Vitamin D and the Built Environment in Victoria

A guideline for planners, engineers, architects and policy makers in local and state government

A Victorian Government initiative

Victoria The Place To Be

Contents

This document acknowledges the following stakeholders consulted in the development of this document: Moonee Valley- Melbourne Primary Care Partnership, Municipal Association of Victoria, Deakin University -Deakin University and DHS Partnership (Barwon South-West Region), SunSmart (Cancer Council Victoria), VicHealth, Australian and New Zealand Bone and Mineral Society, Osteoperosis Australia and the members of the Vitamin D and the Built Environment Working Group: Michael Ackland, Iain Butterworth, Ken DeVries, Neale Gerlach, Clare Hargreaves, Joan Nankervis, Sandy Austin, Susan McDowell, Simon Slota-Kan.

* The information presented in this document is based on the information available at the time of its preparation.

1. Introduction

1.1 Purpose

This document is a guideline for planning safe sun exposure in the built environment as a source of vitamin D. It focuses on how the built environment can enable safe sun exposure for the general community and groups of people requiring special consideration to help prevent vitamin D deficiency. It has a set of design principles and practical case studies in a health promotion framework for implementation by planners, engineers, architects and policy makers. This guideline is intended to be used in conjunction with current SunSmart policies and guidelines.

1.2 Context

Vitamin D is essential for maintaining good musculoskeletal health and reducing the risk of bone fractures. The human body needs vitamin D to regulate calcium levels in the blood and to make and maintain healthy, strong bones and for this reason is important to maintain adequate vitamin D levels year round. Vitamin D deficiency in infants and children can cause rickets, characterised by muscle and bone weakness and bone deformities. Adults with low vitamin D are at risk of bone and joint pain, muscle and bone weakness, osteoperotic fractures and falls (see explanatory notes).

A good source of vitamin D is ultraviolet (UV) radiation from the sun.

Sun exposure is also the cause of approximately 99% of non-melanoma skin cancers and 95% of melanomas in Australia. A balance is required between avoiding an increase in the risk of skin cancer by excessive sun exposure and achieving enough sun exposure to maintain adequate vitamin D levels.

UV radiation levels vary depending on location, time of year, time of day, cloud coverage and the environment. The UV radiation level can be measured and forecasted to give an indication of the maximum daily UV radiation at ground level.

Whenever UV radiation levels reach 3* and above, most people need to use sun protection. This is when UV levels can damage the skin and eyes and lead to skin cancer. When UV levels are below 3, most people do not require sun protection unless they are in alpine regions or near highly reflective surfaces such as snow or water.

In most of Victoria average UV levels are 3 and above from the beginning of September through to the end of April. During this time the majority of people can maintain adequate vitamin D levels from a few minutes of exposure to sunlight on their face, arms, and hands or equivalent area of skin on either side of the peak UV periods, 10 am – 2 pm (11 am – 3 pm daylight saving time).

From May to August, average UV levels in Victoria are below 3 so greater exposure time is required to maintain vitamin D levels. Given this, people may need about two or three hours of sunlight to the face, arms and hands or equivalent area of skin, spread over a week to maintain adequate vitamin D levels.

* The UV Index is a measure of the amount of UV from the sun at the earth's surface at solar noon on a particular day. A Sunsmart UV Alert is issued when the UV Index is forecast to reach 3 and above - the level that can cause sunburn and skin damage. The UV Index reaches high to extreme levels (up to 14) during summer. The SunSmart UV alert is found on the weather pages of all Australian daily newspapers or on the Bureau of Meteorology website at www.bom.gov.au/weather/uv

For people with naturally very dark skin, the exposure times required to maintain vitamin D levels are 3 to 6 times greater. They may not be able achieve enough UV exposure to maintain vitamin D levels, particularly in winter.

Areas that allow access to safe, direct sunlight exposure can include open space amenities and facilities, community facilities, recreation facilities, maternal and child health facilities, libraries, multifunction family centres and aged care facilities.

Settings that require special consideration to allow adequate direct sunlight exposure include high-density residential developments and medium to long term residential care facilities.

Whilst the majority of people get enough exposure to sunlight to ensure they have enough vitamin D to form and maintain healthy bones, certain sections of the population are more likely to be at risk of vitamin D deficiency. These include:

- Naturally very dark skinned people
- People who cover their skin for religious or cultural reasons
- Older people and people who are housebound or in medium to long term residential care
- Babies and infants of vitamin D deficient mothers, especially babies who are exclusively or partially breastfed
- People with osteoporosis.

