



Evidence brief: Boosting children's vegetable intake

Taking a coordinated, action-based approach



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Introduction

Who is this evidence brief for?

Government policymakers, their support staff and other stakeholders with an interest in increasing children's vegetable intake.

Why was this prepared?

To support action on nutrition policies and programs or initiatives that will increase children's vegetable intake by summarising the best available evidence on effective strategies to change behaviour.

The problem

Vegetables are essential for children's healthy growth and development, yet most children fail to eat the recommended amounts.

Australian children's vegetable intake remains below recommended levels, with a 2017-18 National survey reporting that only 6.3% of Australian children and adolescents are eating the recommended amount of vegetables [1].

Liking and acceptance of vegetables are learnt in early childhood and eating habits track into adulthood, thus efforts to increase vegetable intake need to start as soon as possible in life [2].

Increasing vegetable intake is a strong focus for public health and commercial stakeholders with synergic benefits for individuals and families, the community, vegetable growers, food manufacturers, distributors, retailers and governments.

There is a well-established link between an increased intake of vegetables and improved health outcomes for numerous conditions such as cardiovascular disease and some cancers.

In 2015-16 it was estimated that the total burden of disease that could be attributed to low intake of vegetables in Australia was 1.4% and the total health expenditure that occurred as a result of this burden was \$1.4 billion dollars. During this period an estimated \$978.5 million of government health expenditure was attributable to low intake of vegetables [3].

The need for best practice guidelines

Hort Innovation, alongside a consortium of members from CSIRO, Flinders University and Nutrition Australia, have committed to delivering an initiative named VegKIT – which is focused on developing tools and interventions for increasing children’s vegetable intake.

The objective of VegKIT is to deliver an integrated program of research and development activities to increase children’s vegetable related knowledge and intake with the long-term planned impact of increasing children’s intake by more than half a serve of vegetables per day. One key activity of this project has been the development of best practice guidelines (hereon referred to as guidelines) to increase children’s vegetable intake.

Although there is strong evidence on the benefits of greater vegetable intake, children globally fail to meet dietary guideline targets [4].

There are numerous programs and initiatives that aim to increase children’s vegetable intake, each with specific objectives, design characteristics and strengths. Through a systematic review process, the best practice guidelines combine the features of these previous programs and initiatives that were deemed successful into a set of guidelines that aim to collectively and collaboratively achieve a greater and more sustained increase in Australian children’s vegetable intake.

One serve of vegetables

75g = 1 cup raw vegetables or 1/2 cup cooked vegetables or legumes



Development of the best practice guidelines

There were three steps taken to develop the guidelines and their setting-specific resources.

- Part I: A systematic review of the scientific literature was conducted to identify intervention characteristics and strategies associated with success – or increases in children vegetable intake. This provided the scientific foundation for the guidelines.
- Part II: Findings from the review were refined through stakeholder feedback.
- Part III: Research was translated into useful and accessible best practice guidance packages for stakeholders.

Figure 1: Steps in developing the guidelines



Part I: Research

Two systematic reviews were completed to develop the guidelines. Successful interventions, which demonstrated an increase in vegetable intake, had some consistent design features and behaviour techniques which are summarised in the following tables.

Table 1: Common design features and strategies from successful programs in the systematic review.

Design feature	Strategy
Nutrition messages	<p>Communicating a clear and consistent message about increasing vegetable intake.</p> <p>Multiple targets</p> <p>Intervention messages aimed at more than one target audience (e.g. parents and children; parents and teachers), rather than a single audience (e.g. children only).</p> <p>Consistent message</p> <p>Messages were consistent and delivered across multiple settings (e.g. home and school).</p> <p>Specific focus</p> <p>Messages were specific, targeting only vegetables or fruits and vegetables, rather than general healthy eating or healthy lifestyle.</p>
Intervention design	<p>Being exposed to the nutrition messages enough is important for increasing vegetable intake.</p> <p>Length</p> <p>Interventions lasted longer than 6 weeks in duration.</p> <p>Frequency</p> <p>There was frequent contact with the target participant, at least once a week.</p>
Evaluation	<p>An evaluation of the program measured the amount of vegetables eaten by children in serves (not just frequency) using a valid measurement tool to get a clear and accurate measure.</p>

Further, a range of behaviour changes techniques were utilised in interventions that had a positive impact on vegetable intake in children:

Table 2: Behaviour change techniques of successful programs found in the systematic review.

