Hort Innovation

Final Report

Boosting vegetable consumption through diet (VegEze)

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Delivery partner:

SP Health

Project code:

VG16071

Project:

VG16071 Boosting vegetable consumption through diet (VegEze)

Disclaimer:

Funding statement:

This project has been funded by Hort Innovation, using the vegetable research and development levy and contributions from the Australian Government. Hort Innovation is the grower-owned, not-for-profit research and development corporation for Australian horticulture.

Publishing details:

ISBN 978 0 7341 4386 0

Published and distributed by: Hort Innovation

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Content

Summary

This project, VG16071 Boosting vegetable consumption through diet, manifested as VegEze: an iOS mobile app that challenges Australians to eat 3 types of vegetables at dinner or their main meal for 21 days.

The target behaviour was identified in an analysis of the previous Hort Innovation funded project *Fruit, Vegetables and Diet Score* (MT16008) which revealed that people who 'always' have 3 different types of vegetables at dinner or their main meal have higher overall vegetable intake.

The project was a collaboration between SP Health, CSIRO and Hort Innovation. IP in the project is shared 70% to SP Health/CSIRO and 30% to Hort Innovation.

Launched in November 2017 as a community research study, VegEze attracted over 5,000 study participants between November 2017 and May 2018. The Apple® ResearchKit® software was used to deliver validated surveys to participants at baseline, 21 and 90 days to measure the impact of the app on vegetable intake – in terms of amount and variety consumed.

The app also provided participants with features to help them put the target behaviour into practice including a vegetable log, recipes and meal ideas, tips, feedback and awards for completing the challenge.

The impact of the app has been evaluated by CSIRO using the RE-AIM framework which measures the Reach, Effectiveness, Adoption, Implementation and Maintenance of the intervention.

The study attracted a national sample of participants.

- 5,062 Australians downloaded the VegEze app and completed the baseline survey.
- Of these, 24.1% (n=1,224) completed the 21-day survey which was designed to measure change in vegetable consumption as a result of the challenge.
- 5.4% (n=273) completed the 90-day survey which measured maintenance of these changes.

The study found that VegEze resulted in:

- an average increase in vegetable intake of 0.5 serves a day over the 21-day challenge period. The women that maintained this change at the 90-day follow-up did so with an average increase of 0.7 serves.
- over 80% of participants (n=994) 'always' or 'usually' achieved the target behaviour of consuming 3 vegetable serves at dinner at 21 days, which increased to almost 90% (n=239) in the 5.4% of participants who reported intake at the 90-day follow-up.
- almost a quarter of the sample that completed the 21-day survey (n=276) met the *Australian Dietary Guidelines* recommendations for vegetable intake.

The VegEze app performed particularly well with hard-to-reach groups, such as those with low vegetable intake at baseline (n=491), who significantly increased their intake by 1-1.2 serves a day at 21 days.

Obese participants who completed the 90-day survey (n=100) increased their vegetable intake by 0.6 serves a day at 21 days and by 0.8 serves a day at 90 days.

High users of the VegEze app (n=427) also out-performed the sample with an average increase in vegetable intake of 0.6 serves a day and vegetable variety of 1 type a day at 21 days. This association between usage and increased consumption is particularly encouraging for future implementation: finding ways to make more people high users could further improve the impact of VegEze.

Keywords

Mobile app, population health, vegetable intake, vegetable serves, digital health intervention, vegetables, vegetable, app, dietary intervention, diet, health score, VegEze

Introduction

The VegEze app was designed in collaboration by digital health experts SP Health and the CSIRO using iterative design methodology. The app was launched as a 21-day challenge to get Australians in the healthy habit of eating more vegetables, starting with 3 different types at dinner. The app suggests easy and fun ways to help establish this habit, and encourages individuals to monitor their vegetable intake with an easy-to-use tracker for logging the amount and types of vegetables they consume at each meal. The app also provides supporting content about vegetables such as articles and recipes.

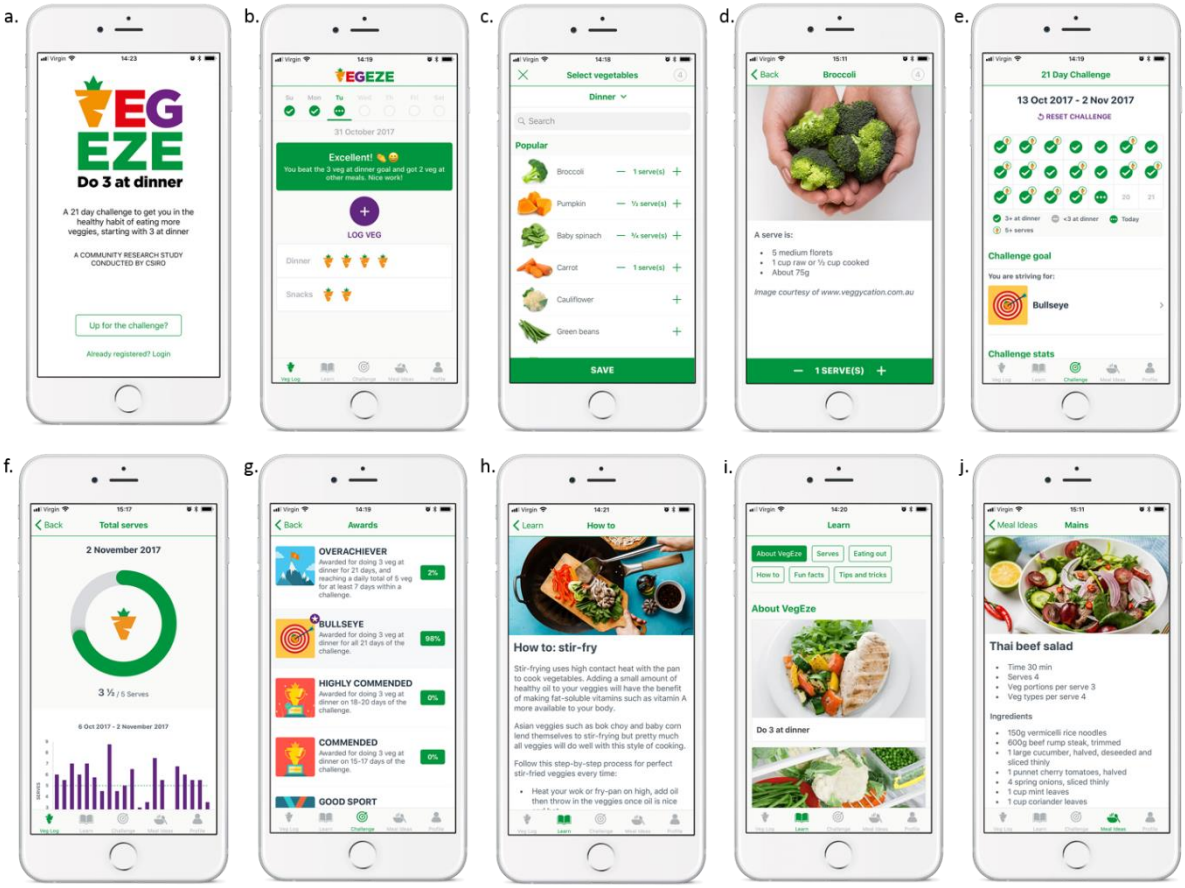


Figure 1 A sample of screenshots from the VegEze app as published in the App Store. (a) Log in and welcome screen; (b) Home screen displaying motivational feedback message, progress for current day for types of vegetables consumed, and vegetable log; (c) Vegetable list and logging functionality; (d) Example of a standard serve of vegetables; (e) Summary challenge screen and level achieved; (f) Feedback screen of serves of vegetables consumed for the day and across the challenge; (g) Leader board of achievements; (h) Example of "How to" content from the learn section; (i) Learn screen; (j) Example of a recipe from the meal ideas section.

Development and results of the app have been fully discussed in the *VegEze Impact Report* (Hendrie, G., Hussain, M.S., Brindal, E., James-Martin, G., Williams, G. [2018]) which is available from Hort Innovation on request.

Methodology

The development of the VegEze app was guided by the IDEAS framework (Figure 2 below). This included surveying target users and getting their feedback on designs and prototypes. The development process took approximately 5 months and involved feedback from over 1,000 target users. These users were recruited from SP Health's database of Australians who had opted in for communications from the CSIRO Total Wellbeing Diet website.

Figure 2 The IDEAS framework that guided the development of VegEze

Development process

The project team implemented the four phases of the IDEAS framework as follows:

- **Phase 1 – Integrate insights from users and theory**: The target behaviour of consuming 3 vegetables at dinner was identified in *Fruit, Vegetables and Diet Score* (MT16008) which revealed that people who 'always' have 3 different types of vegetables at dinner or their main meal have higher overall vegetable intake. The team drew on behaviour change theory to establish the core techniques of the app. The concept was tested in a consumer survey (n=1,068) which also elicited barriers and motivations to eating more vegetables.

- **Phase 2 – Design iteratively and rapidly with user feedback:** The multidisciplinary project team met twice per week to discuss, design and refine project features. A simple vegetable log to track vegetable intake was designed, prototyped and tested for usability with 11 users. This feedback was then incorporated into a beta version of the app. The prototype was also shared with engineers and user experience experts at Apple Australia who provided design and technical advice.

- **Phase 3 – Assess rigorously:** The beta version of the app was tested in a pilot study of 283 users to assess usability and overall satisfaction with the app. The pilot provided an opportunity to resolve any bugs prior to launch. The app was then made available in the Apple® App Store® where the uncontrolled quantitative study commenced.

- **Phase 4 – Share intervention and findings:** Participants were recruited to the study via editorial segments on the Sunrise television show, the Ten Eyewitness News and via digital news stories e.g.

on News.com.au. Participants were also recruited from SP Health's database of members interested in the CSIRO Total Wellbeing Diet. Between November 2017 and May 2018, 5,062 adults downloaded the app and consented to participate in the study. Results of the study were documented in the *VegEze Impact Report* (Hendrie, G., Hussain, M.S., Brindal, E., James-Martin, G., Williams, G. [2018]).

Evaluation framework

The overall impact of the VegEze app was evaluated using the RE-AIM framework in an uncontrolled, quantitative study designed to measure the app's effectiveness in increasing daily vegetable consumption after 21 and 90 days, as well as to determine the associations between user characteristics and outcome measures.

The RE-AIM framework defines impact in terms of Reach, Effectiveness, Adoption, Implementation and Maintenance. Key questions of the VegEze research study included:

- How many Australian adults are willing to participate in the VegEze intervention? (Reach)
- What is the impact of the VegEze intervention on increasing participants' vegetable variety and consumption? (Effectiveness)
- Who used the VegEze app most? (Adoption)
- How do participants use the VegEze app and which features are associated with success? (Implementation)
- Does the VegEze app support participants to maintain their consumption longer term? (Maintenance)

Outputs

The project resulted in the following outputs:

- The VegEze iOS mobile app which can be downloaded from the Apple® App Store® via this link: https://itunes.apple.com/au/app/vegeze/id1268951104?mt=8
- The *VegEze Impact Report* which discusses in detail the results of the study, which is available from Hort Innovation on request.
- The *VegEze Preliminary Impact Report* which included 21-day results and was made public via a press release issued by CSIRO and a blog published on the CSIRO website. The goal of releasing preliminary findings was to attract more study participants.
- A report of the usability of the app which guided design and development decisions (submitted as MS103).
- Dissemination activity including:
    - 2 presentations to a Project Reference Group during development;
    - interviews with CSIRO scientists on broadcast media (e.g. Sunrise, Ten Eyewitness News) and digital media (News.com) to discuss recruitment and preliminary results; and
    - a presentation organized by Hort Innovation at the 2018 Dietitians Association of Australia Conference; and
    - a workshop with Hort Innovation to disseminate results.
- De-identified vegetable consumption data for further analysis by Hort Innovation.
- Recommendations for the future of VegEze provided on page 12.

Outcomes

Outcomes of this project are discussed in detail in the *VegEze Impact Report* which is available from Hort Innovation on request. A summary of outcomes includes:

- Evidence that the VegEze mobile app can increase vegetable intake by a significant 0.5 serves a day.
- Evidence that the VegEze mobile app is effective, especially in hard-to-reach groups, making it relevant as an 'entry level' intervention to improve diet quality.
- An understanding of the groups who do particularly well with the intervention, i.e.
    - Overweight and obese women who increased their daily intake by 0.6 serves and 0.7 types;
    - Individuals with the lowest vegetable intake at baseline who increased their daily intake by 1.2 serves and 0.7 types;
    - High users of the app who increased their daily intake by 0.6 serves and 1 type.
- Quantitative data which is fully discussed in the *VegEze Impact Report*, including:
    - An overwhelming preference for fresh vegetables vs canned or frozen;
    - Preference for vegetables by meal time e.g. carrots, potatoes, tomatoes, capsicum, onion and broccoli were the most commonly logged vegetables for dinner;
    - Types and quantities of vegetables consumed at breakfast, lunch, dinner and snacks.
- An evidence-based app that could be recommended by health professionals to help improve vegetable intake in their patients.
- Evidence that the VegEze app has the potential to boost demand for Australian vegetables. For example, of the sample who completed the 21-day survey (n=1,224) their overall increase in vegetable intake was 34%. In VG15031, Deloitte suggested that a 10% increase in vegetable consumption could boost annual grower profits by $23m.

Monitoring and evaluation

VG16071 *Boosting vegetable consumption through diet* met the objectives outlined in the M&E plan (submitted at MS102) - with the exception of app downloads.

These were forecast at 25,000 but only reached 12,700 downloads. This had a flow-on effect to the number of study participations which was agreed to and documented in a project variation in March 2018.

The M&E plan aimed for two end-of-project outcomes related to increasing demand for Australian vegetable products. These were:

1. Increased daily consumption of 0.5-1 serves of vegetables in a sample of Australian adults
2. Increased consumption of more types of vegetables (variety) in a sample of Australian adults.

The following explains how the 4 Key Evaluation Questions (KEQs) identified in the M&E plan were answered by the project:

1. **To what extent has the project achieved its outcomes?**
   The VegEze app achieved the outcome of increasing vegetable consumption in a large sample of Australians (n=1,224) with an average daily increase of 0.5 serves and 0.4 types of vegetables after 21 days. These changes were maintained in those that completed the 90-day follow-up survey (n=273). Cohorts within the sample achieved greater increases in vegetable intake and variety. For example, low vegetable consumers (n=491) increased vegetable intake by 1-1.2 serves a day and 0.3-0.7 types a day.

2. **How relevant was the project to the needs of intended beneficiaries?**
   The app has potential to drive demand for Australian vegetable products once scaled. Of most interest is the association between app usage and vegetable consumption, i.e. participants who used the app most frequently increased their vegetable intake by 0.6 serves a day and their vegetable variety by 1 type a day at 21 days, which exceeded the average of 0.5 serves and 0.4 types. Finding ways to get more Australians downloading the app and using it frequently could help drive demand for Australian vegetable products.

3. **How well have intended beneficiaries been engaged in the project?**
   Two Project Reference Group (PRG) meetings were conducted during the project. Chris Schreurs represented growers at those meetings. Chris also provided feedback on early designs of the app in a teleconference with the project team prior to the first PRG meeting. A dissemination workshop was conducted at Hort Innovation's Sydney office on 2 July 2018.

4. **What efforts did the project make to improve efficiency?**
   The project utilized both CSIRO's and SP Health's communication assets e.g. social media and email databases, to boost participation in the study. It also aligned with other Hort Innovation projects by utilizing Veggycation content in the app and impact reports.

Intellectual property, commercialisation and confidentiality

IP in the project is shared 70% to SP Health/CSIRO and 30% to Hort Innovation.

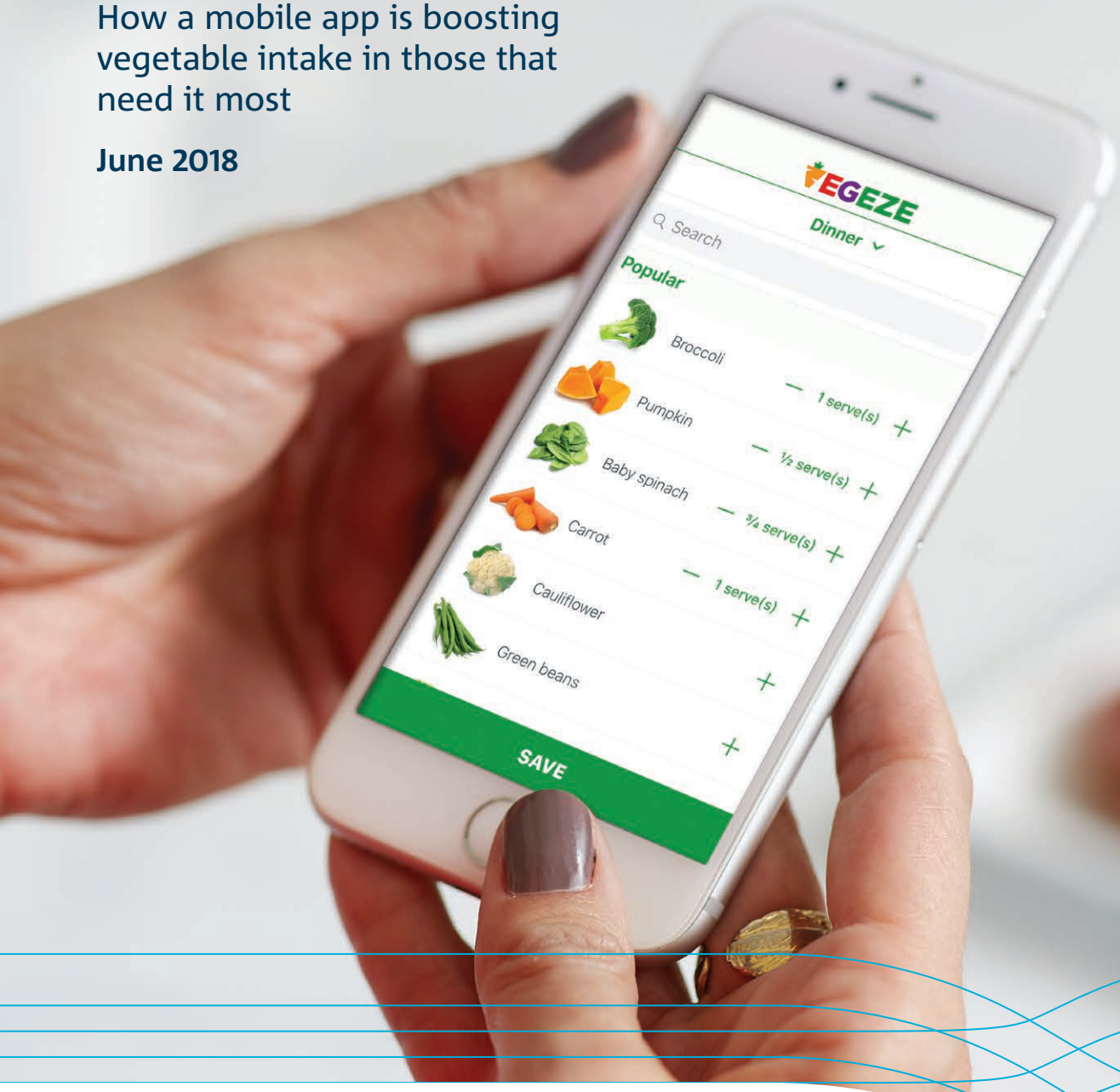
The recommendations of this report on page 12 are confidential.

The de-identified data provided to Hort Innovation as part of this project's outputs should not be shared outside of Hort Innovation without SP Health's consent in writing.

VegEze Impact Report

How a mobile app is boosting vegetable intake in those that need it most

June 2018



Hort Innovation

SP Health.

CITATION

Hendrie, G., Hussain, M.S., Brindal, E., James-Martin, G., Williams, G. (2018) VegEze Impact Report.

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ACKNOWLEDGEMENTS

The VegEze app and research study is a collaboration between SP Health Co., CSIRO and Hort Innovation.

The project known as VG16071 'Boosting vegetable consumption through diet' has been funded by Hort Innovation, using the vegetable industry research and development levy and contributions from the Australian Government. Hort Innovation is the grower owned, not-for-profit research and development corporation for Australian horticulture.

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Contents

Executive summary

Australians aren't eating enough vegetables

Less than 5% of adults eat enough vegetables to meet the recommendations of the *Australian Dietary Guidelines*. Adequate consumption of vegetables may reduce the risk of chronic diseases such as heart disease, diabetes and some cancers, as well as help to maintain a healthy weight.

The VegEze app could be part of the solution

The VegEze app challenges participants to eat 3 types of vegetables at dinner or their main meal for 21 days. The target behaviour was identified in the *Fruit, Vegetables and Diet Score* report (MT16008) which revealed that people who 'always' have 3 different types of vegetables at their evening meal have higher overall vegetable intake.

'Do 3 at dinner' is an effective strategy

The novel and specific instruction to 'do 3 at dinner' i.e. eat 3 types of vegetables at your main meal, helped participants eat more vegetables and more types of vegetables. By the end of the 21-day challenge, participants had increased vegetable intake by 0.5 serves per day and vegetable variety by 0.35 types per day. Over 80% of participants were 'always' or 'usually' eating 3 types of vegetables at dinner by the end of the challenge.

Low vegetable consumers were the biggest winners

Participants who had the lowest vegetable intakes when starting the challenge out-performed all other groups. They increased vegetable intake by 1.2 serves per day and vegetable variety by 0.7 types per day. This result indicates that a simple, actionable recommendation such as 'do 3 at dinner' can be highly effective when encouraging adults to eat more vegetables.

Using VegEze most days seems to help increase veggies

Participants who actively used the VegEze app on most days of the 21-day challenge increased their vegetable intake more than less frequent users. The highest app users increased their vegetable consumption by 0.6 serves per day over the 21-day challenge period. Variety also increased by almost 1 type per day. Among this group of VegEze participants, 87% were reporting to 'always' or 'usually' have 3 different types of vegetables at dinner at the end of the challenge.

Women maintained their gains longer term

Women significantly increased their intake over the 21-day challenge and were able to maintain these gains longer term. From baseline to the end of the 90-day follow-up, women increased their intake by 0.7 serves per day, and 27% were consuming enough vegetables to meet the *Australian Dietary Guidelines* recommendations at the end of 90-day follow-up. This encouraging result suggests VegEze supports women to achieve sustained improvements in their vegetable intake.