People in these groups should consult their doctor for advice on whether they need to take a vitamin D supplement.

Design of areas in the built environment to access direct sunlight exposure should accommodate at-risk groups that require special consideration for

vitamin D deficiency. Vitamin D dietary supplementation in consultation with a medical practitioner may also be required for individuals who are at high risk of skin cancer or in at-risk groups that cannot access sufficient direct sunlight exposure.

1.3 Design Principles

The design considerations for the designated area in the built environment to provide direct sunlight exposure include:

Safe direct sunlight exposure

- In Victoria, from **September to April** most people need sun protection when the UV Index is 3 and above. During these months, most Victorians can maintain adequate vitamin D by exposing their face, arms and hands for a few minutes on most days – but should do this on either side of the peak UV radiation periods. People with naturally very dark skin may need three to six times this exposure.[7]
- In Victoria, between **May and August**, when the average UV level is below 3, direct sunlight exposure of approximately 2-3 hours over a week to the face, arms and hands (or equivalent surface area) is required to generate vitamin D in the general population. People with naturally very dark skin need between 3–6 times this amount of exposure.
- In the Victorian winter, a north facing unshaded aspect is most successful in allowing midwinter sun. In summer, shading or appropriate fixed upward raked eaves can exclude midsummer sun.
- An area having adjustable shade devices or deciduous trees will allow direct sunlight exposure during May to August (when UV levels are typically below 3) and protected sun exposure during times when UV levels are more intense (from September to April).

The area in the built environment with direct sun exposure outdoors should consider:

Accessibility

- be accessible to people with reduced or impaired mobility.
- be accessible by public transport or within walking distance for people with no access to private areas in their own dwellings with direct sunlight exposure.

Comfort and Safety

- be safe for the community to use, particularly for older people and women with children.
- be appealing and comfortable for people so they will want to use it, particularly for longer periods of time in winter (May to August).

Privacy and Security

- offer privacy and screening to enable gender specific use and utilisation by people who cover their skin for religious and cultural reasons.
- minimise clear line of sight from overlooking buildings, roads and public areas to maintain privacy.
- have adequate security and staffing (if private and screened) that is available through co-location with staffed community facilities.

Activity and Social Dimensions

- have activities to encourage use of the area in the built environment with direct sun exposure outdoors and integrate with open space and leisure strategies.
- activities to encourage use may include social and physical activity, children's play or refreshment and food preparation facilities.
- Scheduling activity or gender specific times in existing community facilities that have access to outdoors direct sunlight exposure.

Integrating the Natural and Built Environments

- open space can be utilised to provide direct sun exposure.
- the types of plants / trees (eg. deciduous trees) in a space in conjunction with portable shade can be used to create greater shade when needed and allow greater UV exposure at other times.
- a shade audit can help identify what shade currently exists, how current shade can be optimised and how to best allow for seasonal differences and safe UV exposure.
- visual maps can enhance people's knowledge of nearby open spaces and how to get there.

2. Case Studies – Successful Response Elements to maintaining vitamin D levels

Case studies and successful response elements are presented in a framework consistent with the Ottawa Charter for Health Promotion, Integrated Health Promotion (A practice guide for service providers) and Environments for Health (Municipal Public Health Planning Framework). Whenever UV radiation levels reach 3 and above, most people need to use sun protection and seek shade. The response elements are most applicable for at-risk groups who may additionally require oral Vitamin D supplementation to maintain adequate vitamin D levels.

2.1 Environmental Strategies

Interventions will be dependent on identification of existing infrastructure and facilities, available resources and numbers of people in at-risk groups in the built area or environment under consideration.

There are a range of possible interventions to enhance direct sunlight exposure:

Minimal intervention

Scheduling activity or gender specific times in existing community facilities that have access to outdoor direct sunlight exposure. From May to August the scheduled times would include the hours between 10 am - 2 pm (11 am – 3 pm daylight saving time) and conversely from September to April shading should be provided at these times.

