitamin D deficiency and recommendations for vitamin supplementation, it is proposed that a simple diary insert is designed, which would incorporate this information and highlight groups at increased risk. This may help in disseminating the information in an accessible and practical style.

Further research is recommended to establish if the findings of this study are reflected nationally. If this is the case, it could emphasise the need for a renewed national public health campaign to raise awareness of appropriate prevention messages.

### Conclusion

This study has provided valuable insight about knowledge and practice regarding vitamin D deficiency and vitamin supplementation among community midwifery and health visiting teams, and suggests that health

professionals have forgotten the importance of prevention. Overall, the results suggest that in the context of the trust population, significant numbers of pregnant and breastfeeding women, infants and children may be not be receiving preventive advice about vitamin D deficiency. Training is required to ensure that professionals have a deeper understanding of those at increased risk and health department recommendations for vitamin supplementation in order to help reduce the burden of disease caused by vitamin D deficiency and enable them to prevent the preventable.

### Further information

Since the completion of this research, the Department of Health and Healthy Start have produced literature for professionals about the importance of vitamin D and Healthy Start vitamin supplementation. See:

- [www.healthystart.nhs.uk](http://www.healthystart.nhs.uk)
- [www.dh.gov.uk/publications](http://www.dh.gov.uk/publications)
- [www.sacn.gov.uk](http://www.sacn.gov.uk)

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