Background and objectives

About the VegEze research study

FAST FACTS

VegEze is a new Australian mobile app

Designed to boost vegetable intake and variety

Introduced as a 21-day challenge

Goal is to get 3 types of vegetables at dinner

Why Australians need to eat more vegetables

Poor diet quality is one of the most important modifiable risk factors for chronic disease. Poor quality diets are generally characterised by inadequate consumption of fruit and vegetables, and over consumption of unhealthy, energy dense, discretionary foods.

Data from the latest Australian Health Survey suggests that less than 5% of adults consume enough vegetables to meet the *Australian Dietary Guidelines*. Adequate consumption may reduce the risk of chronic diseases such as heart disease, diabetes and some cancers, as well as help to maintain a healthy weight.

The *Australian Dietary Guidelines* encourage the population to "enjoy plenty of vegetables", "increase consumption", and include "different types and colours", with a general target of reaching 5 serves of vegetables per day. One serve of vegetables is approximately 75g.

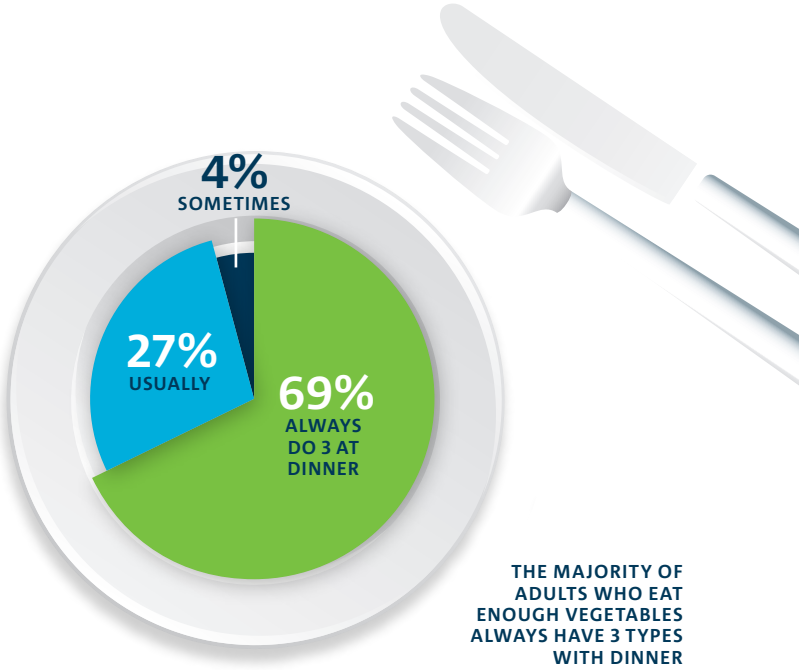
FIGURE 1 **PERCENTAGE OF THE AUSTRALIAN POPULATION WHO EAT ENOUGH VEGETABLES TO MEET THE RECOMMENDATIONS OF THE AUSTRALIAN DIETARY GUIDELINES**

About the VegEze mobile app

Analysis of the CSIRO Healthy Diet Score survey, in over 198,000 Australian adults, revealed that people who 'always' have 3 different types of vegetables at their evening meal have higher overall vegetable consumption relative to other frequencies. These people were also more likely to meet the recommended daily intakes of the *Australian Dietary Guidelines*.

Therefore, the target behaviour of the VegEze app was 'have 3 different types of vegetables at dinner', referred to in the app as 'do 3 at dinner'. The behaviour is novel, specific and actionable.

It is also measurable, easy to self-monitor, and has the potential to produce a cascade benefit, improving vegetable consumption at other meal times.



THE MAJORITY OF ADULTS WHO EAT ENOUGH VEGETABLES ALWAYS HAVE 3 TYPES WITH DINNER

VegEze 21-day challenge

The VegEze app was launched as a 21-day challenge to get Australians in the healthy habit of eating more vegetables, starting with 3 different types at dinner. The app suggests easy and fun ways to help establish this habit, and encourages individuals to monitor their vegetable intake with an easy-to-use tracker for logging the amount and types of vegetables they consume at each meal.

Evaluation framework

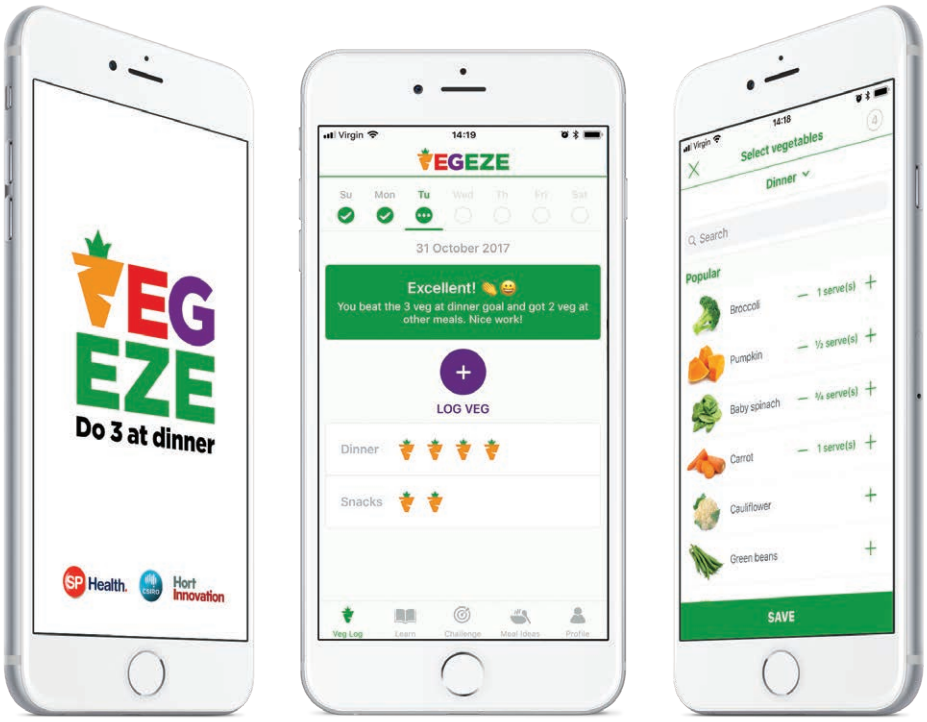
The overall impact of the VegEze app was evaluated using the RE-AIM framework in an uncontrolled, quantitative study designed to measure its effectiveness in increasing daily vegetable consumption after 21 and 90 days, as well as to determine the associations between user characteristics and outcome measures.

The RE-AIM framework defines impact in terms of Reach, Effectiveness, Adoption, Implementation and Maintenance.

Key questions of the VegEze research study include:

- How many Australian adults are willing to participate in the VegEze intervention? (Reach)
- What is the impact of VegEze on increasing participants' vegetable variety and consumption? (Effectiveness)
- Who used the VegEze app most? (Adoption)
- How do participants use the features of the VegEze app and is app usage associated with success? (Implementation)
- Does the VegEze app support participants to maintain their consumption longer term? (Maintenance)

The development of the VegEze app was guided by the IDEAS framework



PHASE 1 → **PHASE 2** → **PHASE 3** → **PHASE 4**

INTEGRATE INSIGHTS FROM USERS AND THEORY

- SPECIFY TARGET BEHAVIOUR
- GROUND IN BEHAVIOURAL THEORY
- EMPATHISE WITH TARGET USERS

DESIGN ITERATIVELY AND RAPIDLY WITH USER FEEDBACK

- IDEATE IMPLEMENTATION STRATEGIES
- PROTOTYPE POTENTIAL PRODUCTS
- GATHER USER FEEDBACK
- BUILD APP WITH KEY FEATURES

ASSESS RIGOROUSLY

- PILOT POTENTIAL EFFICACY AND USABILITY
- EVALUATE EFFICACY IN A TRIAL

SHARE

- SHARE INTERVENTION AND FINDINGS

Recruiting participants for VegEze

The VegEze research study launched in the Apple® App Store® on 8 November 2017. There was associated media coverage including free-to-air television and radio interviews, and social media from 13 November, 2017. Emails were also sent to a database of Australian adults who had opted in to receive newsletters from the CSIRO Total Wellbeing Diet website.

This coverage resulted in over 86,000 impressions within the App Store, over 16,000 product views and 12,777 people downloaded the VegEze app (Figure 2).

To participate in the evaluation of the VegEze app, participants were required to complete a baseline survey. Data is available from 5,092 participants who completed the baseline survey since the launch of the VegEze app.

Between November 2017 and May 2018, 1,313 participants completed the 21-day end-of-challenge survey and 325 participants have completed the 90-day follow-up survey. These are the participants for whom we can report the impact of VegEze on changing vegetable intake (Figure 3). After the removal of extreme outliers (based on vegetable intake greater than about 12 serves per day reported at any time point), this report describes data from 5,062 participants at baseline, 1,224 participants at the end of the 21-day challenge and 273 participants at the 90-day follow-up.

FIGURE 2 **THE REACH OF THE VEGEZE APP FROM IMPRESSIONS TO DOWNLOADS IN THE APP STORE**

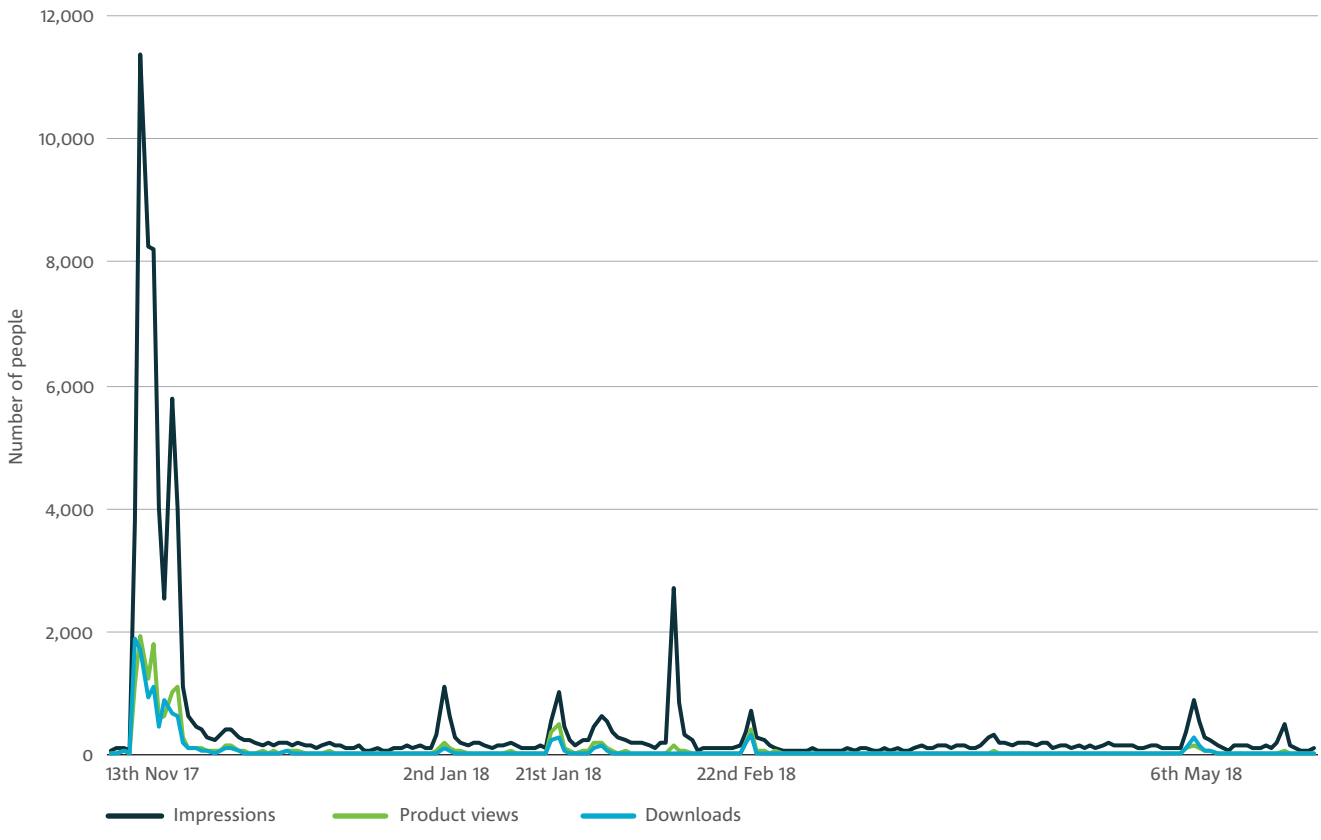
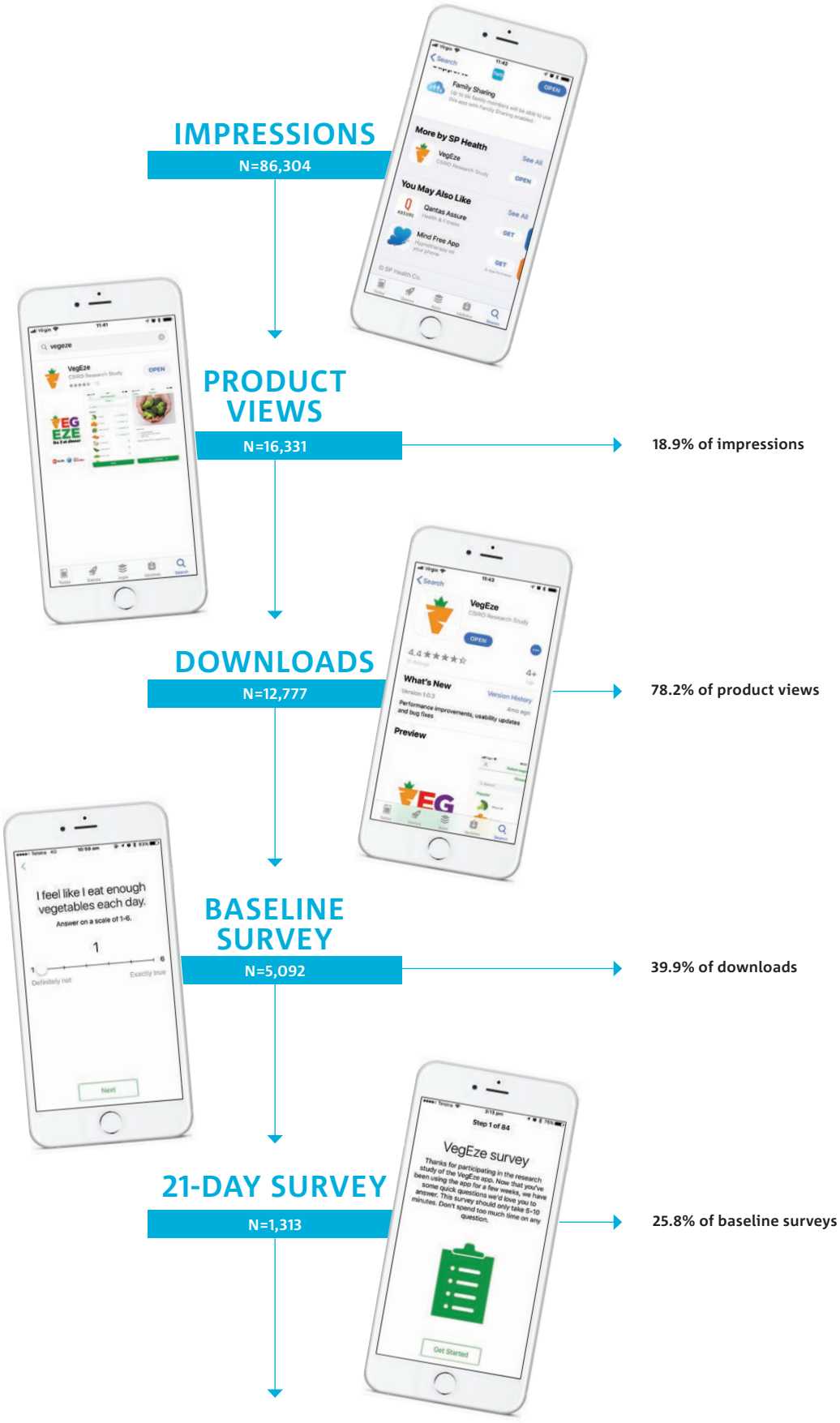


FIGURE 3 **FLOW CHART OF PARTICIPANTS THROUGH THE VEGEZE RESEARCH STUDY**



The participants

Understanding the reach of the VegEze research study

FAST FACTS

Participants are well distributed across Australia

Women are over-represented which is typical for population health studies

Majority of participants are aged 31-70 years

Who participated in the study?

The national media coverage resulted in participants from all around Australia, in a distribution that was relatively similar to the Australian population (Figure 4).

The majority of the baseline sample was female (84.3%), and aged between 31 to 70 years (82.7%, mean age of the sample 48.2 years; Table 1).

The sample contained a greater proportion of obese adults than the Australian population (31.4% in the VegEze sample vs 27.5% in the Australian population), and subsequently a lower proportion in the normal weight category (31.4% in the VegEze sample vs 35.5% in the Australian population; Figure 5).

FIGURE 4 **STATE OF RESIDENCE OF THE SAMPLE (N=5,062), RELATIVE TO THE AUSTRALIAN POPULATION**

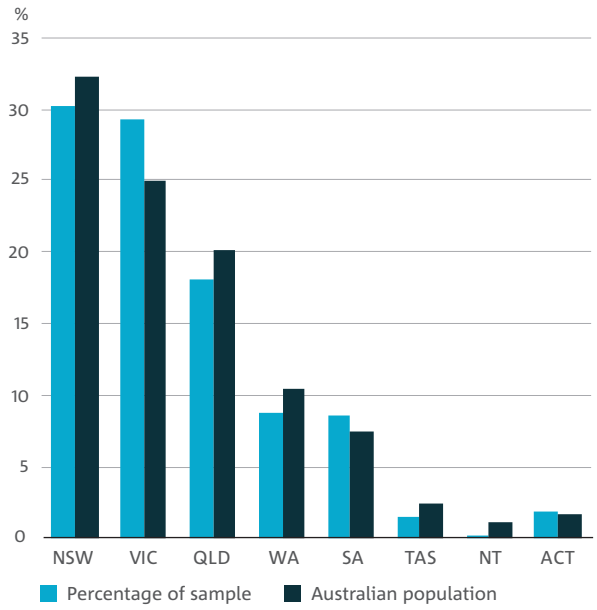


FIGURE 5 **WEIGHT STATUS DISTRIBUTION OF SAMPLE (N=5,062) COMPARED TO THE AUSTRALIAN POPULATION**

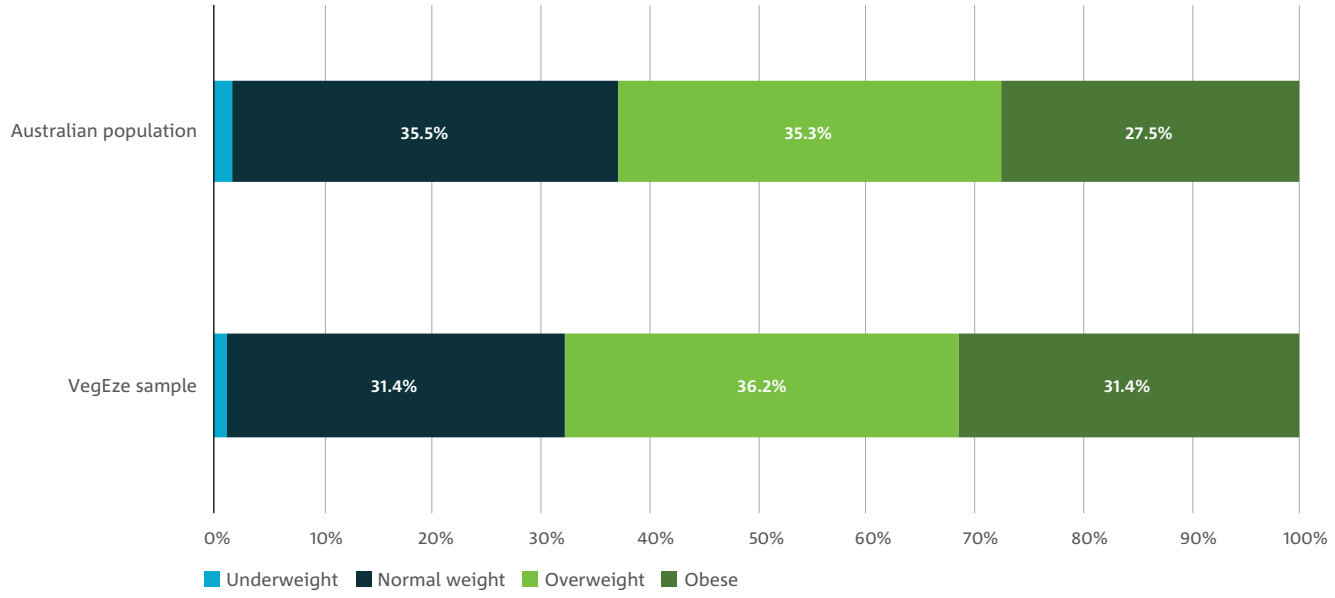


TABLE 1. **DEMOGRAPHIC CHARACTERISTICS OF THE VEGEZE SAMPLE COMPARED TO THE AUSTRALIAN POPULATION**

		SAMPLE N=5,062	PERCENTAGE OF SAMPLE	AUSTRALIAN POPULATION
Gender*	Male	774	15.3%	49.4%
	Female	4,265	84.3%	50.6%
	Unisex	23	0.5%	-
Age group	18-30 years	675	13.3%	18.6%
	31-50 years	1,997	39.5%	37.7%
	51-70 years	2,186	43.2%	30.5%
	71+ years	204	4.0%	13.1%
Weight status	Underweight	52	1.0%	1.7%
	Normal weight	1,587	31.4%	35.5%
	Overweight	1,833	36.2%	35.3%
	Obese	1,590	31.4%	27.5%
State or territory	NSW	1,529	30.2%	32.2%
	VIC	1,484	29.3%	24.9%
	QLD	916	18.1%	20.1%
	WA	446	8.8%	10.4%
	SA	435	8.6%	7.4%
	TAS	76	1.5%	2.3%
	NT	12	0.2%	1.0%
	ACT	93	1.8%	1.7%
Region**	Major urban	3,739	74.5%	
	Other urban	1,108	22.1%	
	Bounded locality	118	2.3%	
	Rural balance	57	1.1%	

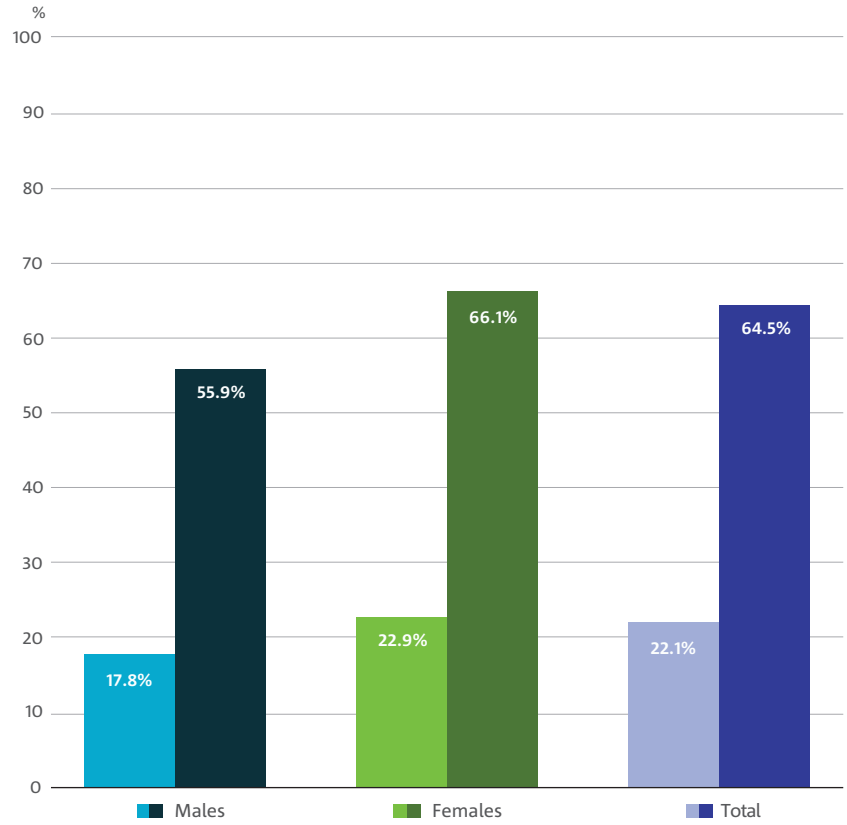
***Gender was self selected from male, female or unisex.**

****Major urban regions are those with more than 100,000 people; Other urban is 1,000 to 99,999 people; Bounded locality is 200 to 999 people; and Rural balance is the remainder of the state/territory.**

‘Doing 3 at dinner’ at baseline

The target behaviour of eating 3 different types of vegetables was referred to in the app as ‘do 3 at dinner’. Before starting the VegEze 21-day challenge, 17.8% of male and 22.9% of female participants reported to ‘always’ consume 3 different types of vegetables at their main or evening meal. This percentage was 55.9% and 66.1% respectively when including those that ‘always’ or ‘usually’ consumed 3 different types of vegetables at their evening meal (Figure 6).