Technique type	Example
Goals and planning	<ul style="list-style-type: none"> ● Problem solving to determine the factors which influence behaviour and to help identify strategies to overcome them. ● Detailed planning of how to implement new behaviours in specific environments. ● Ask participants to commit to changing their behaviours. ● Ask participants to review and change their goals according to their progress.
Feedback and monitoring	<ul style="list-style-type: none"> ● Providing participants with feedback on how frequently, how well or for how long they have been performing the desired behaviour. ● Encouraging participants monitor their own behaviour. ● Providing feedback on the outcomes of the behaviour.
Shaping knowledge	<ul style="list-style-type: none"> ● Instructions on how to perform the behaviour, or demonstration of the behaviour.
Consequences of behaviour	<ul style="list-style-type: none"> ● Providing information about the health benefits of changing behaviour. ● Understanding the social and environmental consequences of performing the behaviour. ● Changing the physical environment to support the new behaviour. ● Remove unwanted cues or distraction which create barriers to performing the behaviour.

A full report outlining the evidence for the best practice guidelines can be found on the VegKIT website: www.vegkit.com.au.

PART II: Translation

Development of the guidelines framework

The consistent elements and behaviour change techniques that were associated with increased vegetable intake by children from the successful programs, were used to develop a set of seven guidelines. The guidelines aim to inform future research, government and community initiatives to ensure they are effective at increasing children's vegetable intake. They consider the key players that can influence intake in each setting and encompass a quality framework approach to the planning and implementation phases. Based on the latest scientific evidence, they utilise a multi-sector approach to develop children's willingness to try vegetables and learn to love them.

Best practice guidelines for increasing children's vegetable intake

These guidelines focus on vegetables as part of a healthy diet and can support multiple sectors and policy levels to boost children's vegetable intake.

The best practice guidelines for increasing children's vegetable intake are highly practical. They synthesise the current evidence into clear information with recommendations for concrete action.

Figure 2: VegKIT framework: Seven best practice guidelines for increasing children's vegetable intake

Foundation

- 1 Make vegetables the hero**
Have simple vegetable specific messages with a clear focus.
- 2 Coordinate sustained effort across multiple players**
Coordinate long-term action among key players involved in providing and promoting vegetables to children.
- 3 Grow knowledge and skills to support change**
Identify and act on gaps in knowledge and skills to support children's vegetable intake.
- 4 Minimise barriers to increase success**
Understand and identify ways to address barriers to children's vegetable intake.

Action

- 5 Plan for and commit to success**
Set clear and measurable vegetable-specific goals and commit to a plan of action.
- 6 Create an environment that supports children to eat vegetables**
Make vegetables the easy choice by providing an environment that promotes vegetable familiarisation and intake.

Review

- 7 Monitor and provide feedback on progress**
Monitor progress and achievement against goals and provide feedback at regular intervals.

Part III: Implementation

Tailoring the guidelines framework into setting-specific tools

The guidelines have been translated into best practice user guides and resources for key stakeholders within the community, across the food supply and industry/academic sectors. The setting-specific user guides are designed to provide advice about the best practice guidelines, examples of how the audience could adopt the guidelines in practice and some strategies and purpose designed tools to support the implementation of the guidelines.

User guides have been developed for:

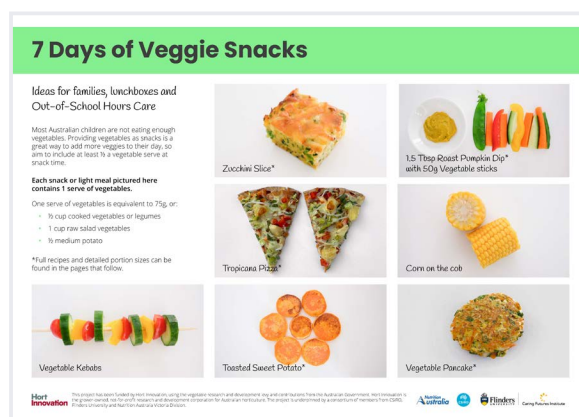
- [Long Day Care \(LDC\)](#)
- [Out of School Hours Care \(OSHC\)](#)
- [Primary Schools](#)
- [Research](#)
- [Food Industry.](#)