For example:

- scheduling access times for women and children to use and work in existing community gardens in privacy and comfort.
- scheduling outdoor organised community activity for women and children to be undertaken in neighbourhood houses, child care centres and community centres with outdoor/screened areas with privacy and comfort.
- scheduling access for outdoor activities by older people at senior citizen centres, community centres or residential aged care facilities in safe and comfortable areas (activities such as barbeques and birthday parties).
- development of visual maps which enhance people's knowledge of nearby open spaces and how to get there.

Strategy in action

Brunswick City Baths managed by the YMCA has times and days when women can use pool facilities in privacy and comfort. These could be scheduled to allow opportunities for improved direct sunlight exposure for at-risk groups.

Minor modifications

Screening of existing areas attached to community facilities.

For example:

- providing access to refreshment making facilities and food preparation areas in outdoor areas adjacent to community centres/neighbourhood houses to allow women and children to spend longer periods outdoors.
- community centres that are available to residents of nearby high density/high rise housing could develop private screened outdoor space with play facilities for children.

Strategy in action

The Hopetoun Maternal and Child Health Centre (City of Moonee Valley) is available to women and children enrolled at the centre and is located near high rise housing. The centre has screened private outdoor space with play facilities for children that allows private and secure sunlight exposure for at-risk groups.

Major modifications

New high density residential developments, medium to long term residential aged care facilities, community centres and neighbourhood houses, particularly in inner urban areas, require planning and accreditation standards that incorporate accessible areas for outdoors sunlight exposure and shade provision.

For example:

- providing outdoor sheltered balconies or garden areas with wheelchair/limited mobility access in multilevel residential aged care facilities.
- incorporating north facing private screened areas in the new urban renewal development of schools and multi function family centres to allow accessible direct sunlight exposure for use by parents and children.
- Improving access to open space and parkland adjacent to high density/high rise residential developments.

Development of new community facilities that are focused on outdoor exposure with privacy and comfort within existing open spaces.

For example:

- developing new playground facilities that allow provision of privacy screening and scheduled access times for women and children within staffed community facilities.
- developing new community gardens that allow provision of privacy screening, security and scheduled access times for women and children.
- developing outdoor community facilities such as street chess/ checkers boards, barbeques and outdoor gym equipment.
- the types of plants / trees (eg. deciduous trees) in a space in conjunction with portable shade can be used to create greater shade when needed and allow greater UV exposure at other times.

2.2 Policy Initiatives

Local Government and the Department of Human Services need to incorporate the design principles of direct sunlight exposure and shade provision associated with accessibility, comfort and safety, privacy, activity and social dimensions in built environment policies. Relevant policies may include urban renewal; public housing; aged care guidance; and municipal public health planning and practice.

Policies on the built environment that impact at-risk groups will require particular consideration.

Local government planning and regulation, in partnership with private developers and industry, need to incorporate these guidelines and also SunSmart guidelines in relation to the balance of sun exposure and shade provision in new and existing built environments.

For example:

- Local government planning overlays or local level Health Impact Assessment may be appropriate to specify appropriate facilities in new developments.
- Local governments with high density residential developments, and especially in areas that have substantial at-risk populations, need to devote particular consideration to these guidelines.

Relevant state and commonwealth government departments that are involved with urban renewal, high density residential developments, maternal and child health facilities and residential care facilities guidance, planning and practice need to incorporate a balance between safe sun exposure and shade design principles.

For example:

- the Department of Human Service's planning guidelines for health services and capital projects.
- ensuring policy, planning guidelines and regulations for new high density residential developments. Such as the draft Housing Standards Policy Manual – multi-storey construction standards that incorporate public and private open space or communal facilities with direct sunlight in winter and shading in summer.
- the proposed new residential aged care facility planning guidelines.
- the *Dementia friendly environments. A handbook for residential and respite care,* handbook.

2.3 Strengthening Communities

Audit tools can be used by community members to assess the built and natural environment and generate community action. Results from community audits can be used to educate and empower community members and inform local and state government planning.

For example:

- using the interview schedule outlined in *Creating built environments for sun exposure in dark skinned and veiled women* as a practical audit tool.
- facilitating support or self help groups for mothers from at-risk communities to engage and enhance vitamin D levels though safe sun exposure.
- facilitating exercise and activity groups to encourage safe sun exposure and advocate for appropriate community facilities to encourage these activities e.g. gardening, outdoor chess, walking and bocce.