FIGURE 6 **PERCENTAGE OF THE SAMPLE REPORTING TO ‘ALWAYS’ (LIGHT COLOUR) AND ‘ALWAYS’ OR ‘USUALLY’ (DARK COLOUR) CONSUME 3 DIFFERENT TYPES OF VEGETABLES AT THEIR MAIN OR EVENING MEAL AT BASELINE (N=5,062)**



Do 3 at dinner for 21 days

Images courtesy of Veggycation: www.veggycation.com.au

Vegetable intake at baseline

Before the start of the VegEze 21-day challenge, the average reported vegetable intake among participants was 2.9 serves per day. Australians only consume a small amount of legumes and vegetable juice, therefore the average intake when legumes and vegetable juice were included was only slightly higher, 3.1 serves with legumes included and 3.2 serves when legumes and juice were included (Table 2).

Females reported higher consumption and variety than males. The average reported intake of vegetables at baseline was 2.7 serves for males and 3.0 serves for females.

TABLE 2 **VEGETABLE INTAKE (AMOUNT AND VARIETY) AT BASELINE, BY GENDER (N=5,062)**

INDICATORS OF INTAKE	MALE	FEMALE	TOTAL
Vegetables (serves)	2.70	2.98	2.94
Vegetables with legumes (serves)	2.94	3.15	3.12
Vegetables with legumes and juice (serves)	3.07	3.22	3.20
Vegetable variety (types per day)	2.25	2.55	2.50
Vegetable intake score (out of 100)	45.50	55.80	54.20

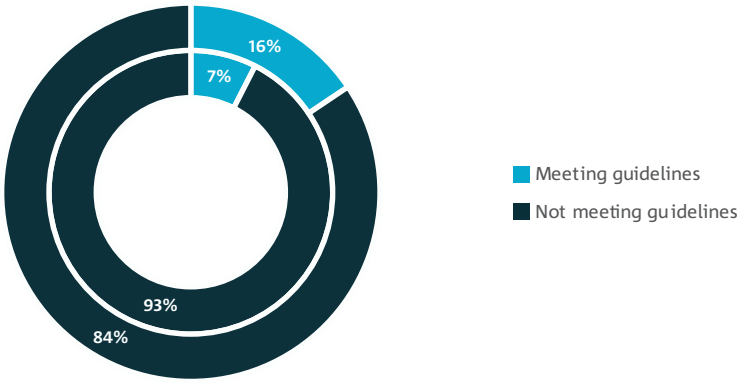
At baseline, participants reported consuming 2.9 of the 5 recommended serves of vegetables

2.9
SERVES VEGETABLES (APPROXIMATELY 220G)

Meeting the Australian Dietary Guidelines at baseline

At baseline, 7% of male and 16% of female participants consumed enough vegetables to meet the *Australian Dietary Guidelines* recommendations for vegetables (Figure 7). This compares with less than 5% of adults meeting the recommendation according to the Australian Health Survey.

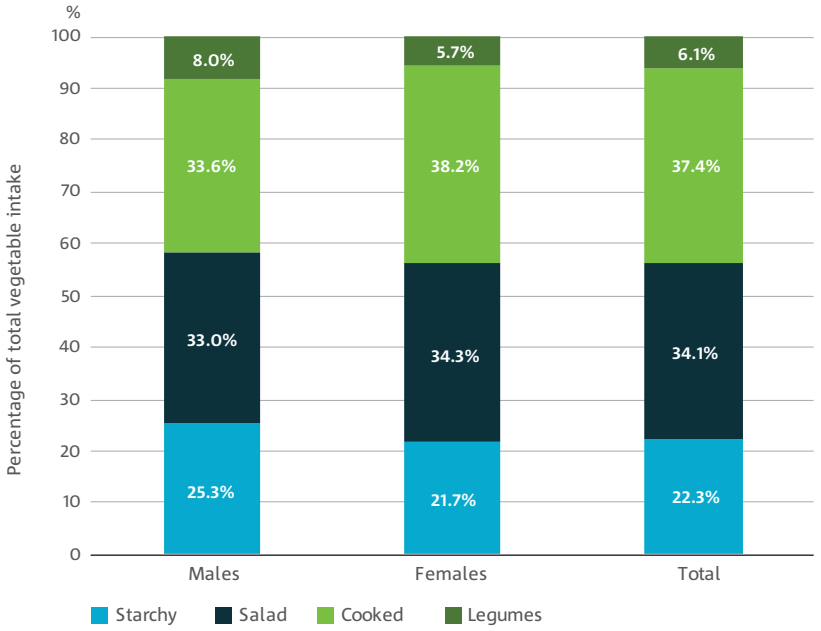
FIGURE 7 **PERCENTAGE OF THE SAMPLE MEETING THE AUSTRALIAN DIETARY GUIDELINES VEGETABLE RECOMMENDATION, BY GENDER (N=5,062). FEMALES REPRESENTED IN THE OUTER RING; MALES IN THE INNER RING.**



Vegetable preference at baseline

On average, 37.4% of the vegetables consumed by participants were cooked vegetables, 34.1% were salad vegetables and 22.3% were starchy vegetables (Figure 8). Females reported to consume a greater proportion of their vegetables as salad and cooked vegetables, whereas males tended to consume a greater proportion as starchy vegetables.

FIGURE 8 **THE PROPORTION OF TOTAL VEGETABLE INTAKE BY TYPE (STARCHY, SALAD, COOKED VEGETABLES AND LEGUMES) AT BASELINE, BY GENDER (N=5,062)**

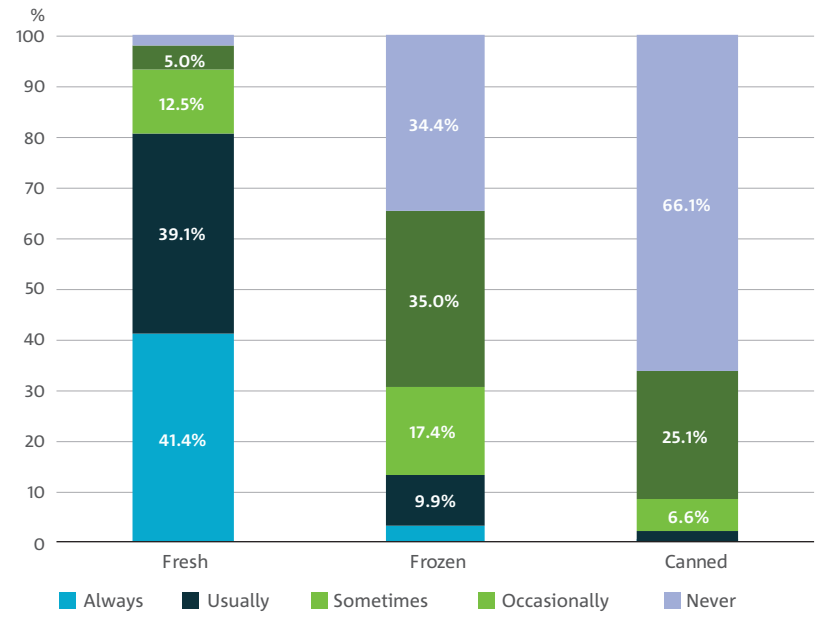


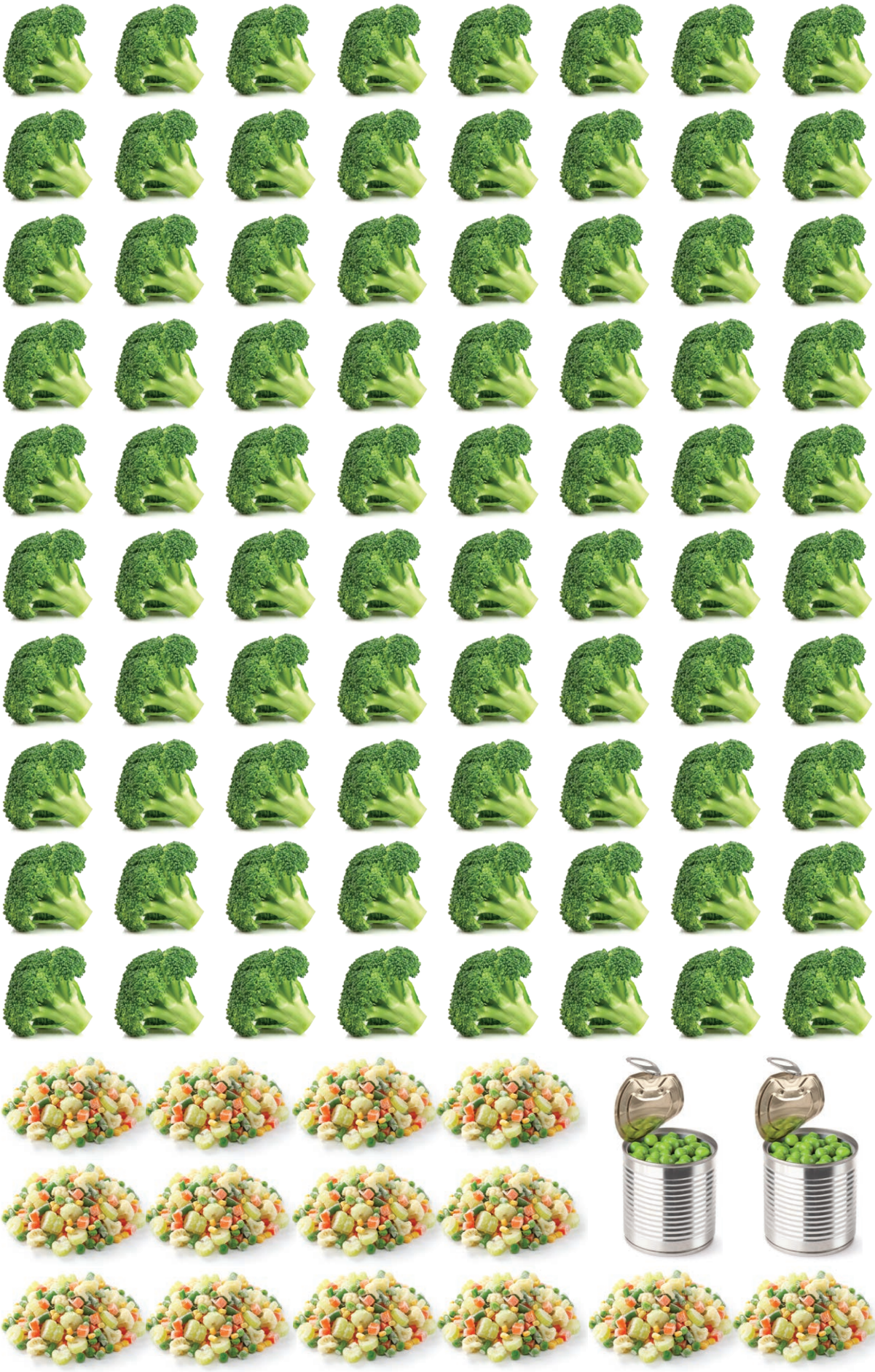
Preference for fresh vegetables at baseline

Before the challenge started, 41.4% of participants reported to 'always' consume fresh vegetables and an additional 39.1% usually consumed fresh vegetables (80.5% reported to 'always' or 'usually' consume fresh vegetables, Figure 9).

Frozen and canned vegetables were less commonly consumed. 13.2% of participants reported to 'always' or 'usually' consume frozen vegetables. About one third of the sample never consumed frozen vegetables, and two thirds of the sample never consumed canned vegetables.

FIGURE 9 **FREQUENCY OF FRESH, FROZEN AND CANNED VEGETABLE CONSUMPTION AT BASELINE (N=5,062)**





80.5% ALWAYS OR USUALLY CHOOSE FRESH VEGETABLES

2.2% ALWAYS OR USUALLY CHOOSE CANNED VEGETABLES

13.2% ALWAYS OR USUALLY CHOOSE FROZEN VEGETABLES

Participant 'psychographics'

Participants were asked to rate how much they liked vegetables on a scale of 1 'Dislike' through to 6 'Love', and their cooking style from 1 'Simple' through to 6 'Masterchef'. The majority of the sample rated their liking of vegetables as a 5 (32.3%) or 6 (38.2%, Figure 10), and rated their cooking style as a 3 (27.8%) or 4 (26.4%, Figure 11).

From this, participants were classified into 4 groups:

- Chef / disliker:
  Liking ≤4 and cooking style ≥4
- Chef / lover:
  Liking ≥5 and cooking style ≥4
- Simple cook / disliker:
  Liking ≤4 and cooking style ≤3
- Simple cook / lover:
  Liking ≥5 and cooking style ≤3

These groups were an indication of participants' vegetable preference, and were not communicated to the participants directly, however, they were used to tailor the types of recipes sent to them via push notifications.

About one third (32%) of participants were classified in the 'Chef / lover' category and they received more complex recipes such as vegetable paella or stuffed capsicums, and meal ideas with new vegetable trends such as zoodles and kimchi. 28% of male and 19% of female participants were classified in the 'Simple cook / disliker' category and received meal ideas that were quick and easy to prepare such as burgers, and with hidden vegetables such as vegetable bolognese or shepherd's pie.

FIGURE 10 **FREQUENCY DISTRIBUTION OF RATING VEGETABLE LIKING AT BASELINE (N=5,062)**

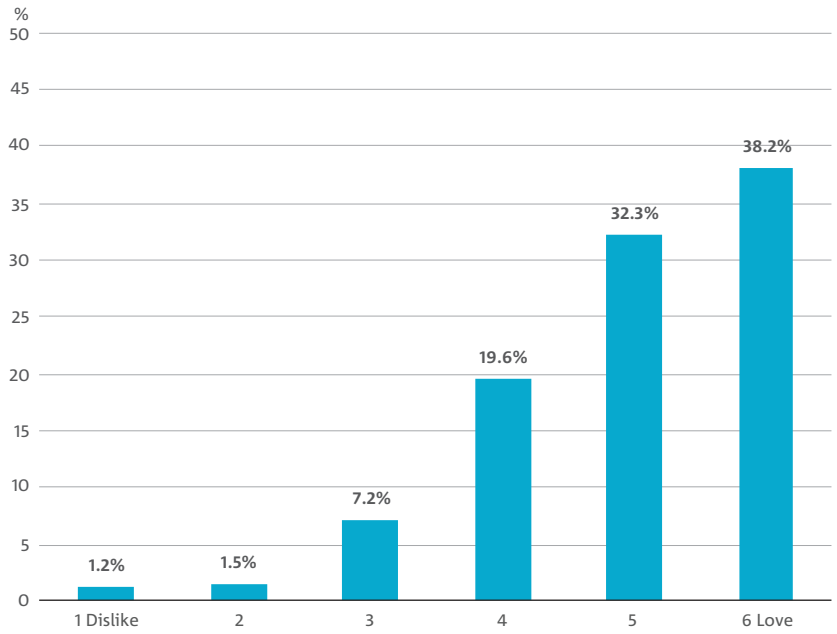


FIGURE 11 **FREQUENCY DISTRIBUTION OF RATING COOKING STYLE AT BASELINE (N=5,062)**

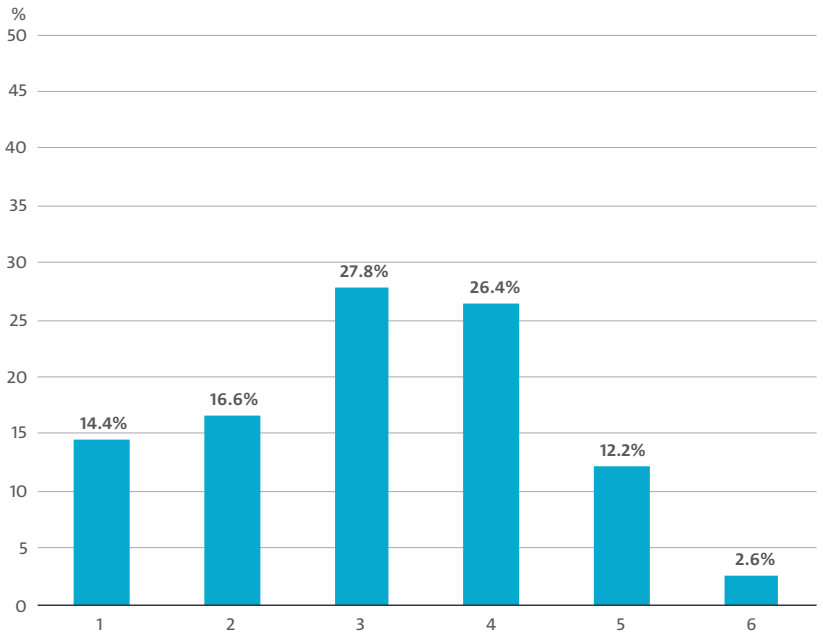


FIGURE 12 **PERCENTAGE OF PARTICIPANTS CLASSIFIED BY LIKING OF VEGETABLES AND COOKING STYLE (N=5,062)**

The results

Effectiveness of the VegEze app at 21 days

FAST FACTS

VegEze is effective in increasing vegetable intake and variety

Overweight adults and those with low vegetable intake at baseline appear to benefit most from the 21-day challenge

Women improve their vegetable intake more than men, but both groups report gains in variety

Overall impact of VegEze

59% of participants who have completed the 21-day survey reported an increase in their vegetable consumption from baseline.
By gender, 55% of men and 60% of women increased their vegetable consumption from baseline.
By weight status, 55% of normal weight and 61% of overweight and obese participants increased their intake from baseline.

There was a shift in the population distribution of intake to the right (towards higher intake), particularly in the lower levels of intake (Figure 13). There was also a shift towards an increased variety from baseline to the end of the 21-day challenge (Figure 14).

FIGURE 13 **DISTRIBUTION OF REPORTED SERVES OF VEGETABLES CONSUMED AT BASELINE AND AT THE END OF THE CHALLENGE (N=1,224)**

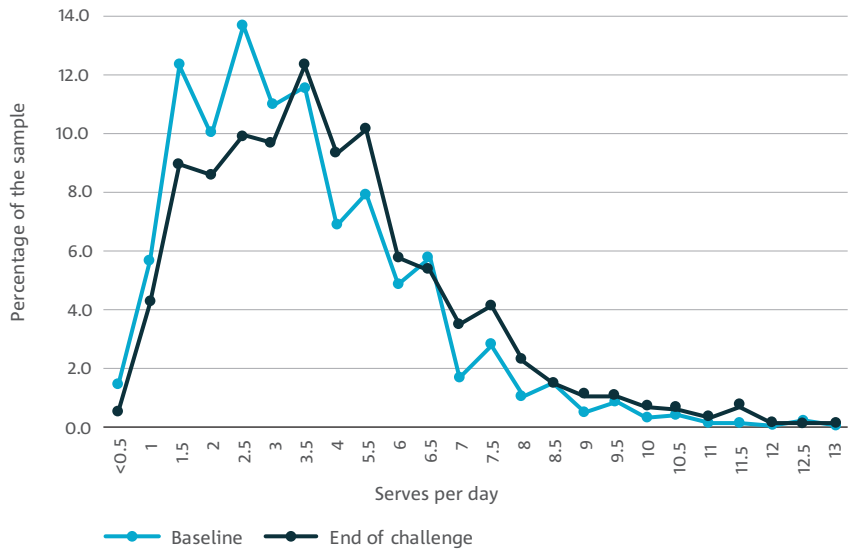
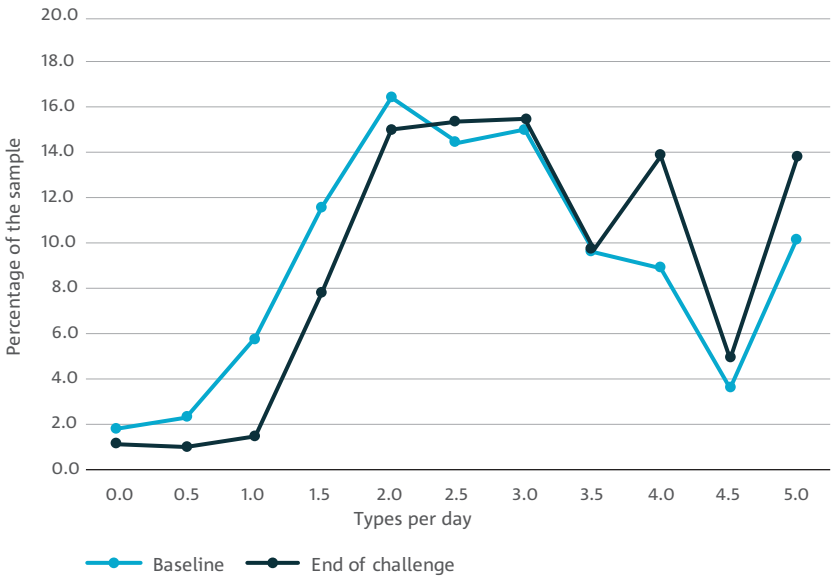


FIGURE 14 **DISTRIBUTION OF THE VARIETY OF VEGETABLES CONSUMED AT BASELINE AND AT THE END OF THE CHALLENGE (N=1,224)**



Impact of VegEze on intake and variety

The average vegetable consumption at baseline and after 21 days for those that completed the end-of-challenge survey are reported in Table 3.