To assist with the adoption of the guidelines, a number of setting-specific resources have also been developed to support certain settings that influence children's vegetable intake:

- [Video: Best Practice Guidelines for Increasing Children's Vegetable Intake in Early Childhood Services.](#)
- [Sample Quality Improvement Plan for Increasing Children's Vegetable Intake in Long Day Care.](#)
- [Infographic: Best Practice Guidelines for Increasing Children's Vegetable Intake \(for LDC, OSHC, Schools\)](#)
- [7 Days of Veggie Snacks \(for OSCH and families\).](#)



Video: Best Practice Guidelines for Increasing Children's Vegetable Intake in Early Childhood Services.



7 Days of Veggie Snacks (for OSCH and families)

Initiatives that align to the guidelines

Through the VegKIT project, a resource registry has been created to access credible initiatives, community projects and research which promote vegetable intake in children.

This online repository is a searchable hub of projects and initiatives that can be used by health professionals, including early and primary educators, community, public health and NGOs to plan, develop and evaluate their own initiatives.

All research and community initiatives uploaded onto the registry have been assessed by an independent expert panel to highlight how each of the initiatives aligns with the guidelines, as well as to determine the efficacy of the evaluation activities and effectiveness.

The VegKIT registry can be found here: www.vegkit.com.au/registry.

There are a number of initiatives that align well with the best practice guidelines that have been evaluated. These include:

- [Crunch&Sip®](#)
- [Eat It To Beat It](#)
- The Stephanie Alexander Kitchen Garden Foundation - see over the page for how this initiative aligns with the guidelines.

Quality Improvement Plan – Key improvements sought

You can link many components of the seven best practice guidelines for increasing children's vegetable intake in long day care to your centre's Quality Improvement Plan (QIP).

Here are some **examples** of goals, outcomes and success measures aligned to selected Quality Areas. These goals and steps are a suggestion on how you can incorporate the best practice guidelines into your QIP. Not all goals might be relevant or of priority. Choose all results, rather than only goals and steps, set to track how they suit your centre.

Standard/element	Issue identified during self-assessment	What outcomes or goal do we seek?	Priority (U/M/L)	How will we get this outcome? (Steps)	Success measure	By when?	Progress notes
1.2 Educators facilitate and extend each child's learning and development	Parents, caregivers or staff identify that children are not eating enough vegetables	Children consume assistance and intake of vegetables by the children	M/H	All staff: <ul style="list-style-type: none"> Watch Best Practice Guidelines for increasing Children's vegetable intake in Long Day Care when doing staff meetings at the start of the month. Revisit Best Practice Guidelines for increasing Children's vegetable intake in Long Day Care and guide during staff meetings in the middle of the month. 	All staff receive 10 minutes knowledge on the Best Practice Guidelines (BPG). Staff are familiar with the centre's goals that support it and are clear on the role they have to play.	Mid-Nov 2009	
4.2.1 Management, educators and staff work with mutual respect and collaboration, and challenge and learn from each other, recognising each other's strengths and skills.				Management, educators and staff to reflect on the guidelines and set clear goals during staff meetings at the end of the month.	Plan to (number) more activities to expose children to vegetables in the weekly activity plans for each classroom/group.	End Nov 2009	
				Educators to bear down 15 min lessons for teaching children learning.	Reflector for families by these a report, with pictures and to rates the growth in vegetable activities the children have been doing in the classroom.	Mid Dec 2009	
				Cooks and educators to meet once a week to ensure alignment of menu.	Implement lesson/activities.	Jan-Apr 2011	

Sample Quality Improvement Plan for Increasing Children's Vegetable Intake in Long Day Care.

Best Practice Guidelines for Increasing Children's Vegetable Intake

Only 6% of children aged 2-17 are eating enough vegetables. You can make a difference by making a few small changes in your area of work. These research-based guidelines can be used in your programs and initiatives to help to increase children's vegetable acceptance and intake.