2.4 Refocusing Health Services

Health care providers, particularly primary care, maternal and child health, obstetric, aged care, refugee and migrant health services that serve at-risk populations can undertake community and individual health promotion interventions.

For example:

- encouraging individual risk assessment, screening and education within primary care of people with naturally very dark skin, those who wear concealing clothing or older adults.

- undertaking community outreach and social marketing using media such as SBS radio or community organisations to at-risk groups from healthcare providers.
- engaging and increasing awareness in general practice and maternal child health services of at-risk groups and resources available, particularly in regions with substantial at-risk populations.
- engaging health care providers through Primary Care Partnerships or Divisions of General Practice.

Health promotion information can be generated for use by health care providers, the Department of Human Services, local government and maternal and child health services for the general population and at risk groups.

For example:

- making print materials available to the community in neighbourhood houses, community centres, libraries, migrant and refugee resource centres, home care, meals on wheels, aged care facilities and special accommodation facilities.

2.5 Developing Personal Skills

Education and information can be provided to individuals in at risk groups and the general population through community engagement, utilising health services, refugee and migrant services, aged care services, local and state government agencies.

For example:

- delivering integrated safe sun exposure and SunSmart messages through health promotion sessions, expert seminars, peer group discussion, focus groups and role plays.

2.6 Integrating with Skin Cancer Prevention Interventions

The principles outlined in this guideline have been designed to be used in conjunction with skin cancer prevention interventions promoted by the SunSmart program. SunSmart advocates that sun protection is required (for the majority of the population) whenever UV levels are forecast to reach 3 and above. In Victoria average UV levels are 3 and above from the beginning of September to the end of April. When UV levels are 3 and above, a combination of five sun protection measures is recommended including shade, sun protective clothing, hats, sunglasses and sunscreen.

When UV Index levels are below 3, sun protection is not required unless in alpine regions or near highly reflective surfaces such as snow and water. Average UV radiation levels in Victoria are below 3 from May to August. During this time SunSmart recommends that the general population does not need to use sun protection.

At-risk groups particularly with naturally very dark skin may require more UV radiation exposure to produce an adequate level of vitamin D. They may also require oral vitamin D supplementation but this should be discussed and assessed with their general practitioner.

It may not be necessary for people with naturally very dark skin to apply sunscreen, but it is still necessary to wear a broad brimmed hat and sunglasses to protect eyes and face.

3. Supporting Resources

Brochures

- *How much sun is enough? Getting the balance right: Vitamin D and sun protection*
  (Cancer Council Victoria – **www.sunsmart.com.au**)
- *Vitamin D Deficiency: Are you at risk?*
  (MVM Primary Care Partnership – 115 Melrose St North Melbourne)

Information sheets

- *Risks and Benefits of Sun Exposure: Position Statement*
  Approved by the Australian and New Zealand Bone and Mineral Society, Osteoporosis Australia, The Australasian College of Dermatologists and the Cancer Council Australia, 3 May 2007.
  (Cancer Council Victoria – **www.sunsmart.com.au**)
- *UV radiation and vitamin D- for people with naturally very dark skin* – available in English, Arabic, Amharic, Tigrigna, Somali and Nuer
  (Cancer Council Victoria – **www.sunsmart.com.au**)

Reports

- *Creating built environments for sun exposure in dark skinned and veiled women: Project Report, July 2008*
  (MVM Primary Care Partnership-115 Melrose St North Melbourne)

Public Health Planning

- *Environments for Health: Promoting Health and Wellbeing through Built, Social, Economic and Natural Environments: Municipal Public Health Planning Framework*
  (**http://www.health.vic.gov.au/localgov/mphpfr/index.htm**)
- *An introduction to the Integrated health promotion resource kit - For local government*
  (**http://www.health.vic.gov.au/healthpromotion/what_is/integrated.htm**)
- *Ottawa Charter for Health Promotion*
  (**http://www.who.int/healthpromotion/conferences/previous/ottawa/en/**)
- *Integrated Health Promotion*
  (**http://www.health.vic.gov.au/healthpromotion/evidence_res/integrated.htm**)

Open Space and recreation planning

- *Open Space for Sport and Recreation - Planning Principles and Implementation Notes for Local Government*
  (**http://www.srq.qld.gov.au/Industryinformation/Recreationplanning/Planningnotes.aspx**)

4. Explanatory Notes

Purpose

1. To provide a policy framework for Health Promotion with respect to Vitamin D in the population and the built environment.
2. This policy is aimed at an audience in Victoria and that includes local government planners, particularly strategic and recreational planners, health and social planners, public housing, architects, engineers, builders and developers, state government agencies and commonwealth agencies particularly with respect to guidelines for approval of construction, planning and accreditation of community facilities and aged care facilities.