On average participants increased their intake from 3.1 serves to 3.5 serves over the 21-day challenge period. This increase of half of a serve was statically significant (average increase 0.48 serves; p=0.002). Over the 21-day challenge, the variety of vegetables consumed also increased significantly (average increase 0.35 types, p<0.001).

TABLE 3 **VEGETABLE INTAKE AT BASELINE AND END OF CHALLENGE BY DEMOGRAPHIC CHARACTERISTICS (N=1,224)**

	SAMPLE N=1,224 (%)	BASELINE CONSUMPTION	END OF CHALLENGE (DAY 21)	CHANGE
Gender				
Male	139 (11.4%)	3.06	3.30	0.25
Female	1,078 (88.1%)	3.07	3.58	0.51
Unisex	6 (0.5%)	2.30	2.04	-0.26
Total	1,224 (100%)	3.06	3.54	0.48
Age group				
18-30 years	95 (7.8%)	3.08	3.30	0.22
31-50 years	411 (33.6%)	2.75	3.28	0.53
51-70 years	654 (53.5%)	3.24	3.74	0.50
71+ years	63 (5.2%)	3.23	3.54	0.31
Weight status				
Underweight	9 (0.7%)	3.63	3.54	-0.10
Normal weight	392 (32.1%)	3.01	3.40	0.40
Overweight	436 (35.7%)	3.08	3.61	0.53
Obese	386 (31.6%)	3.10	3.61	0.51

Compliance with the age/gender specific *Australian Dietary Guidelines* recommendations also increased. The vegetable intake score, which measures compliance with the Dietary Guidelines, increased by an average of 7 points out of 100 (p<0.001, Table 4).

TABLE 4 **VEGETABLE INTAKE AND VARIETY AT BASELINE AND AT THE END OF THE CHALLENGE (N=1,224)**

INDICATORS OF INTAKE	BASELINE	END OF CHALLENGE (21 DAYS)	CHANGE	SIGNIFICANCE
Vegetables (serves)	3.06	3.54	0.48	0.002
Vegetables with legumes (serves)	3.24	3.75	0.50	<0.001
Vegetable variety (types)	2.75	3.10	0.35	<0.001
Vegetable intake score (out of 100)	57.13	64.15	7.01	<0.001

Men vs women – differences by gender

There were differences in the impact of the VegEze 21-day challenge on vegetable intake by gender. Males increased their intake by 0.25 serves compared to 0.51 serves for females, although only the increase for women was statistically significant (Table 5).

Male and female participants significantly increased their variety of vegetables, with males reporting to eat an extra 0.2 types per day ($p<0.05$) on average compared to females' 0.4 more types per day ($p<0.001$).

TABLE 5 **CHANGE IN VEGETABLE INTAKE AND VARIETY OVER THE 21-DAY CHALLENGE, BY GENDER (N= 1,224)^**

	(BASELINE TO END OF CHALLENGE)	
Indicators of intake	Males (n=139)	Females (n=1,078)
Vegetables (serves)	0.25	0.51***
Vegetables with legumes (serves)	0.31	0.53***
Vegetable variety (types)	0.23*	0.36***
Vegetable intake score (out of 100)	3.12	7.57***

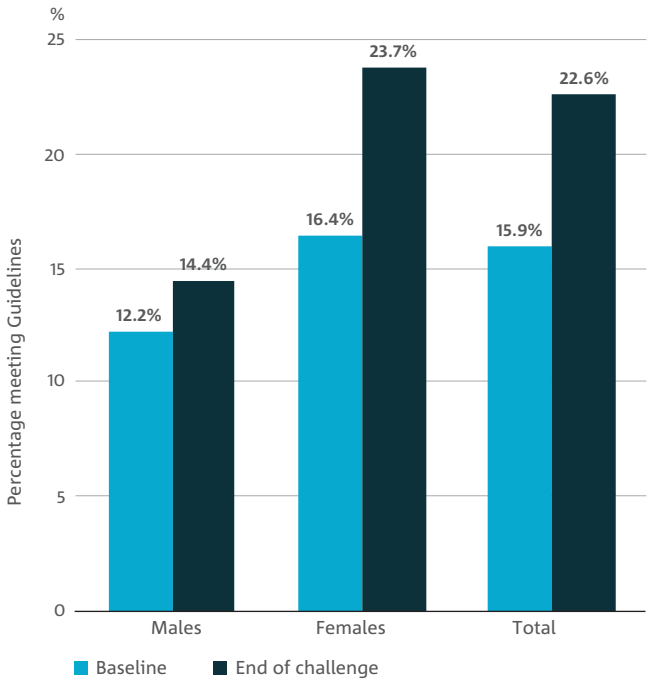
*****p<0.001; **p<0.01; *p<0.05**
^ Inadequate sample size to report on unisex category

Meeting the Australian Dietary Guidelines vegetable recommendation

Among the participants who completed the VegEze 21-day challenge, the percentage who met the age/gender specific *Australian Dietary Guidelines* vegetable intake recommendations increased from 15.9% to 22.6%.

The VegEze 21-day challenge resulted in a 2% increase in the proportion of males meeting the vegetable recommendation, from 12.2% to 14.4%. The increase for females was greater, from 16.4% at baseline to 23.7% at the end of the challenge (Figure 15).

FIGURE 15 **PERCENTAGE OF SAMPLE MEETING THE DIETARY GUIDELINE TARGET FOR VEGETABLES AT BASELINE AND END OF THE CHALLENGE, BY GENDER (N=1,224)**



MEN INCREASED VEGETABLE INTAKE BY
0.25
SERVES

WOMEN INCREASED VEGETABLE INTAKE BY
0.51
SERVES

- Men increased vegetable intake by **0.25** serves per day
- Men increased vegetable variety by **0.23** types per day
- Small increase in men meeting the vegetable Dietary Guideline – up to 14.4%
- Normal weight and overweight men made more gains than obese men

- Women increased vegetable intake by **0.51** serves per day
- Women increased vegetable variety by **0.36** types per day
- 7.3% increase in women meeting the vegetable Dietary Guideline – up to 23.7%
- Overweight and obese women made the greatest gains

Younger vs older – differences by age groups

The impact of the VegEze 21-day challenge on vegetable intake varied in different age groups of the sample. Participants in the 31-50 and 51-70 year age groups reported significant increases in the amount and variety of vegetables they consumed over the challenge period. Participants aged 19-30 and 71+ years also significantly increased their vegetable variety, but to a lesser extent the amount of vegetables consumed compared to participants aged 31-70 years. Participants aged 19-30 years and 71+ years increased their intake by 0.2 and 0.3 serves per day respectively, compared to about 0.5 serves for participants aged 31-70 years.

TABLE 6 **CHANGE IN VEGETABLE INTAKE AND VARIETY AT THE END OF THE CHALLENGE, BY AGE GROUP (N=1,224)**

	CHANGE (BASELINE TO END OF CHALLENGE)			
Indicators of intake	19-30 (n=95)	31-50 (n=411)	51-70 (n=654)	71+ (n=63)
Vegetables (serves)	0.22	0.53***	0.50***	0.31
Vegetables with legumes (serves)	0.20	0.57***	0.52***	0.31
Vegetable variety (types)	0.38**	0.34***	0.35***	0.37**
Vegetable intake score (out of 100)	2.54	8.93***	6.76***	3.89

*****p<0.001; **p<0.01; *p<0.05**

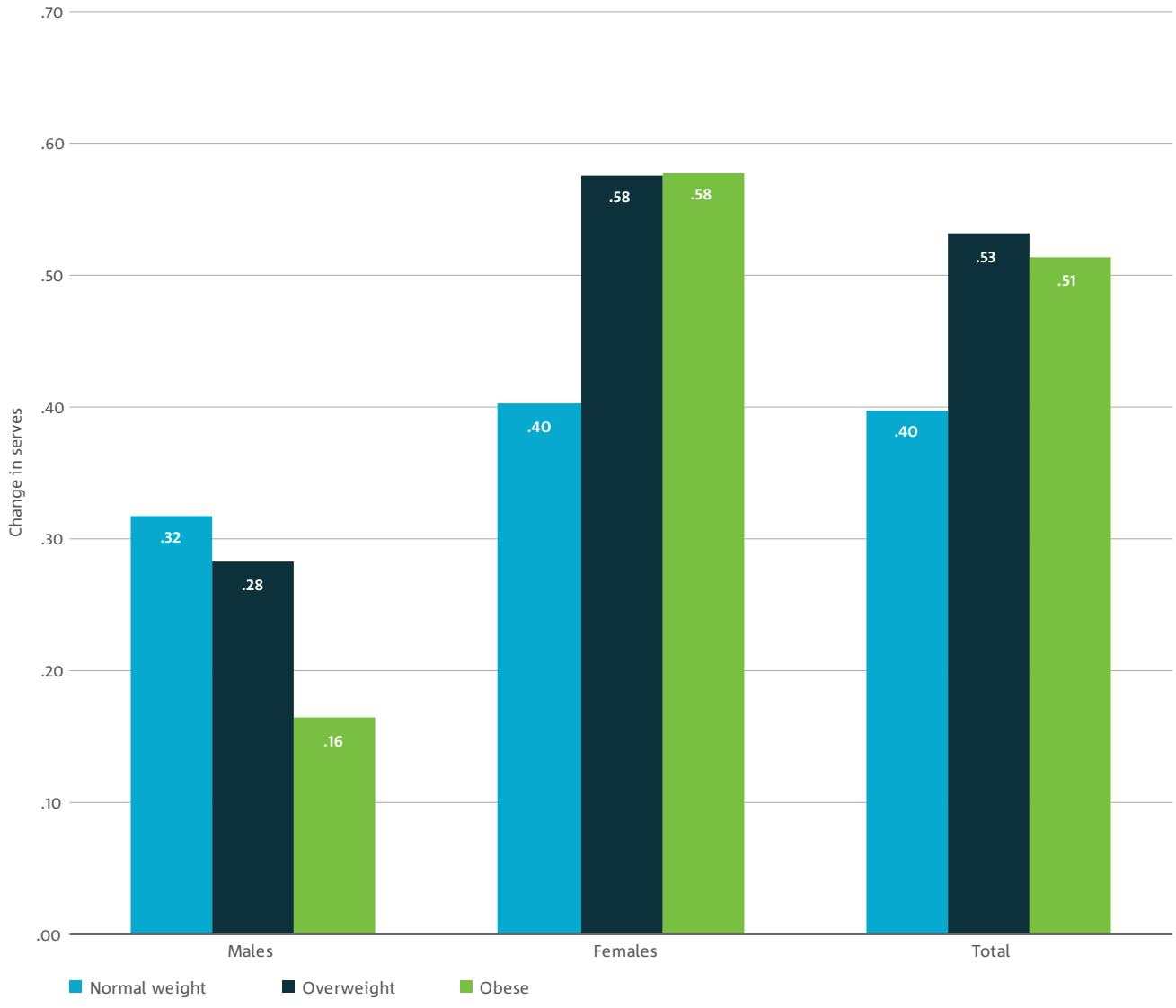
Participants aged 31-70 increased vegetable intake the most during the 21-day challenge

Weight status – differences by healthy, overweight and obese

The impact of the VegEze 21-day challenge on vegetable intake varied by weight status. The challenge appeared to have a slightly greater impact in overweight and obese adults. Overall, overweight and obese adults reported a 0.5 serve increase in intake, compared to 0.4 serves for normal weight adults (Figure 16).

The greatest increases in intake were observed for overweight and obese females who reported an average increase of about 0.6 serves per day. In contrast, normal weight males reported a greater increase in intake compared to obese males (0.3 vs 0.16 serve increases respectively).

FIGURE 16 **CHANGE IN VEGETABLE INTAKE (IN SERVES), BY GENDER AND WEIGHT STATUS (N=1,224)**



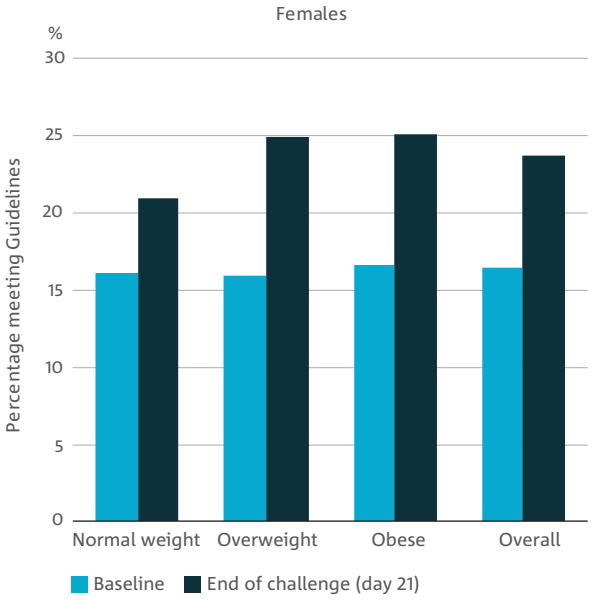
Weight status – changes in meeting the Australian Dietary Guidelines

The VegEze challenge increased the proportion of the sample meeting the Dietary Guidelines for vegetables from 15.9% at baseline to 22.6% at the end of 21 days. The proportion of the sample meeting the vegetable guideline increased slightly more in overweight adults than other weight status groups (Figure 17).

By the end of the 21-day challenge, 25% of overweight and obese female participants were meeting the Dietary Guideline recommendations for vegetables (Figure 18). There were also positive increases in the proportion of normal and overweight male participants meeting the guidelines, however a slight decrease of 4% was observed for obese males (Figure 19).

Overall, males and females reported significant increases in their variety of vegetables consumed. Increases in variety were significant for all weight status groups for females, but the increase was only significant for obese men and not other weight status groups (Table 8).

FIGURE 18 **THE PROPORTION OF FEMALES MEETING THE DIETARY GUIDELINE FOR VEGETABLES AT BASELINE AND THE END OF THE CHALLENGE, BY WEIGHT STATUS (N=1,078)^**



^Inadequate sample size to report on underweight category within gender

FIGURE 17 **THE PROPORTION OF THE SAMPLE MEETING THE VEGETABLE DIETARY GUIDELINE AT BASELINE AND THE END OF THE CHALLENGE, BY WEIGHT STATUS (N=1,224)^**

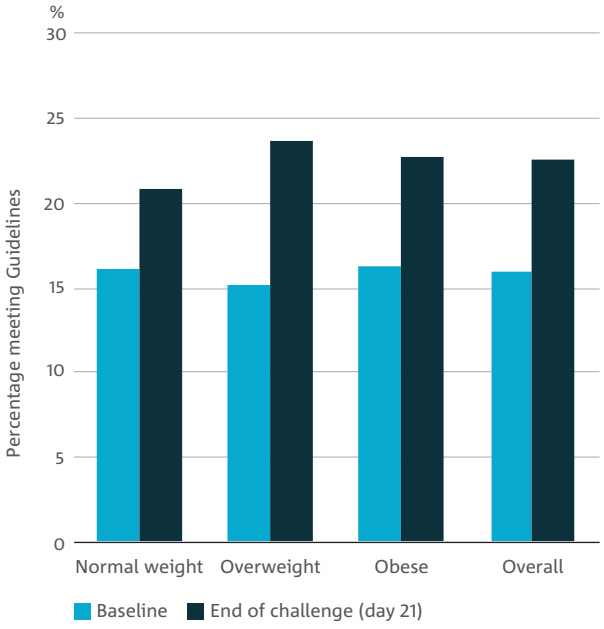


FIGURE 19 **THE PROPORTION OF MALES MEETING THE DIETARY GUIDELINE FOR VEGETABLES AT BASELINE AND THE END OF THE CHALLENGE, BY WEIGHT STATUS (N=139)^**

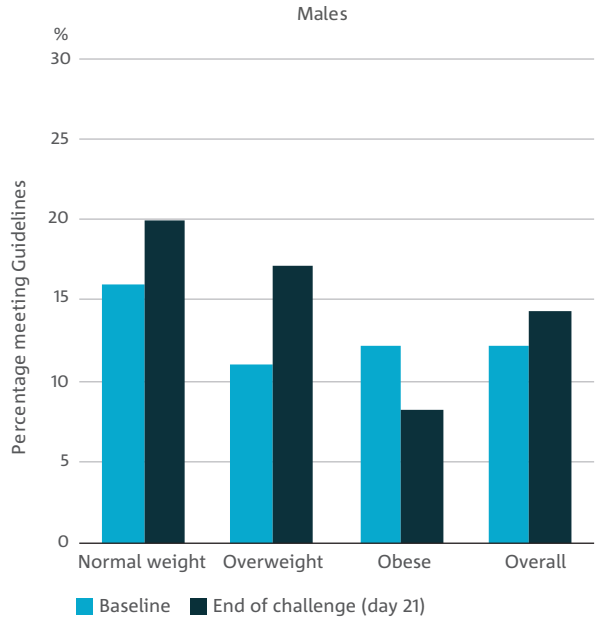


TABLE 7 **THE CHANGE IN THE PROPORTION OF THE SAMPLE MEETING THE DIETARY GUIDELINES FOR VEGETABLES BETWEEN BASELINE AND THE END OF THE CHALLENGE, BY GENDER AND WEIGHT STATUS (N=1,224)^**

	CHANGE (BASELINE TO END OF CHALLENGE)	
	Males (n=139)	Females (n=1,078)
Normal weight	4.0%	4.9%
Overweight	6.3%	8.9%
Obese	-4.1%	8.4%
Overall	2.2%	7.3%

^Inadequate sample size to report on underweight category within gender

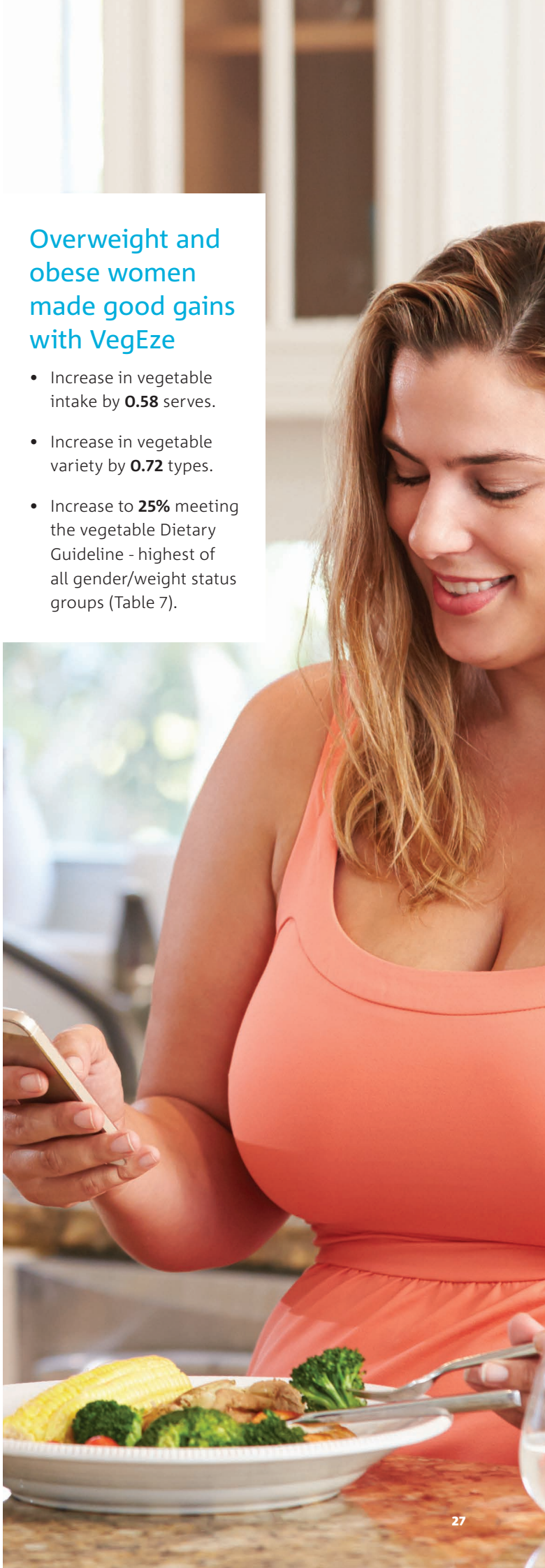
TABLE 8 **CHANGE IN VARIETY OF VEGETABLE CONSUMPTION BETWEEN BASELINE AND THE END OF THE CHALLENGE, BY GENDER AND WEIGHT STATUS (N=1,224)^**

	CHANGE (BASELINE TO END OF CHALLENGE)	
	Males (n=139)	Females (n=1,078)
Normal weight	0.34	0.38***
Overweight	0.13	0.41***
Obese	0.35*	0.31***
Overall	0.23*	0.36***

^Inadequate sample size to report on underweight category within gender

Overweight and obese women made good gains with VegEze

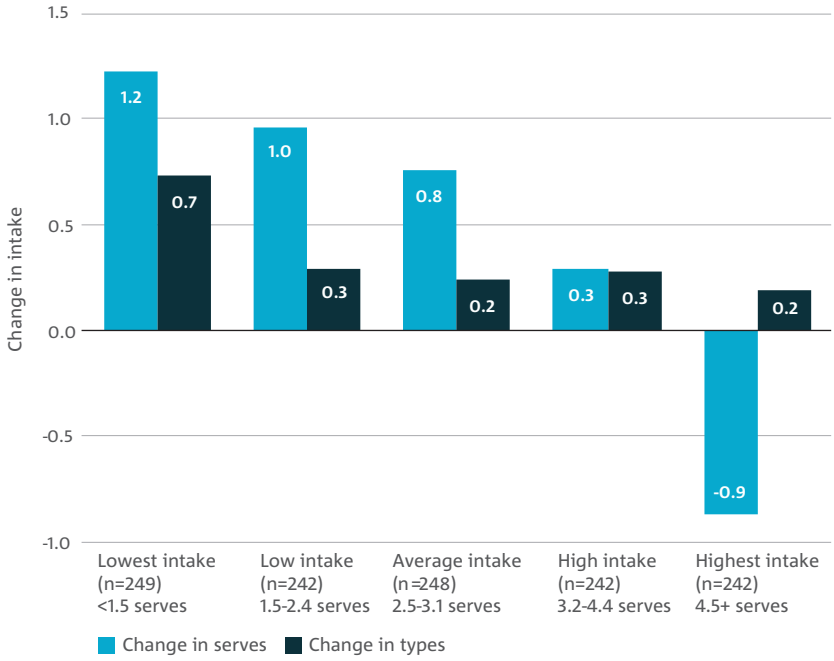
- Increase in vegetable intake by **0.58** serves.
- Increase in vegetable variety by **0.72** types.
- Increase to **25%** meeting the vegetable Dietary Guideline - highest of all gender/weight status groups (Table 7).