For more information visit www.vegkit.com.au

- 1 Make vegetables the hero**
Have clear and consistent, vegetable-focused messages. These messages can be around meals or snacks, or even outside of eating occasions.
Action: Include vegetables in a range of play and education activities.
- 2 Coordinate sustained effort across multiple players**
Everyone has a role to play, including educators, cooks, management, parents and carers.
Action: Work as a team and be clear on what your role is.
- 3 Grow knowledge and skills to support change**
Action: Support staff to participate in education opportunities during their work hours to learn more about how to increase vegetable liking and intake in children.
- 4 Minimise barriers to increase chance of success**
Understand and identify the possible barriers to children's vegetable intake.
Action: Address barriers such as cost, food waste or children's acceptance to eating a greater variety of vegetables.
- 5 Plan and commit for success**
Identify a goal, this may be around frequency, servings or variety of vegetables provided.
Action: Choose a practical approach such as providing to serve of vegetables per child at snack times.
- 6 Create an environment that supports children to eat vegetables**
Make vegetables readily available and appealing at each eating occasion.
Action: Outside of mealtimes you can introduce vegetables through storytelling, posters, games or by starting a vegetable garden.
- 7 Monitor and provide feedback on progress**
Record your goals to help you keep track of your progress.
Action: Include your goals in your Quality Improvement Plan. Share progress with staff and families and provide guidance for future initiatives.

Hot Innovation
This project has been funded by Hot Innovation, using the vegetable research and development they and other bodies from the Australian Government. Hot Innovation is a not-for-profit research and development organisation for Australian horticulture. The project is supported by a consortium of researchers from CSIRO, Rensselaer University and Horticulture Australia Victoria Division.

Infographic: Best Practice Guidelines for Increasing Children's Vegetable Intake

Bringing the best practice guidelines to life:

The Stephanie Alexander Kitchen Garden Foundation

A food philosophy that makes sense

The Stephanie Alexander Kitchen Garden Foundation (SAKGF) provides educational resources, professional development, support and inspiration for educators to deliver pleasurable food education to children in Australia with the aim that this approach will influence children's food choices and behaviours in a positive way.

The program works by having children in early childhood settings through to primary and secondary schools, participate in regular garden classes in a vegetable garden located in the school/service that they have helped to design, build and maintain. They also participate in regular classes where they prepare and share dishes produced using the food grown in the garden. Specialist staff or existing teachers are trained to run the Program and schools and services are encouraged to start small and build their program over time, so costs are kept minimal. The Program is implemented within a whole-of-school/service approach, engaging families and the community and well as being integrated with the curriculum.

SAKGF embodies the best practice guidelines for increasing vegetable intake in children in a number of ways. One is how they place great importance on pleasurable food education through experiences such as encouraging the children to enjoy and have fun learning about where food comes from in the garden as well as exploring taste, texture and technique in the kitchen classes, maximising their learning potential (Guidelines 1, 4, 6).

Further, through activities, templates, recipes and fact sheets, vegetables are integrated into play and curriculum linked activities. The aim is to make vegetables the focus and for the children to be familiar with them – and invested in their growth and care – so they are more likely to choose and eat them. (Guidelines 1,3,6).

Implementation of the kitchen garden program calls for the commitment and enthusiasm of key individuals within the school/service community and encourages a coordinated effort (Guideline 2). Examples of how they do this include linking the kitchen garden with the school's canteen, tailored take-home information and activities for families, and ideas and assistance with fundraising/sponsorship activities to support the Program.

The Foundation offers a range of professional development training options that can be customised to address specific knowledge or skill gaps of staff and those in the school community (Guideline 3). Moreover, the Program offers a framework and self-assessment tools to help with the planning and monitoring of the Program within their school/service (Guidelines 5, 7).

Evaluated in 2013 by the University of Wollongong, findings reported that the kitchen garden program had enabled primary school students in Years 3 – 6 across Australia to participate in enjoyable food experiences that included how to grow, harvest, prepare and share seasonal fresh food. Strong evidence was found for significant improvements in students' food choices and kitchen lifestyle behaviours as a result of participation.



Image credit: Stephanie Alexander Kitchen Foundation

Additionally, the program was found to be cost-effective. Analysis on the economic return on investment determined that on average, a total of \$181,979 was generated within the school community to run the Program over an initial two-year period. This included an average investment by the Australian Government of \$44,758 per school, translating into an economic multiplier of 5.07 for each dollar provided by the Australian Government [4]. The funding model has now changed slightly with schools/centres now having the option to become a member of SAKGF (\$165 joining fee and annual renewal), which thereby provides them with access to an array of support services to run a program that is unique to their situation and environment. Thus, building and running a cost-effective community run program with the Foundation's continual support.