Background

3. Adequate population Vitamin D levels are essential to maintain good musculoskeletal health particularly with respect to reducing the risk of osteomalacia. Vitamin D is required to regulate blood calcium levels and to make and maintain healthy, strong bones[1].
4. Vitamin D deficiency in children can result in rickets, characterised by bone and muscle weakness and bone deformities. For adults with low vitamin D, problems may include fractures, bone and joint pain, falls, muscle and bone weakness, and difficulties with walking[1].
5. To achieve and maintain adequate vitamin D levels for the general population in Victoria from May to August requires 2-3 hours of direct sunlight exposure to the face, arms and hands or equivalent skin area over a week [1].
6. To achieve and maintain adequate vitamin D levels in the general population from September to April, a few minutes (just before 10 am or just after 2 pm) of direct sunlight exposure on most days of the week is adequate. Protection from UV radiation is required whenever UV levels are 3 and above – this includes minimising exposure to the sun's UV by using shade, clothing, hats, sunglasses and sunscreen. Particular care is needed between 10 am–2 pm (11 am–3 pm daylight saving time) when UV levels are most intense. [1].
7. At high altitude, around highly reflective surfaces such as sand, snow and water and in the northern parts of Victoria (North of Ballarat, above 37 deg latitude) sun protection may be required between May and September, depending on UV levels [1, 2].
8. The body can store vitamin D for a period between 30-60 days assuming adequate initial vitamin D levels. Therefore deficiency of vitamin D can occur during winter or after this period of time without adequate sun exposure or vitamin D supplementation [1, 3].
9. At-risk groups will require particular consideration to achieve adequate sun exposure for vitamin D generation and if inadequate, vitamin D supplementation in consultation with a medical practitioner may be required [1, 4, 5]. These at-risk groups include:
    - People with naturally dark skin need between 3-6 times the amount of direct sunlight exposure as people with naturally fair skin.
    - People who are house bound or in residential care facilities, particularly older people are at higher risk of vitamin D deficiency[1].
    - People who cover their skin for religious and cultural reasons are at higher risk of vitamin D deficiency.
10. Particular at-risk groups will require special consideration to determine if vitamin D supplementation rather than sun exposure is more appropriate to maintain adequate vitamin D levels[1]:
    - People at high risk of skin cancer. They include individuals who have had skin cancer, have had an organ transplant or are highly sensitive to the sun.
    - Babies and infants of vitamin D deficient mothers, especially babies who are exclusively or partially breast fed.
11. This guideline has taken reference regarding vitamin D from the 'Risks and Benefits of Sun Exposure,' a joint position statement, developed by the Australian and New Zealand Bone and Mineral Society, Osteoporosis Australia, Australasian College of Dermatologists and the Cancer Council of Australia[1].

Bibliography

1. The Australian and New Zealand bone and Mineral Society, Osteoporosis Australia, Australasian College of Dermatologists and the Cancer Council of Australia. *Risks and Benefits of Sun Exposure: Position Statement*. in *Sun and Health*. 2007. Cancer Control Institute of the Cancer Council of Victoria.
   Available at:
   www.cancer.org.au//File/PolicyPublications/PSRisksBenefitsSunExposure03May07.pdf
2. Samanek, A.J., et al., Estimates of beneficial and harmful sun exposure times during the year for major Australian population centres. *Med J Aust*, 2006. 184(7): p. 338–41.
3. Bolland, M.J., et al., The effects of seasonal variation of 25-hydroxyvitamin D and fat mass on a diagnosis of vitamin D sufficiency. *Am J Clin Nutr*, 2007. 86(4): p. 959–64.
4. Clemens, T.L., et al., Increased skin pigment reduces the capacity of skin to synthesise vitamin D3. *Lancet*, 1982. 1(8263): p. 74–6.
5. Grover, S.R. and R. Morley, Vitamin D deficiency in veiled or dark-skinned pregnant women. *Med J Aust*, 2001. 175(5): p. 251–2.


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