Low vs high vegetable intake – differences by intake at baseline

The impact of the VegEze 21-day challenge appeared to be more effective in those participants with low vegetable intake at baseline. Reported intake increased by 1.2 serves in those with the lowest intake at baseline. In fact, the lowest 3 groups of intake all increased their vegetable intake by more than half a serve over the challenge period. However, participants with the highest baseline intake reported a 0.9 serve decrease in the vegetable intake (Figure 20). Interestingly, all groups increased their variety over the 21-day challenge period.

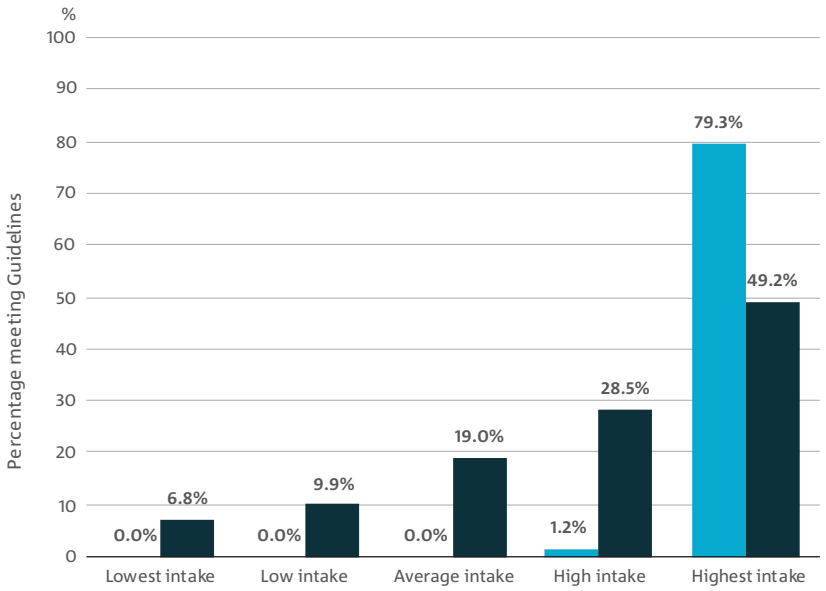
FIGURE 20 **CHANGE IN REPORTED VEGETABLE INTAKE (SERVES AND TYPES) BY BASELINE LEVELS OF INTAKE (N=1,224)**



The proportion of participants meeting the Dietary Guideline recommendations for vegetables increased in all groups except for those with the highest intake at baseline. At the end of the 21-day challenge between 7 and about 20% of participants in the lowest groups of intake met the Dietary Guideline recommendations for vegetables.

The percentage meeting the Dietary Guidelines in the group of participants with the highest intakes at baseline decreased from 79.3% to 49.2% (Figure 21). This finding was unexpected and needs to be explored in greater detail.

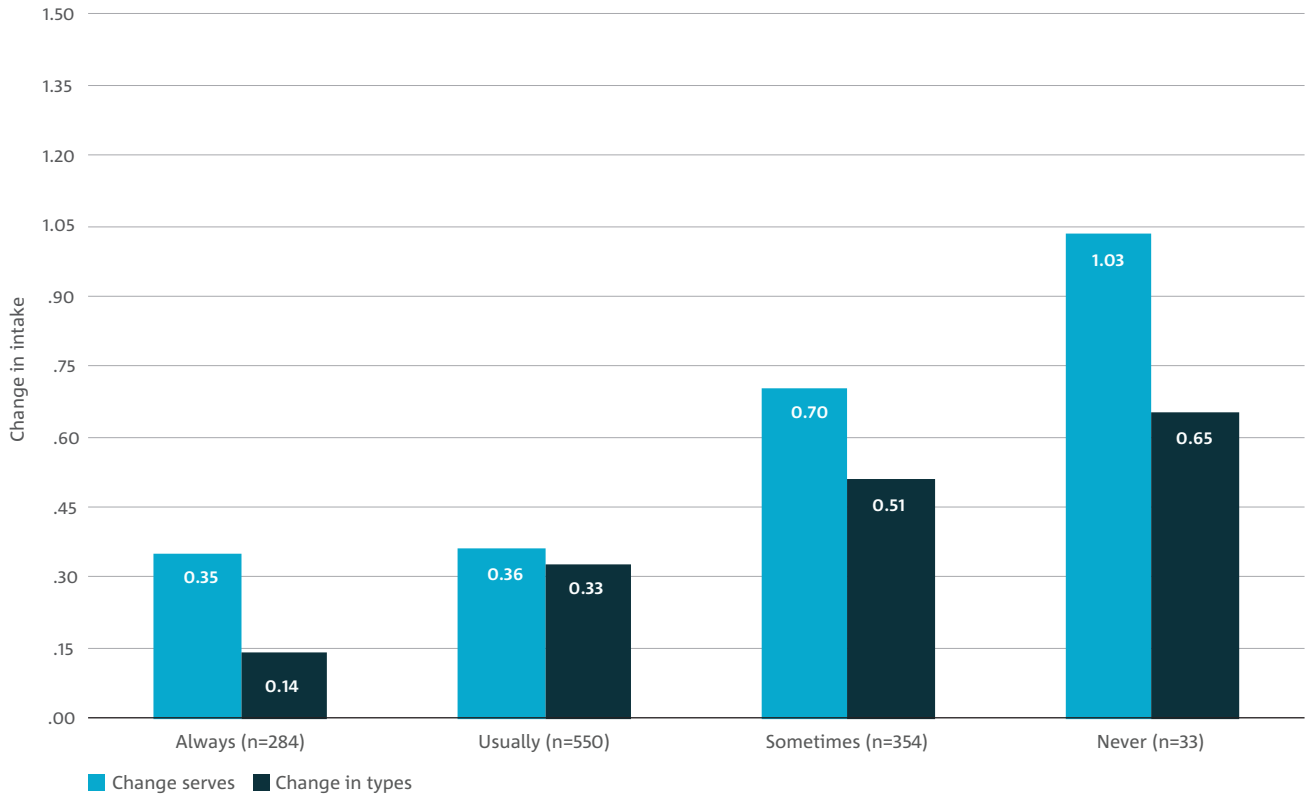
FIGURE 21 **PROPORTION OF THE SAMPLE MEETING THE VEGETABLE DIETARY GUIDELINE BY BASELINE LEVELS OF INTAKE (N=1,224)**



Achieving the target behaviour of ‘do 3 at dinner’

Vegetable intake and variety increased incrementally in those participants who, at baseline, reported to ‘usually’, ‘sometimes’ and ‘never’ have 3 different types of vegetables at their evening meal. Those participants who ‘usually’ had 3 types of vegetables at their evening meal reported a 0.36 serve increase in vegetables, compared to 0.70 serves in those who ‘sometimes’ had 3 types and 1.03 serves in those who ‘never’ had 3 types of vegetables at their evening meal at baseline (Figure 22).

FIGURE 22 **CHANGE IN VEGETABLE INTAKE (SERVES AND TYPES) BY FREQUENCY OF CONSUMING AT LEAST 3 TYPES OF VEGETABLES AT DINNER AT BASELINE (N=1,224)**



Do 3 at dinner – difference by gender

The proportion of the sample reporting to 'always' have 3 different types of vegetables at their evening meal increased to a similar extent in males and females. Males increased 23.0% to 28.8% (Figure 23), and females increased from 23.4% to 28.9% (Figure 24).

When 'always' and 'usually' were combined, the proportion of the sample having 3 different types of vegetables at their evening meal increased in both males and females. The proportion of males who 'always' or 'usually' had 3 different types of vegetables at their evening meal increased from 64.7% to 81.3%, compared to 68.8% to 81.3% in females.

FIGURE 23 **PERCENTAGE OF MALES REPORTING TO 'ALWAYS' OR 'ALWAYS' AND 'USUALLY' HAVE 3 DIFFERENT TYPES OF VEGETABLES AT THEIR EVENING MEAL, AT BASELINE (LIGHTER COLOUR) AND THE END OF THE CHALLENGE (DARKER COLOUR) (N=139)**

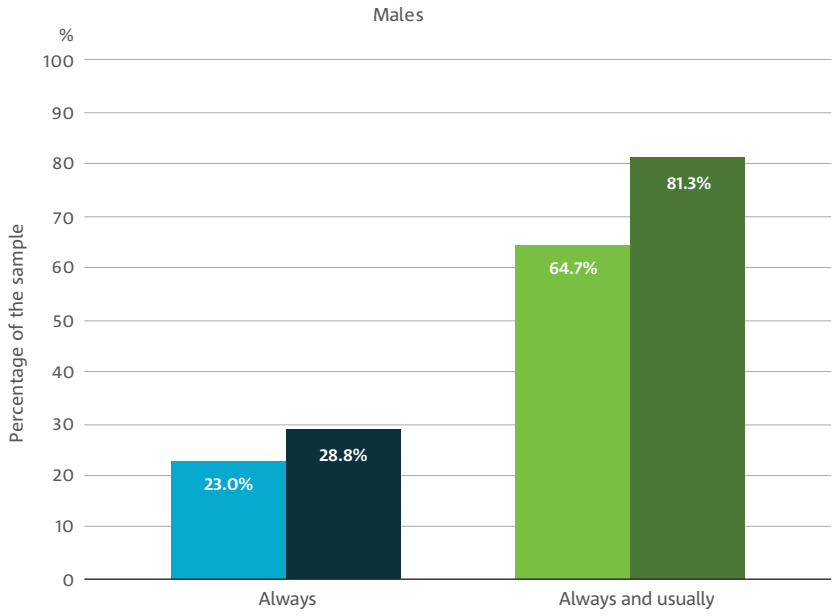
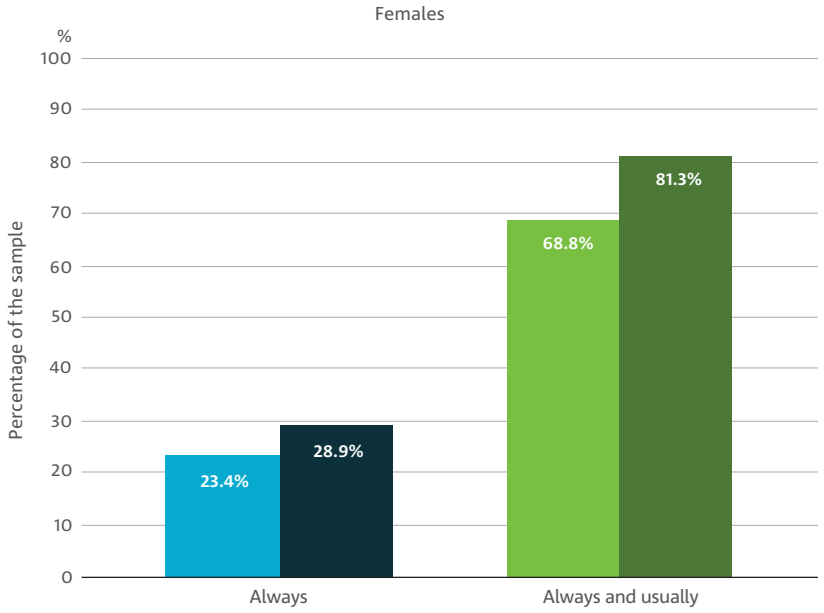


FIGURE 24 **PERCENTAGE OF FEMALES REPORTING TO 'ALWAYS' OR 'ALWAYS' AND 'USUALLY' HAVE 3 DIFFERENT TYPES OF VEGETABLES AT THEIR EVENING MEAL, AT BASELINE (LIGHTER COLOUR) AND THE END OF THE CHALLENGE (DARKER COLOUR) (N=1,078)**



Changes in behaviour

Understanding the impact of VegEze on psychological outcomes

FAST FACTS

Attitudes to eating more vegetables improved during the 21-day challenge

Participants felt more confident in their ability to stick to healthy eating by the end of the challenge

Plans to eat more vegetables each day, a critical factor in behaviour change, also improved

VegEze and influences of behaviour

A useful health promotion model for understanding the many direct and indirect influences of behaviour is the Ecological Model (Figure 25). This model suggests that there are four layers of influence: those factors within an individual through to the broader societal influences. VegEze mainly addresses personal level influences because it directly targets an individual's dietary behaviour.

There are many personal factors that are thought to predict changes in behaviour. Three of the strongest predictors for health behaviours are:

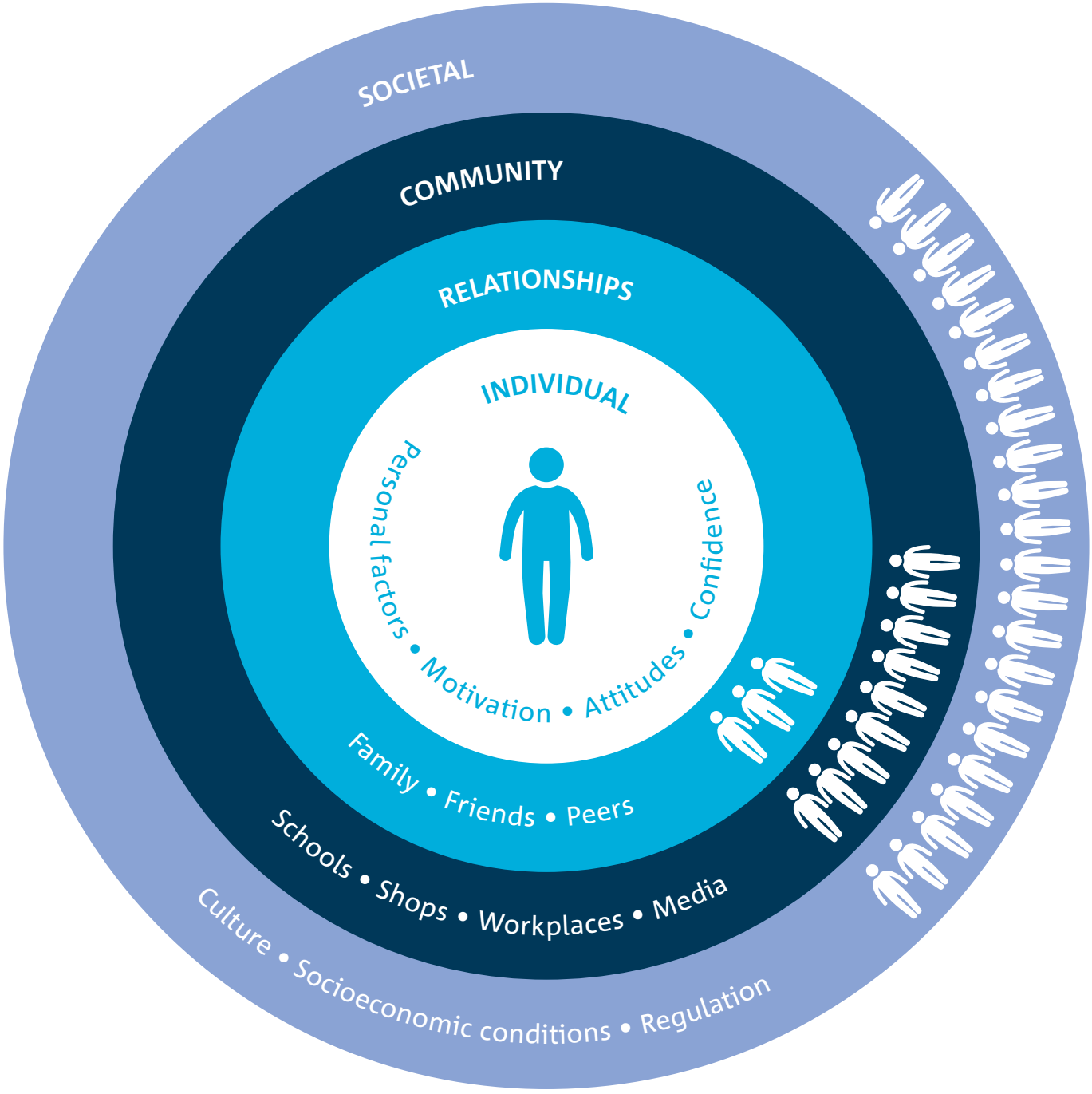
- Intention to perform a behaviour;
- Attitudes toward a behaviour;
- Confidence in your ability to perform a behaviour: which is measured in terms of self-efficacy.

More recently, it has been suggested that having action plans about how to implement the target behaviour is also a critical predictor of behaviour, especially in the longer term.

The VegEze evaluation surveys measured individuals' intention, attitudes, confidence, and plans to increase their vegetable intake. Positive changes in these factors would suggest an increased likelihood of eating a greater variety and amount of vegetables.

It is common to observe changes in personal, psychological factors prior to changes in behaviour. Literature suggests that these individual factors need to change in order to eventually change dietary behaviour.

FIGURE 25 **THE ECOLOGICAL MODEL SHOWING THE LAYERS OF INFLUENCES OF BEHAVIOUR^**



^The Ecological Model adapted from http://www.cdc.gov/violenceprevention/pdf/SVPrevention-a.pdf

Impact of VegEze on psychological factors

There were positive changes in individual's attitudes, self-efficacy and action planning from baseline to the end of the 21-day challenge.

Participants reported more positive attitudes towards eating a greater variety of vegetables at the end of the 21-day challenge (Figure 26). Nutrition self-efficacy also improved meaning participants felt more confident in their ability to stick to healthy eating (Figure 27) and their planning to eat vegetables each day increased (Figure 28). These changes were all statistically significant over the 21-day challenge period ($p<0.01$).

It should be noted that attitudes toward eating a greater variety of vegetables were high at baseline, with an average score of 3.84 out of a possible 4 which indicates highly positive attitudes before starting the 21-day challenge. Therefore, while there was only a little bit of room for improvement, the increase in attitudes towards the target behaviour was small in magnitude but statistically significant.

FIGURE 26 **ATTITUDES TOWARD EATING A GREATER VARIETY OF VEGETABLES AT BASELINE AND END OF THE 21-DAY CHALLENGE (N=1,224)**

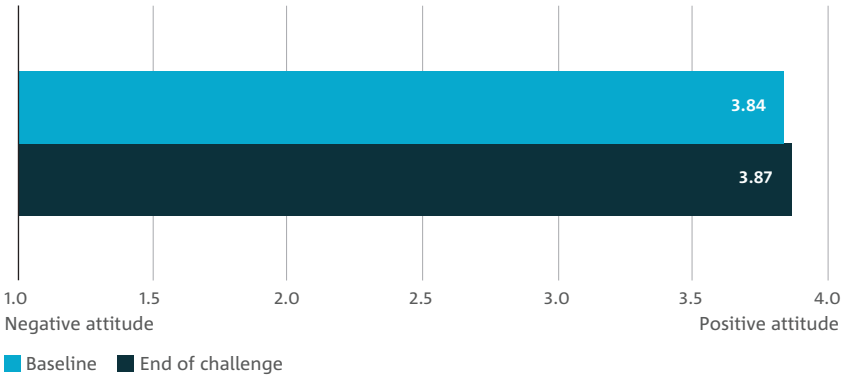
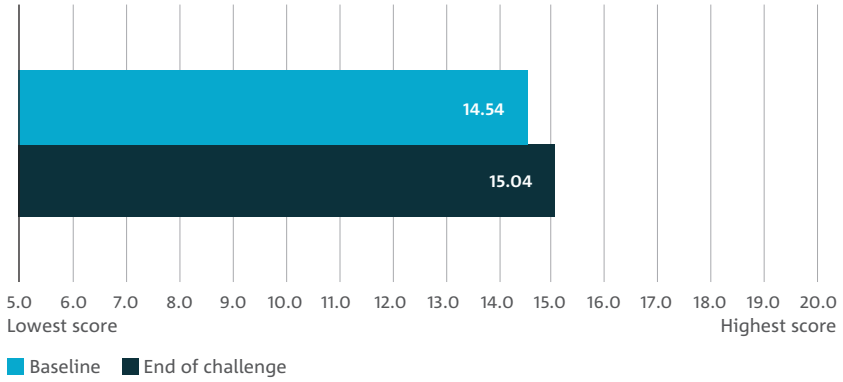


FIGURE 27 **NUTRITION SELF-EFFICACY AT BASELINE AND END OF THE 21-DAY CHALLENGE (N=1,224)**

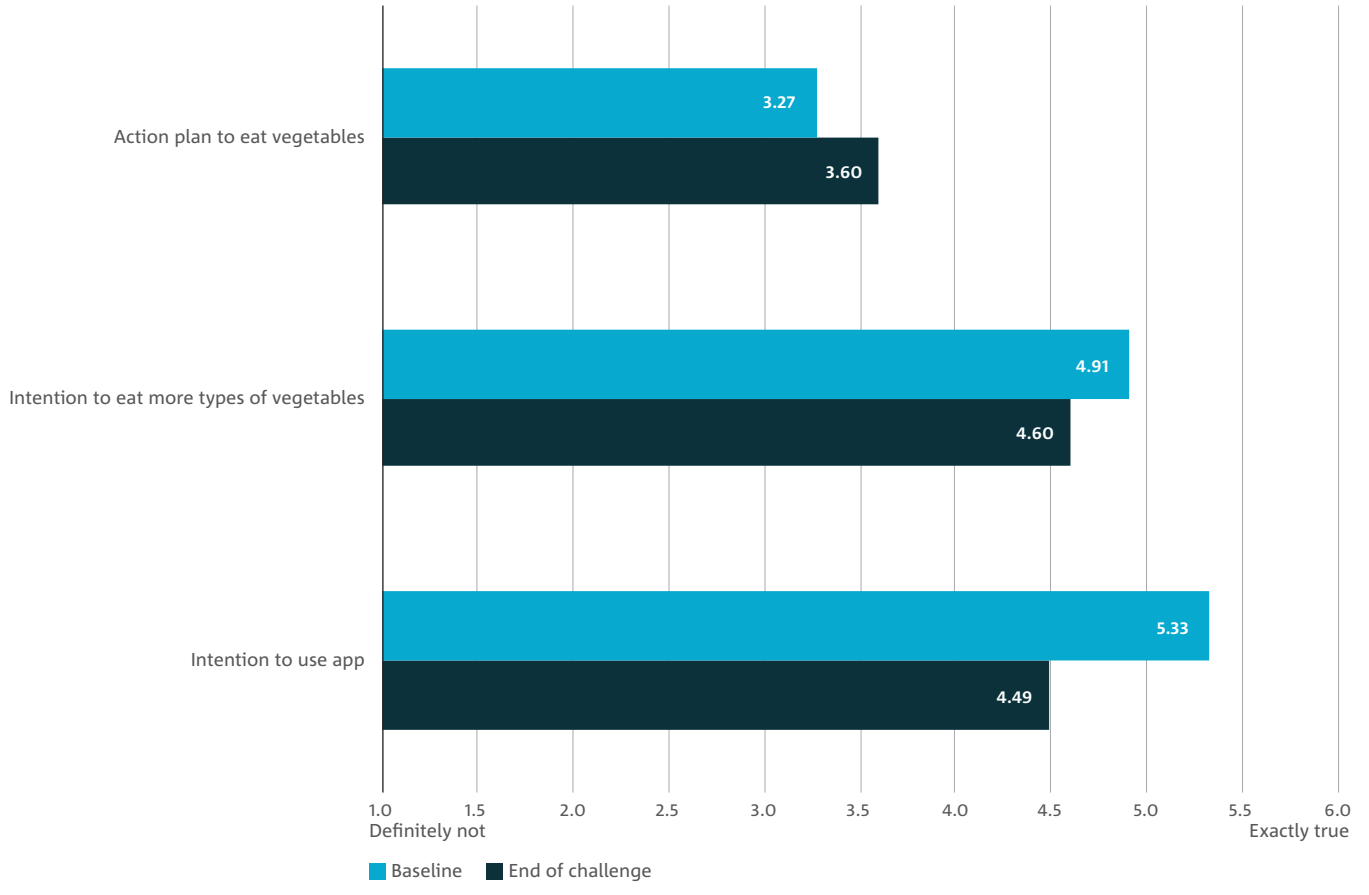


Changes in attitude

Whilst participants' planning to eat vegetables each day increased during the 21-day challenge, there was a significant decrease in intention to eat more types of vegetables and intention to keep using the VegEze app between baseline and the end of the challenge ($p<0.01$, Figure 28). These findings are consistent with other app-based programs we have evaluated.