Find out more at www.kitchengardenfoundation.org.au.

The role of government

Considering the gap between recommendations and the current intake of vegetables in Australian children, in conjunction with the health, social and economic benefits of eating more vegetables, addressing low intake in children is a public health priority.

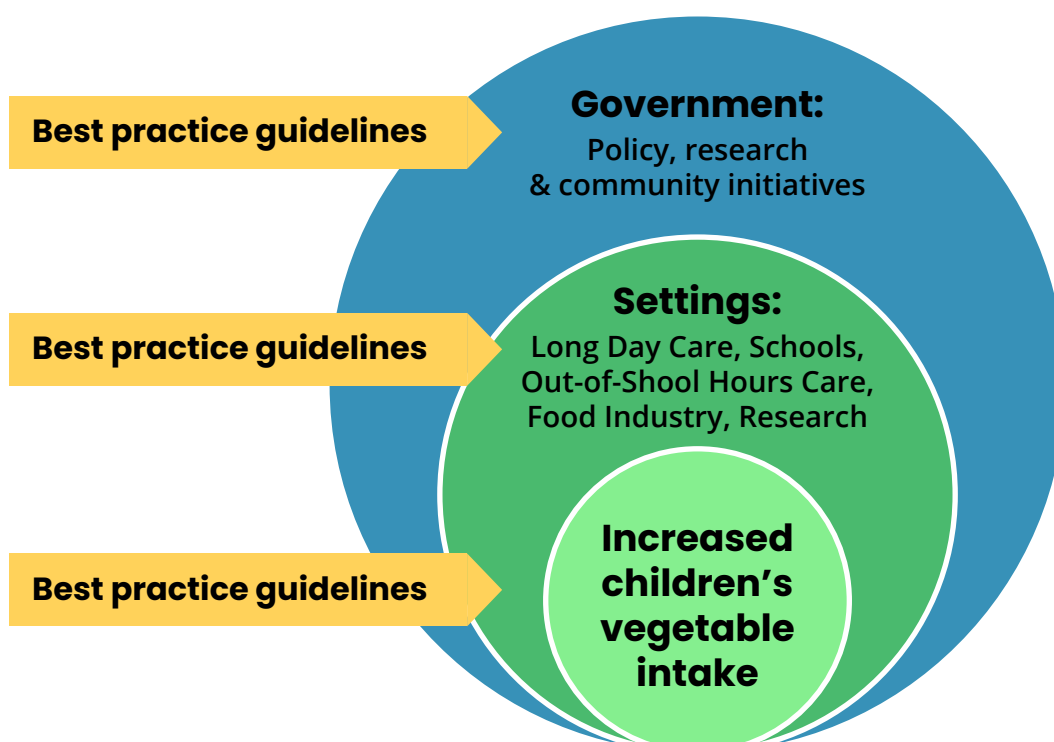
Government plays a critical role in improving the nutritional intake of children. The best practice guidelines can be utilised as a tool to help inform and influence existing and new government policies and initiatives within the settings that contain children's eating opportunities.

In addition to this, multiple strategies from other key stakeholders are needed to drive the change in behaviour that is required to improve vegetable intake levels in Australian children (Figure 3). Large-scale improvements can only be achieved when all those who influence children's eating habits are involved, including:

- government
- community settings such as long day care, primary schools and out-of-school hours care
- parents, families and carers
- industry and service providers
- research institutes.

Similarly, success depends on a collaborative approach of multiple strategies and activities.

Figure 3: The role of government in increasing children's vegetable intake.



Key actions for government

- Ensure state and national policies and initiatives support integration and adoption of the vegetable-specific, best practice guidelines (e.g. National Healthy School Canteens Guidelines).
- Focus investment on the development, implementation and evaluation of evidence-informed policies and initiatives that will enable increases in children's vegetable intake.
- Support successful and evidence-based programs and initiatives that focus on increasing children's vegetable intake, to be sustained beyond their initial lifespan to ensure they are embedded into the ongoing activities of the sector (e.g. grant funding for vegetable programs in long day care centres, schools, out-of-school hours care, etc.).

Government, the food industry, peak bodies, and local settings and services need to work together to support children to eat more vegetables.

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