We suspect that participants start the program with high levels of motivation and as they progress through the program this typically falls. There are a number of possible reasons for this. For example, the VegEze app centres around a 21-day challenge, and at the end of the challenge period participants feel as though they have completed the program and no longer need to keep improving and/or using the app (i.e. lower intention). It is also possible that participants feel they have been successful in their behaviour change endeavours and therefore no longer require as much motivation to continue performing these behaviours. Finally, motivation is critical for initiating new behaviours but as the behaviour becomes routine, different factors may be needed to continue to support doing this behaviour.

FIGURE 28 **ACTION PLAN AND INTENTIONS IN RELATION TO EATING MORE VEGETABLES AND USING THE VEGEZE APP (N=1,224)**



App usage

How VegEze was adopted by participants

FAST FACTS

Participants used the VegEze app for an average of 6.3 days during the 21-day challenge

Women used the app slightly more than men

The Veg Lookup and Challenge features were most frequently used during the 21-day challenge

Patterns of usage

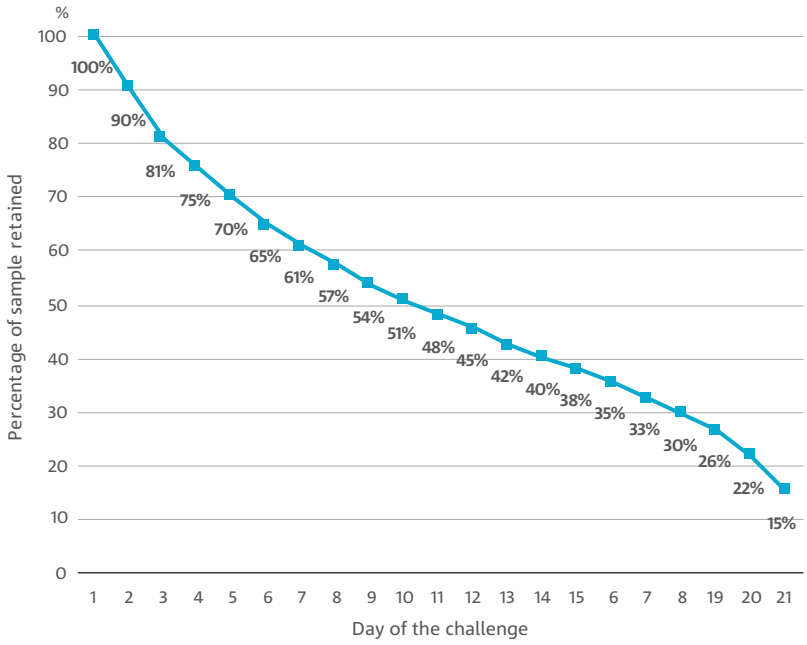
Attrition in VegEze

92.5% of participants (4,683/5,062 participants) had app log data that is included here to understand how VegEze was adopted by those who downloaded the app and completed the baseline survey.

The attrition curve for usage of the app is shown in Figure 29. There is a gradual reduction in the percentage of the sample retained.

By day 10 of the challenge, about half the sample was using the app, and 21 days after completing the survey about 15% of participants were still using the app.

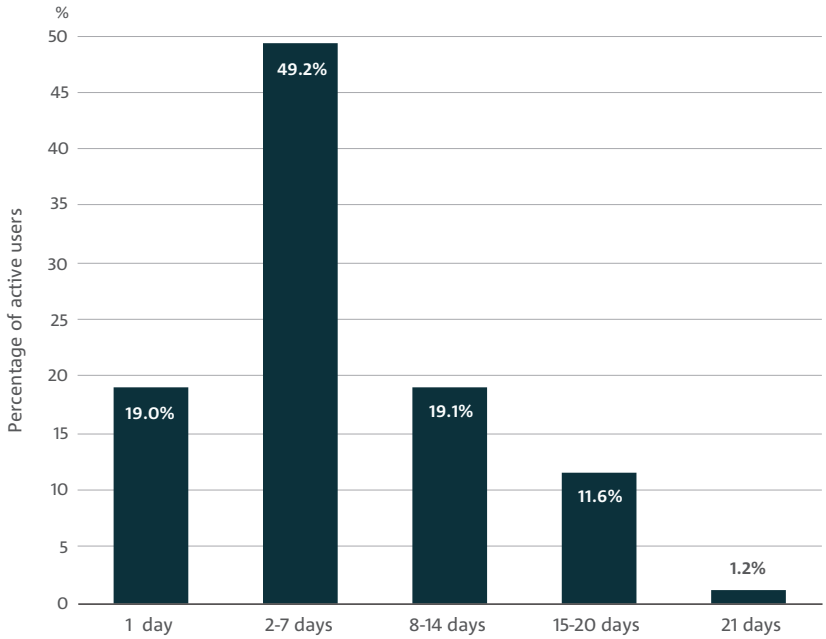
FIGURE 29 **PARTICIPANT ATTRITION OVER THE 21-DAY CHALLENGE (N=4,683)**



Usage frequency

On average, participants actively used the app for 6.3 days out of 21 days of the challenge. About half of the sample (49.2%) actively used the app for between 2-7 days, a further 19.1% used the app for between 8-14 days, 11.6% for between 15-20 days and 1.2% (or 55 participants) used the app every day during the 21-day challenge period (Figure 30).

FIGURE 30 **FREQUENCY DISTRIBUTION OF NUMBER OF DAYS PARTICIPANTS ACTIVELY USED THE APP DURING THE 21-DAY CHALLENGE (N=4,683)**



Which groups used VegEze most/least?

Females were more likely than males to use VegEze for more than 7 days during the challenge (32.9% vs 26%, Figure 31). On average, females actively used the app for 6.4 days during the challenge, compared to 5.6 days for males.

App usage was similar regardless of weight status. 32.4% of normal weight participants used the app for more than 7 days during the challenge, compared to 31.4% and 31.8% of overweight and obese participants respectively (Figure 32). On average, normal weight participants used the app for 6.4 days during the challenge, which was similar to overweight (6.3 days) and obese participants (6.2 days).

FIGURE 31 **PERCENTAGE OF THE SAMPLE ACTIVELY USING THE APP FOR "UP TO 7 DAYS" AND "MORE THAN 7 DAYS" BY GENDER (N=4,683). FEMALES ON THE INNER RING (N=3,956). MALES ON THE OUTER RING (N=707).**

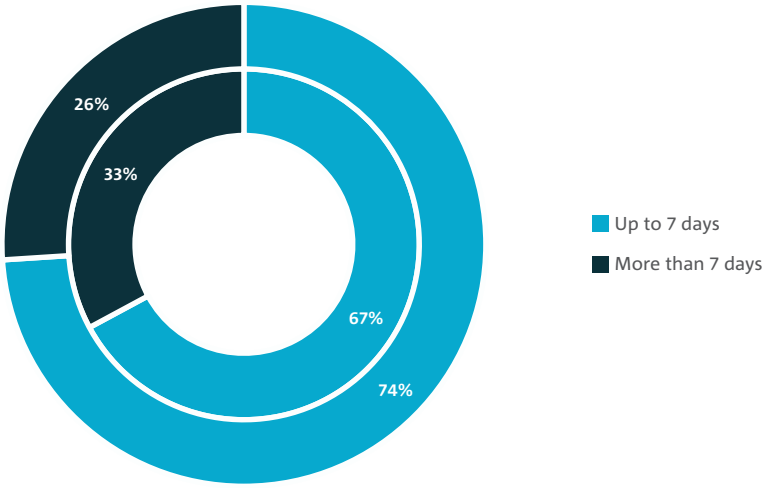
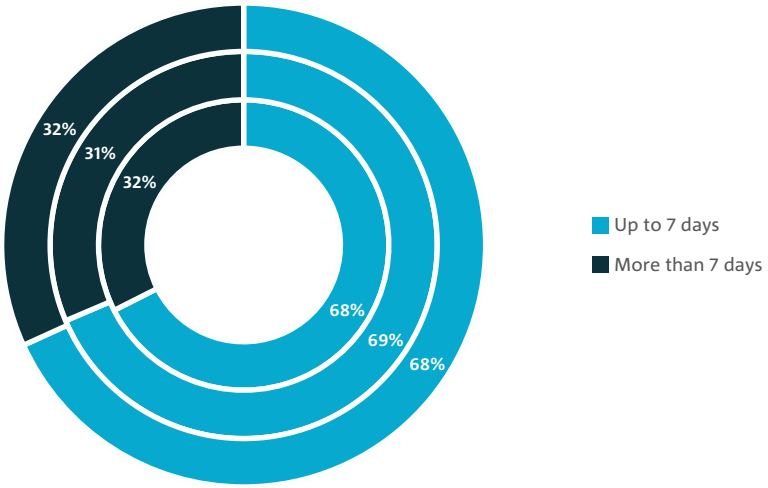


FIGURE 32 **PERCENTAGE OF THE SAMPLE ACTIVELY USING THE APP FOR "UP TO 7 DAYS" AND "MORE THAN 7 DAYS" BY WEIGHT STATUS (N=4,683). NORMAL WEIGHT ON THE INNER RING (N=1,483). OVERWEIGHT ON THE MIDDLE RING (N=1,691). OBESE ON THE OUTER RING (1,456).**



App usage and vegetable consumption

Almost all participants who had completed the baseline and end of challenge surveys had app log data that is included here to understand how use of the VegEze app is associated with change in vegetable intake (n=1,219/1,224).

The majority of these participants used the app for between 8-20 days (Figure 33), and with an average active usage of 12.5 days out of the 21 day challenge. This sample of participants had higher usage than the larger sample who downloaded the app and had just completed the baseline survey (12.5 days vs 6.3 days).

Higher usage is associated with higher vegetable intake

Participants with the highest app usage were actively using the app almost every day of the 21-day challenge. This group increased their vegetable intake by 0.63 serves per day over the 21-day challenge compared to 0.32 serves per day for those with the lowest app usage (difference 0.31 serves, p=0.056, Figure 34). Changes in the variety of vegetables consumed also increased in a stepwise manner with increasing app usage. The highest app users increased their variety by 0.95 types per day, which was significantly more than the lowest app users who increased by 0.51 types per day (difference 0.45 types, p<0.05).

FIGURE 33 **FREQUENCY DISTRIBUTION OF NUMBER OF DAYS FOR WHICH PARTICIPANTS WHO HAD COMPLETED BASELINE AND END OF CHALLENGE SURVEYS ACTIVELY USED THE APP DURING THE 21-DAY CHALLENGE (N=1,219)**

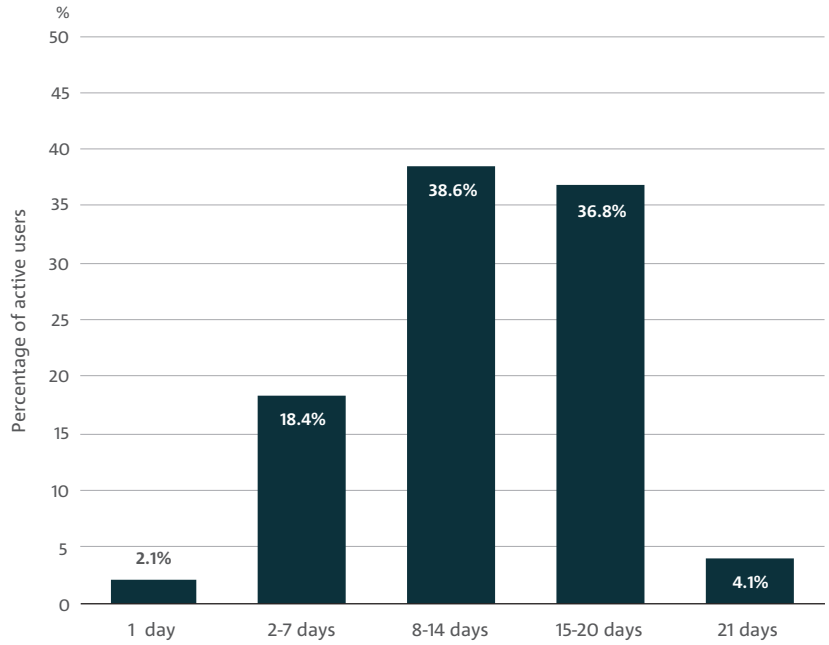
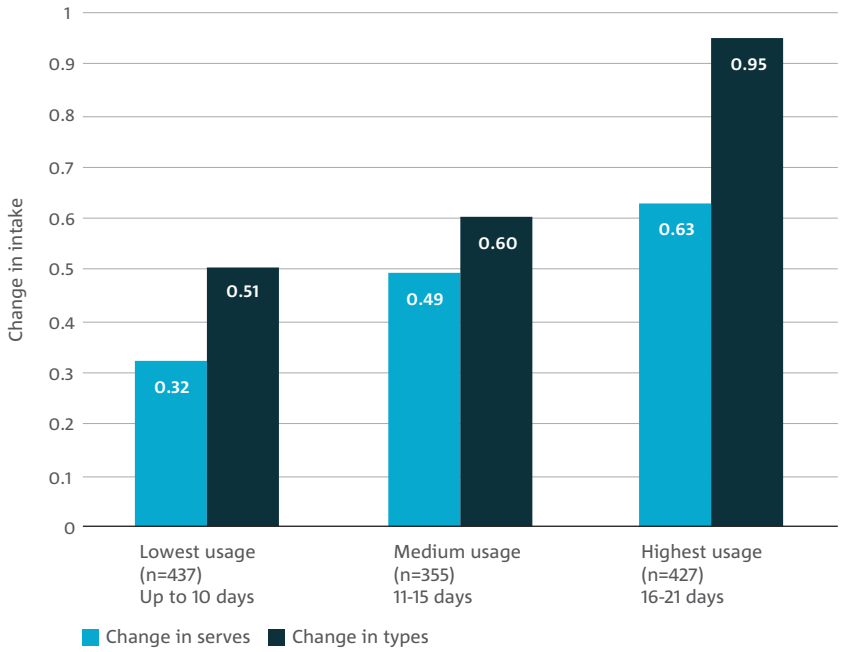
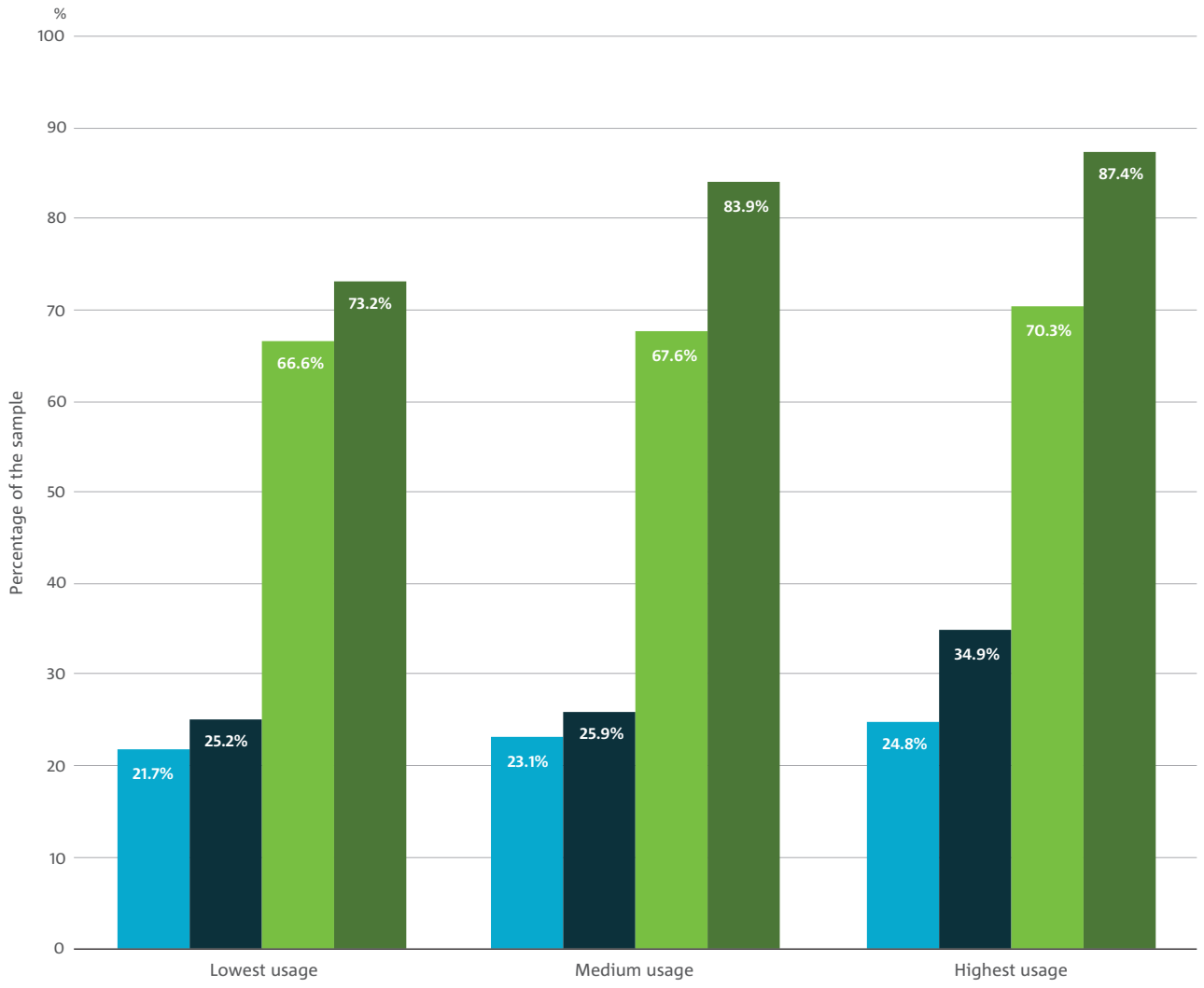


FIGURE 34 **CHANGE IN REPORTED VEGETABLE INTAKE (SERVES AND VARIETY) BY LEVEL OF APP USAGE (N=1,219)**



The percentage of participants reporting to 'always' have 3 different types of vegetables at their evening meal increased from 21.7% to 25.2% in the lowest app users (increase of 3.4%) compared to 24.8% to 34.9% in the highest app users (increase of 10.1%). The percentage of participants reporting to 'always' or 'usually' having 3 different types of vegetables their evening meal increased by 6.6% in the lowest app users compared to 17.1% in the highest app users (Figure 35).

FIGURE 35 **PERCENTAGE OF THE SAMPLE REPORTING TO 'ALWAYS' (IN BLUE) OR 'ALWAYS' AND 'USUALLY' (IN GREEN) HAVE 3 DIFFERENT TYPES OF VEGETABLES AT THEIR EVENING MEAL, AT BASELINE (LIGHTER COLOUR) AND THE END OF THE CHALLENGE (DARKER COLOUR) (N=1,219)**

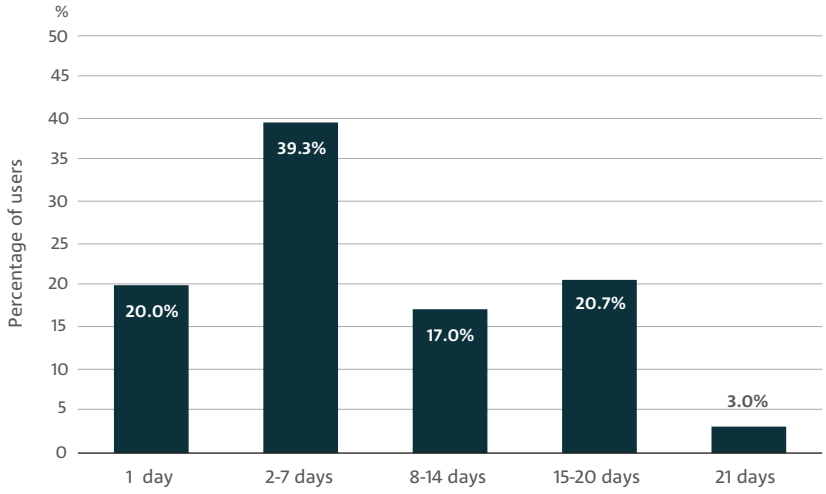


How was the vegetable log used?

Logging of vegetable intake was one of the core functions of the VegEze app. 75.8% of participants (3,838/5,062 participants) had vegetable log data that is included here to understand how the vegetable logging feature of the VegEze app was adopted by those who downloaded it and completed the baseline survey.

It was most common for participants to log their vegetable intake for 2-7 days during the 21-day challenge (39.3% of users). An additional 20.7% of users logged their intake for 15-20 days, and 3% logged their intake every day of the 21-day challenge (Figure 36).

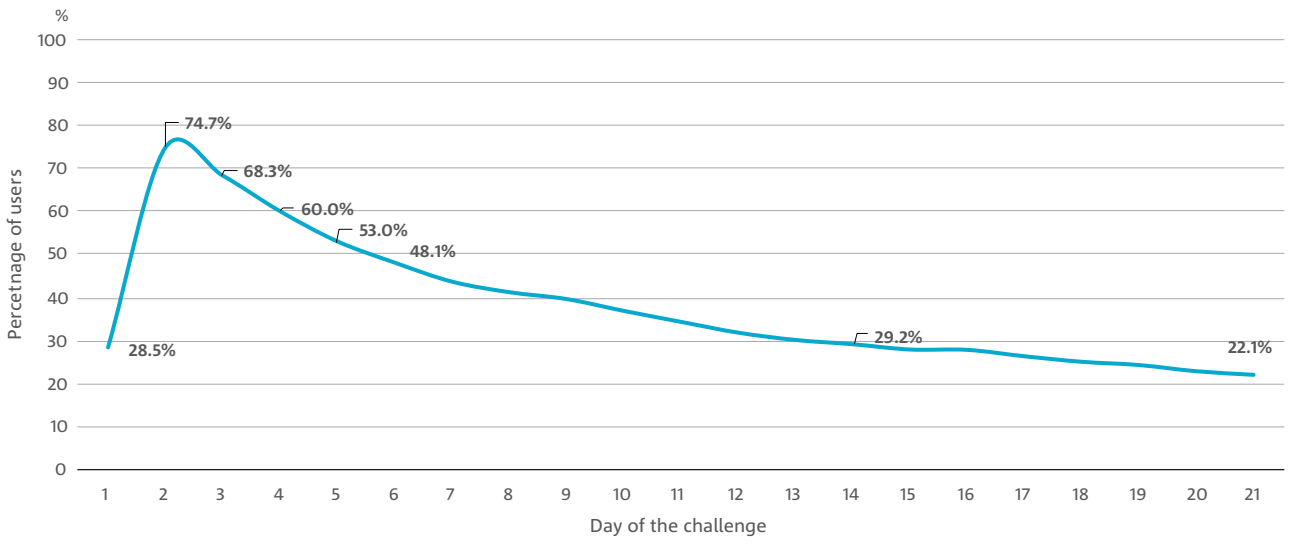
FIGURE 36 **FREQUENCY DISTRIBUTION OF NUMBER OF DAYS FOR WHICH VEGETABLES WERE LOGGED DURING THE 21-DAY CHALLENGE (N=3,838)**



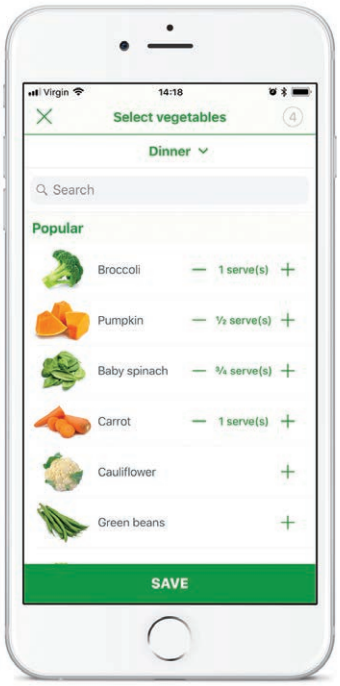
Pattern of using the vegetable log

Use of the vegetable log feature peaked on day 2 of the 21-day challenge when 2,868 users (or 74.7% of users) logged their vegetable intake. There was a gradual, steady decline in the number of users logging their vegetable intake in the app over the challenge period. On day 6, just under half of the users logged their intake (48.1%), and then a steady decline down to between 22.1-29.2% of users logged their intake in the last 7 days of the 21-day challenge (Figure 37).

FIGURE 37 **PERCENTAGE OF USERS LOGGING THEIR VEGETABLE INTAKE ON EACH DAY OF THE 21-DAY CHALLENGE (N=3,838)**

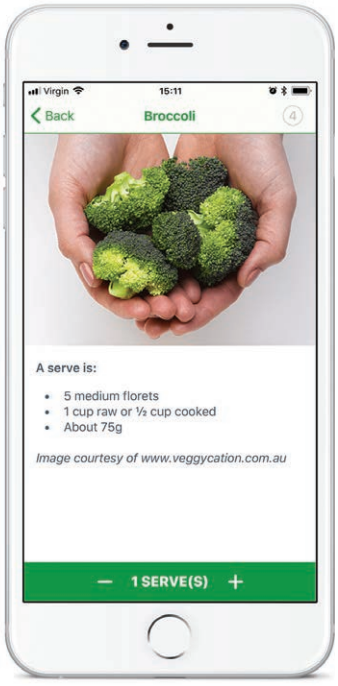


How the vegetable log works



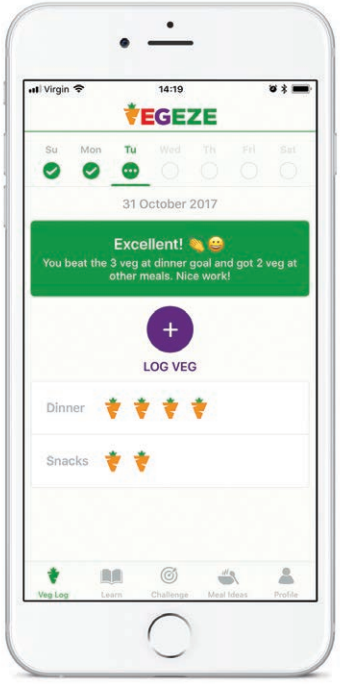
1

Participants look up the vegetables they've consumed



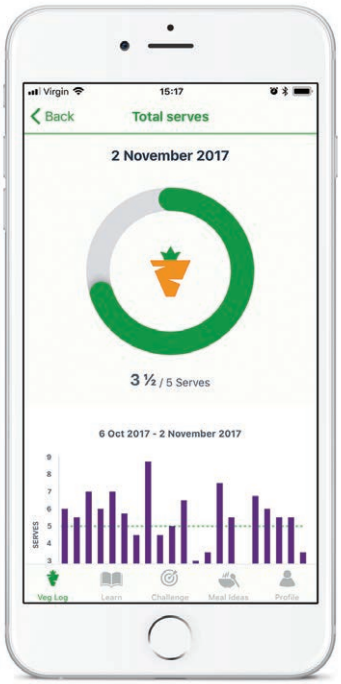
2

Serve size information helps participants estimate how much they've eaten



3

Participants receive feedback and encouragement when they log the vegetables they've consumed



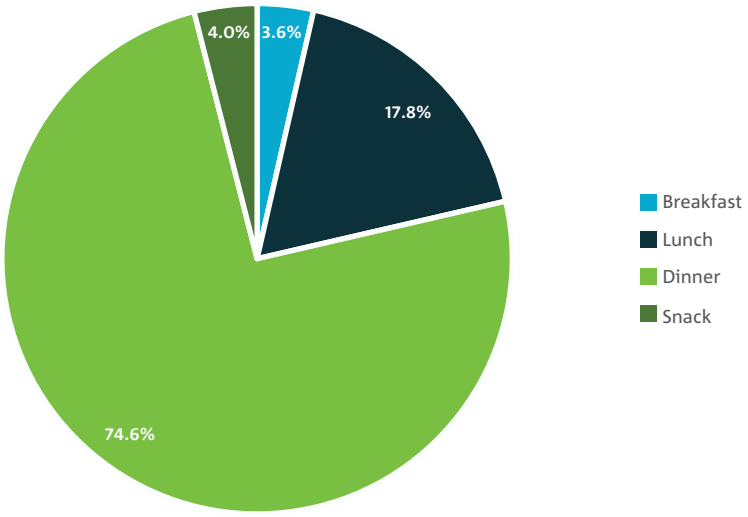
4

Participants can also view their total vegetable serves for the day and over the challenge period

Meal time logging

The focus of the VegEze app was 'do 3 at dinner', therefore as expected the app usage data shows that, on average, 74.6% of all meals logged were dinner (Figure 38). However, some participants also logged their vegetable intake at other meal times throughout the day. 17.8% of meals logged were lunch, 3.6% breakfast and 4.0% were snacks.

FIGURE 38 **MEALS LOGGED, AS A PERCENTAGE OF TOTAL MEALS LOGGED (N=3,838)**

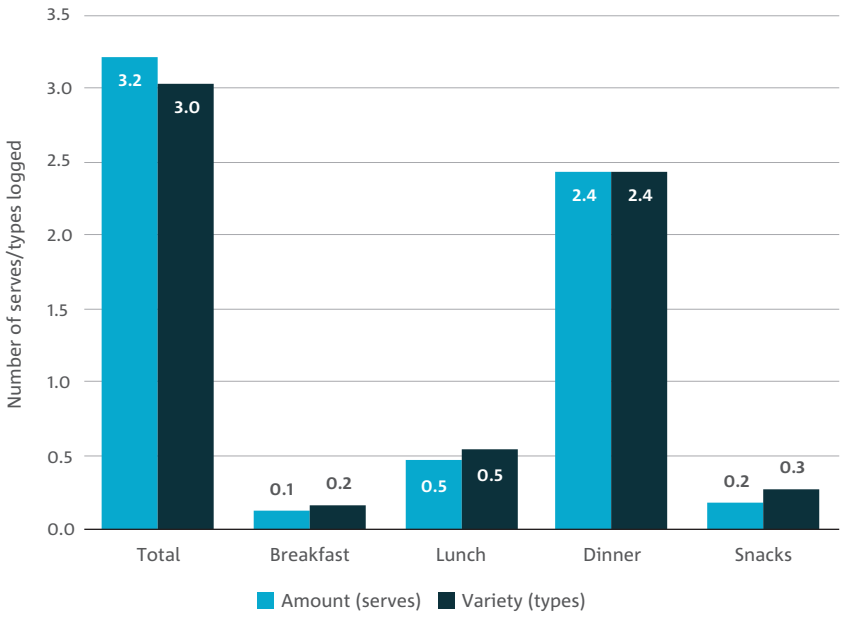


The greatest variety and highest vegetable consumption was logged for dinner. On average, 3.2 serves of vegetables were logged per user per day, and of those 2.4 serves were consumed at dinner (Figure 39).

At lunch 0.5 serves of vegetables were logged. Only a very small amount of vegetables were consumed at breakfast and as snacks.

Variety of vegetable consumption showed a similar trend. On average, 3.0 different types of vegetables were consumed per user per day, and of those 2.4 different types were consumed at dinner (Figure 39).

FIGURE 39 **AVERAGE VEGETABLE INTAKE (SERVES AND TYPES) LOGGED PER USER PER DAY, IN TOTAL AND BY MEAL TYPE (N=3,838)**

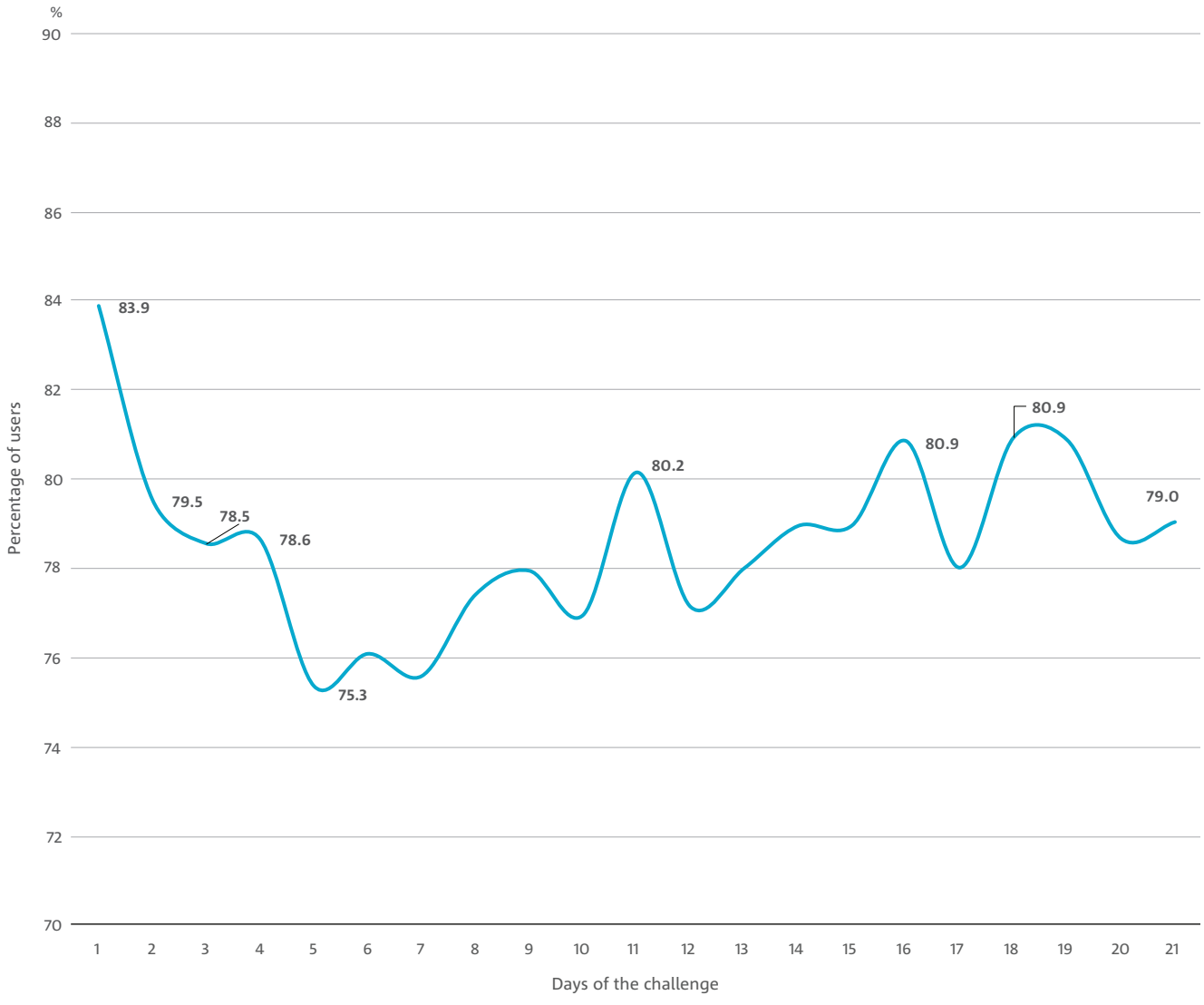


Pattern of using the vegetable log

Using the logged data, the percentage of users achieving the target behaviour of 'do 3 at dinner' was highest on day 1 of the challenge with 83.9% of users achieving this behaviour. On day 5, 75.3% of users logged 3 or more types of vegetables, which was the lowest percentage across the 21-day challenge period. Generally about 79% of the users logged 3 different types of vegetables at dinner on any given day (Figure 40).

It should be noted these data are for those who have logged their vegetable intake, and this sample of participants are likely to be more motivated than others who haven't logged their intake. It is common for participants who are doing well and are successful in achieving the target behaviour to want to use the app and log their intake.

FIGURE 40 **PERCENTAGE OF USERS ACHIEVING 3 TYPES OF VEGETABLES AT DINNER ON EACH DAY OF THE 21-DAY CHALLENGE (N=3,838)**



Which vegetables were logged most?

Overall the greatest variety of vegetables was consumed at dinner. Carrots were the most commonly consumed vegetable at dinner, followed by potatoes, tomatoes, capsicum, onion and broccoli in that order (Table 10).

Tomato, cucumber, carrots, and salad greens were the most commonly consumed vegetables at lunch time. At breakfast, tomatoes, avocado, baby spinach and mushrooms were most commonly consumed. Carrot sticks were the most commonly consumed vegetables as snacks.

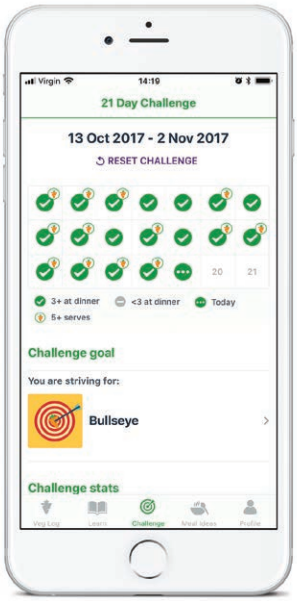
TABLE 10 **THE MOST COMMON VEGETABLES CONSUMED AT EACH MEAL OCCASION^**

RANK	BREAKFAST		LUNCH		DINNER		SNACKS	
1	Tomato	14.0%	Tomato	9.7%	Carrot	8.5%	Carrot sticks	10.2%
2	Avocado	13.6%	Cucumber	7.2%	Potato	5.3%	Tomato	5.6%
3	Baby spinach	10.6%	Carrot	7.0%	Tomato	5.0%	Cherry tomato	5.4%
4	Mushroom	9.5%	Salad greens	6.4%	Capsicum	4.9%	Carrot	5.4%
5	Baked beans	3.7%	Avocado	5.2%	Onion	4.5%	Capsicum	4.9%
6	Vegetable juice	3.7%	Capsicum	5.1%	Broccoli	4.2%	Celery	4.6%
7	Cherry tomato	3.7%	Cherry tomato	4.0%	Cherry tomato	3.3%	Avocado	4.1%
8	Capsicum	3.6%	Baby spinach	3.6%	Zucchini	3.0%	Cucumber	3.7%
9	Carrot	2.3%	Lettuce	3.2%	Mushroom	2.9%	Baby cucumber	2.8%
10	Zucchini	2.3%	Onion	2.5%	Cucumber	2.9%	Baby spinach	2.3%
11			Celery	2.4%	Baby spinach	2.7%	Lettuce	2.1%
12			Mushroom	2.0%	Avocado	2.6%		
13					Green beans	2.5%		
14					Sweet potato	2.5%		
15					Pumpkin	2.5%		
16					Cauliflower	2.3%		
17					Lettuce	2.1%		

^Included vegetables>=2%

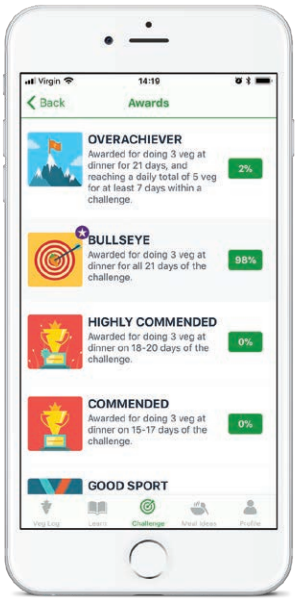
Top 5 vegetables by meal time

Other VegEze app features



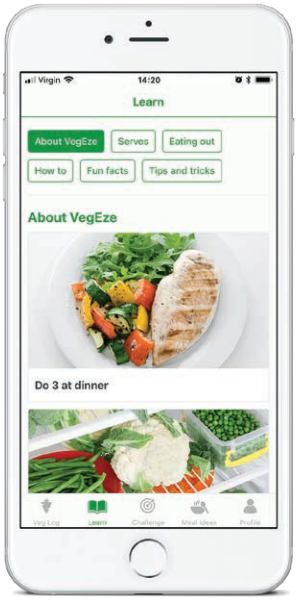
Challenge section

Progress feedback, fun facts such as “streaks” and the level reached by completing the challenge.



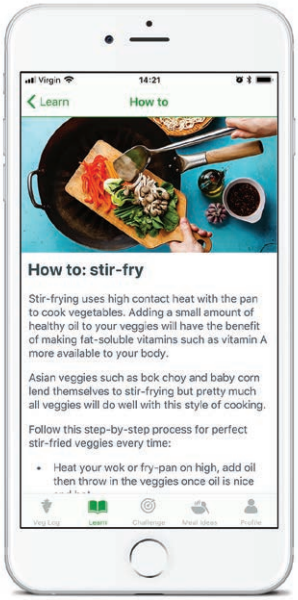
Awards

The challenge section includes targets and awards to support goal setting.



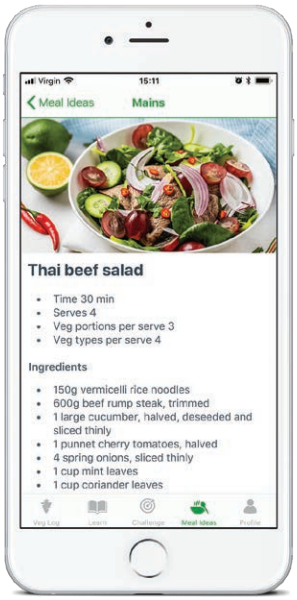
Learn section

Instructions, tips and fun facts on vegetables including health benefits and cooking instructions.



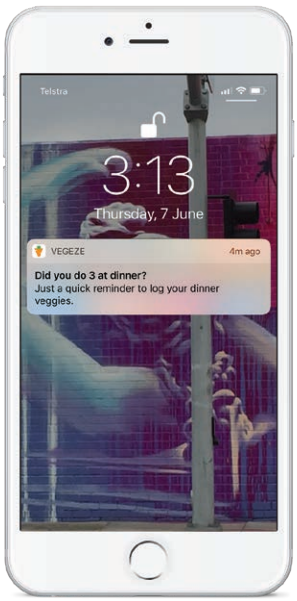
How to

The Learn and Meal Ideas sections include step-by-step instructions on how to prepare vegetables.



Meal Ideas

Over 50 recipes and meal suggestions including at least 3 types of vegetables.



Notifications

To remind users to log their vegetables and call their attention to content in the Learn and Meal Ideas sections.

How were other VegEze features used?

On average, participants actively used the app for 6.3 days out of 21 days of the challenge. The Home screen was obviously visited most (6.1 days out of 21 days). The most visited feature of the app was the Veg Lookup section which was visited, on average, 3.7 days out of the 21 days (Figure 41). On average, the Challenge section and Notifications were visited 1.3 and 1.0 day respectively, out of the 21-day challenge (Figure 41).

On average, on 96% of the days that users visited the app they viewed the Home screen. On 45.5% of active days, participants used the Veg Lookup feature to search and seek more information about vegetables and their serve size. On 22.6% of active days participants viewed the Challenge feature, on 18.1% of active days they viewed the Meal Ideas section, on 14.3% of active days they interacted with Notifications and on 12.6% of the active days they viewed the Learn section (Figure 42).

FIGURE 41 **AVERAGE NUMBER OF DAYS THE APP AND ITS FEATURES WERE USED DURING THE 21-DAY CHALLENGE (N=4,683)**

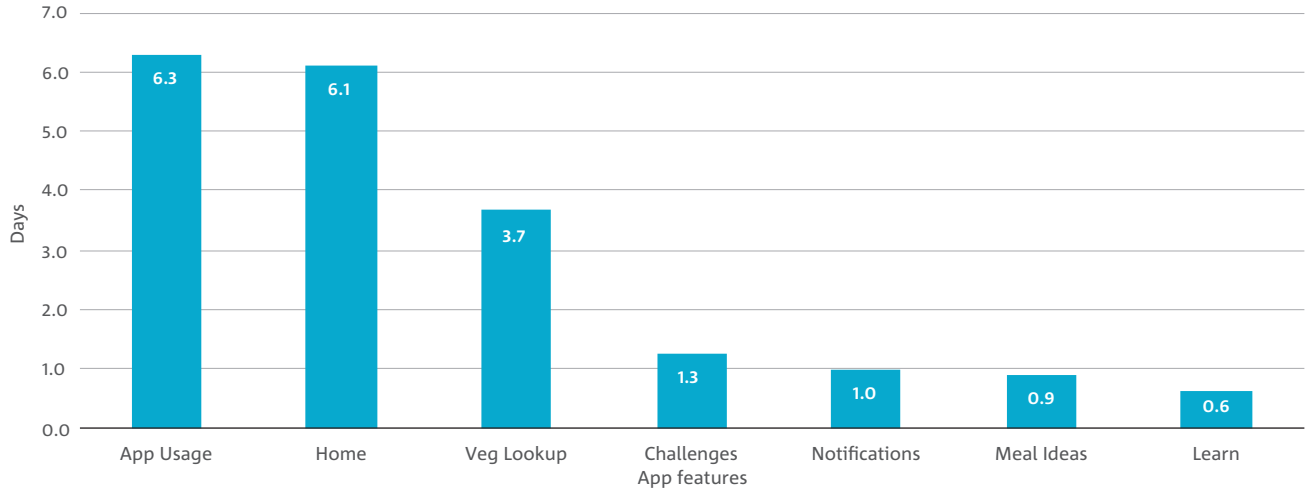
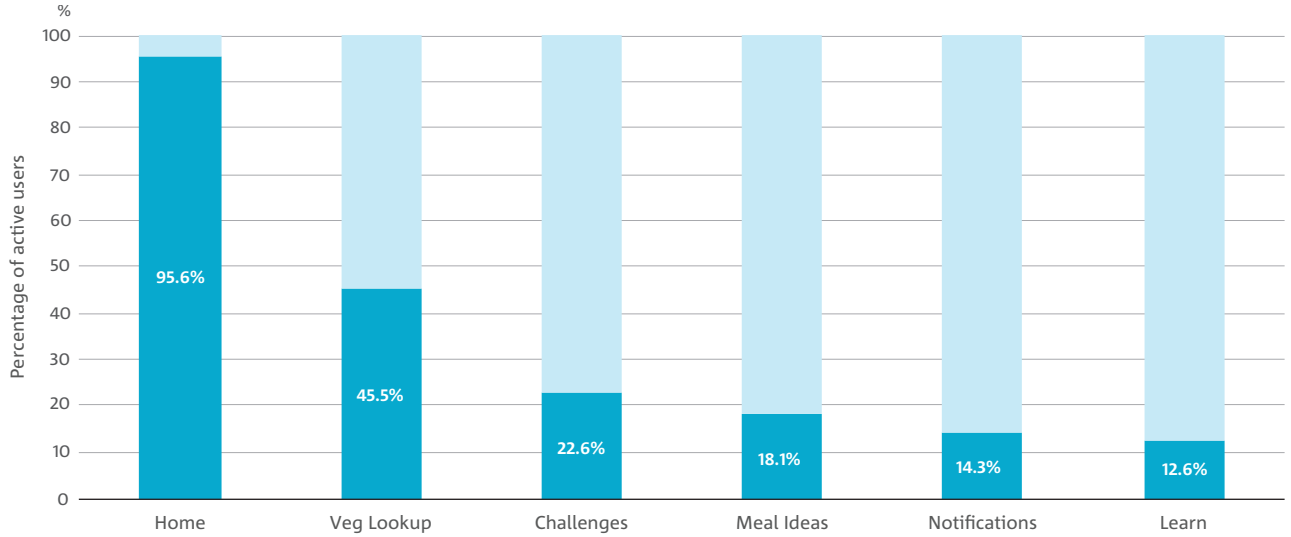


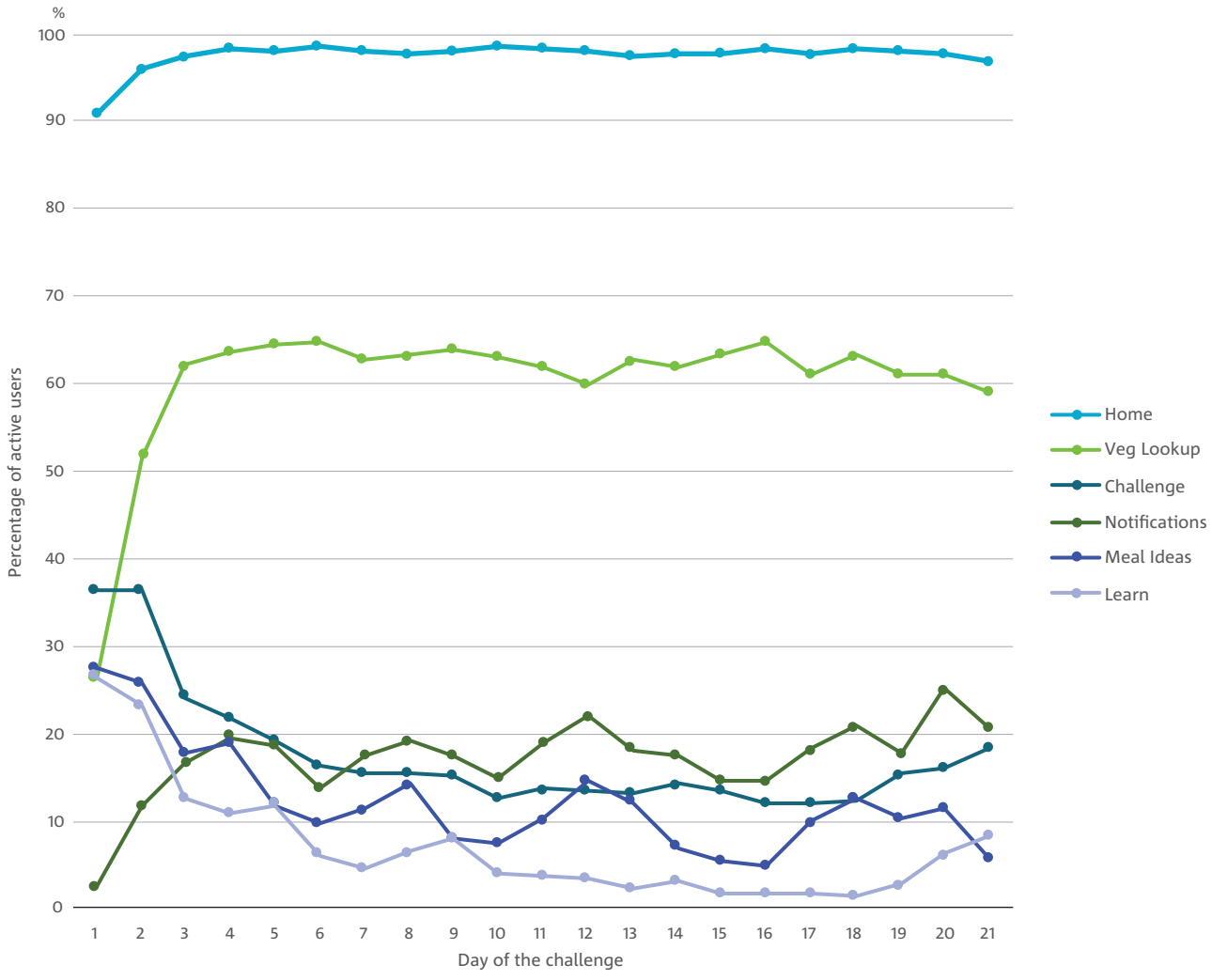
FIGURE 42 **AVERAGE PERCENTAGE OF DAYS PARTICIPANTS USED THE APP FEATURES DURING THE 21-DAY CHALLENGE (N=4,683)**



Pattern of using other VegEze features

The percentage of active users using the Veg Lookup feature of the app increased from 26.3% on day 1 to 62.3% on day 3, and from then on stayed relatively stable at between 60-63% of users. Viewing the Notifications in the app appeared to increase in the second half of the 21-day challenge, from about 15% of users to about 20% of users. In contrast, the percentage of users viewing the Challenge screen decreased from 36% of users on day 1 and 2 of the challenge to between 12-15% during the middle of the challenge, and then peaked again slightly to 16-18% in the last few days of the challenge. The Meal Ideas and Learn features started with about 25% of users viewing their content in the first few days of the challenge, and then this decreased to about 5% of users for Learn and 11% of users for Meal Ideas during the remainder of the challenge period.

FIGURE 43 **PERCENTAGE OF ACTIVE USERS USING APP FEATURES THROUGHOUT THE 21-DAY CHALLENGE PERIOD**



Maintenance

Longer term impact of VegEze

FAST FACTS

Overall, participants maintained changes in vegetable intake and variety at 90 days

Women improved their vegetable intake between 21 and 90 days, although not significantly

At 90 days, 88% of participants were ‘always’ or ‘usually’ having 3 types of vegetables at dinner

Longer term impact of VegEze

VegEze was positioned as a 21-day challenge, however, participants were able to continue using the app beyond 21 days. They were also asked to complete the evaluation survey at 90 days, which was designed to measure changes in vegetable intake and variety.

61.2% of participants who completed the 90-day survey reported an increase in their vegetable consumption from baseline. The average vegetable consumption at baseline and after 90 days for those that completed the follow-up survey are reported in Table 11.

On average, participants increased their intake significantly from 3.1 serves to 3.8 serves per day over the 90-day study period (average increase 0.68 serves, p<0.001). Overall variety also increased significantly over the 90-day study period (average increase 0.48, p<0.001, Table 12).

Compliance with the age/gender specific *Australian Dietary Guidelines* recommendations for vegetables also increased significantly over the 90-day study period. The vegetable intake score, which measures compliance with the Dietary Guidelines, increased by an average of 8.72 points out of 100 (p<0.001, Table 12).

TABLE 11 **VEGETABLE INTAKE AT BASELINE AND THE END OF THE 90-DAY STUDY PERIOD BY DEMOGRAPHIC CHARACTERISTICS (N=273)**

	SAMPLE N=273 (%)	BASELINE CONSUMPTION	END OF STUDY (90 DAYS)	CHANGE
Gender				
Male	19 (7.0%)	3.56	3.63	0.07
Female	254 (93.0%)	3.12	3.85	0.73
Unisex	0 (0.0%)			
Total	273 (100%)	3.15	3.83	0.68
Age group				
18-30 years	10 (3.7%)	2.54	2.69	0.15
31-50 years	70 (25.6%)	2.85	3.48	0.63
51-70 years	178(65.2%)	3.29	4	0.7
71+ years	15 (5.5%)	3.24	4.27	1.04
Weight status				
Normal weight	77 (28.2%)	3.08	3.59	0.51
Overweight	93 (34.1%)	3.06	3.71	0.64
Obese	100 (36.6%)	3.29	4.13	0.84

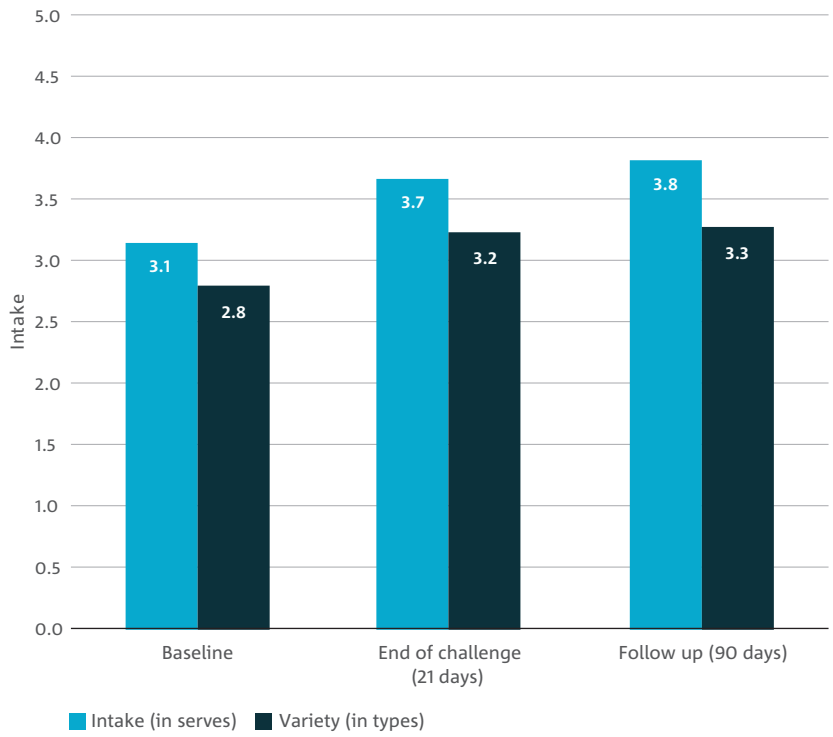
TABLE 12 **VEGETABLE INTAKE AND VARIETY AT BASELINE AND AT THE END OF THE STUDY PERIOD (N=273)**

INDICATORS OF INTAKE	BASELINE	END OF CHALLENGE (21 DAYS)	FOLLOW UP (90 DAYS)	CHANGE (0-90 DAYS)	CHANGE (21-90 DAYS)
Vegetables (serves)	3.15	3.68	3.83	0.68***	0.15
Vegetables with legumes (serves)	3.32	3.87	4.03	0.71***	0.16
Vegetable variety (types)	2.8	3.23	3.27	0.48***	0.05
Vegetable intake score (out of 100)	60.1	66.4	68.82	8.72***	2.42

***** p<0.001**

The majority of the increase in vegetable intake during the 90-day study period occurred during the 21-day challenge, and was maintained during the follow-up period (Figure 44). In this sample of participants, the average increase from baseline to the end of the 21-day challenge was 0.53 serves per day ($p<0.001$); between 21 and 90 days the average increase was 0.15 serves per day (which was not significant).

FIGURE 44 **VEGETABLE INTAKE (SERVES) AND VARIETY (TYPES) AT BASELINE, 21 DAYS AND 90 DAYS (N=273)**



Changes in behaviour at 90 days

Meeting the Dietary Guidelines at 90 days

In this sample of participants, 16% consumed enough vegetables to meet the *Australian Dietary Guidelines* recommendations for vegetables at baseline (Figure 45). This increased to 25% at the end of the 21-day challenge, and was maintained through to the end of the study period at 26%.

'Doing 3 at dinner' at 90 days

The proportion of the sample reporting to 'always' have 3 different types of vegetables at their evening meal increased from 22.3% at baseline, to 32.2% at the end of the 21-day challenge, and then to 36.3% at the end of the 90-day follow-up period (Figure 46).

The proportion who 'always' or 'usually' had 3 different types of vegetables at their evening meal increased from 71.8% at baseline to 83.5% at the end of the 21-day challenge, and up to 87.5% at the end of the 90-day follow-up period.

FIGURE 45 **PERCENTAGE OF THE SAMPLE MEETING THE AUSTRALIAN DIETARY GUIDELINES VEGETABLE INTAKE TARGET AT EACH TIME POINT (N=273). BASELINE REPRESENTED IN THE INNER RING, 21-DAYS IN THE MIDDLE, 90-DAYS IN THE OUTER RING.**

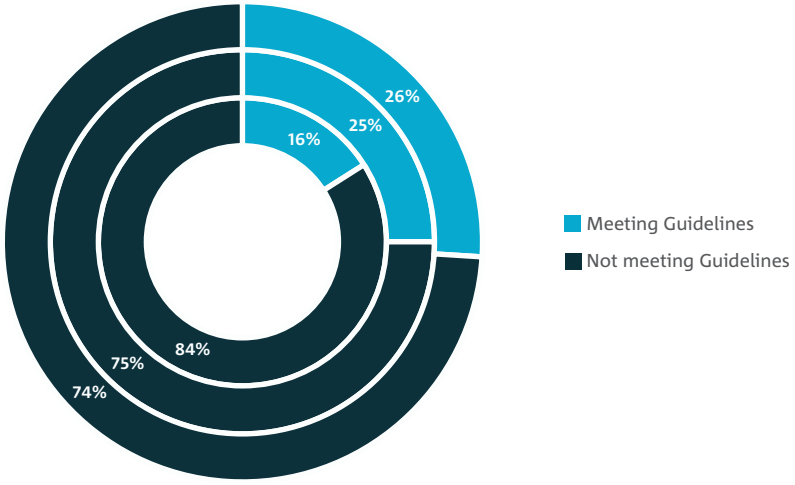
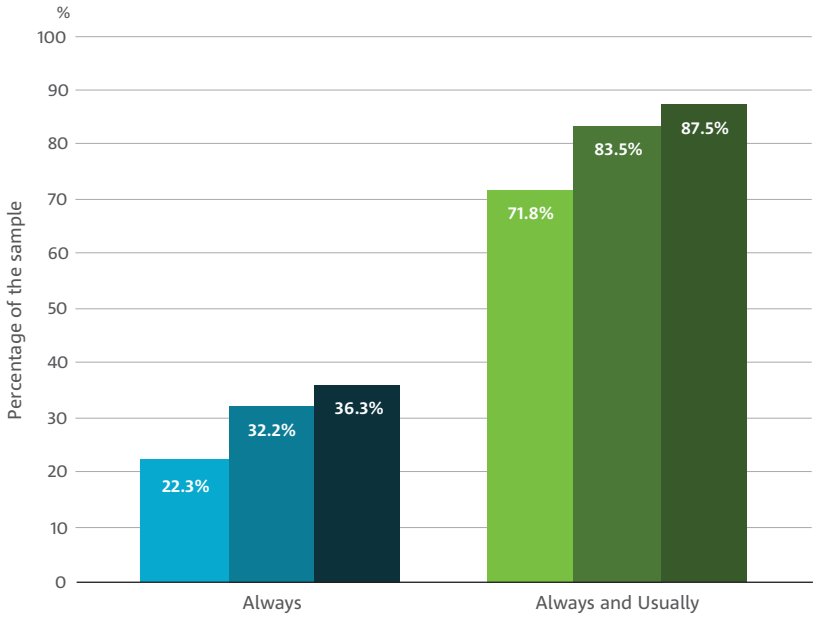


FIGURE 46 **PERCENTAGE OF THE SAMPLE REPORTING TO 'ALWAYS' OR 'ALWAYS' AND 'USUALLY' CONSUME 3 DIFFERENT TYPES OF VEGETABLES AT THEIR MAIN OR EVENING MEAL, AT BASELINE (LIGHTEST COLOUR), END OF THE 21-DAY CHALLENGE, AND AT THE 90-DAY FOLLOW-UP (DARKEST COLOUR) (N=273)**



Men vs women – differences by gender

The impact of the VegEze app over the 90-day study period varied by gender. Females significantly increased their intake by 0.5 serves per day over the 21-day challenge period ($p<0.001$), and then increased their intake by a further 0.22 serves during the follow-up period, although this increase was not statistically significant (Figure 47). Of the males that completed the 90-day survey, the average increase during the 21-day challenge period was 0.83 serves, however their reported intake decreased during the follow-up period back to almost the same level as baseline (average increase from baseline 0.07 serves). It should be noted that only 19 males completed the 90-day survey, and therefore this result may not be generalizable and should be interpreted with caution.

Changes in variety followed a similar pattern to change in serves consumed over the 90-day study period. Females significantly increased the variety of vegetables they were consuming during the 21-day challenge, and then reported a further small, but non-significant increase in variety during the follow-up period (Figure 48). However, males reported an increase followed by a decrease back to baseline levels of variety.

FIGURE 47 **VEGETABLE INTAKE (SERVES) AT BASELINE, 21 AND 90 DAYS BY GENDER (N=273)**

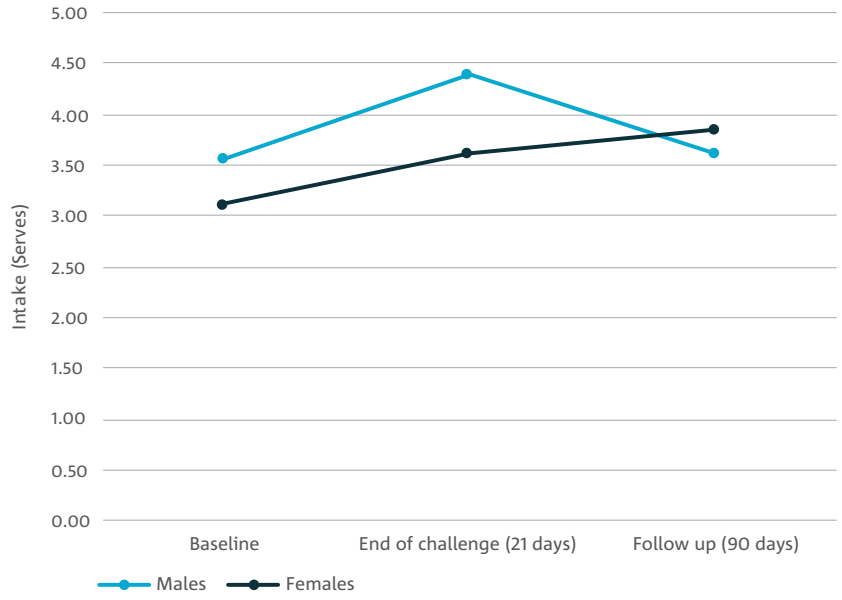
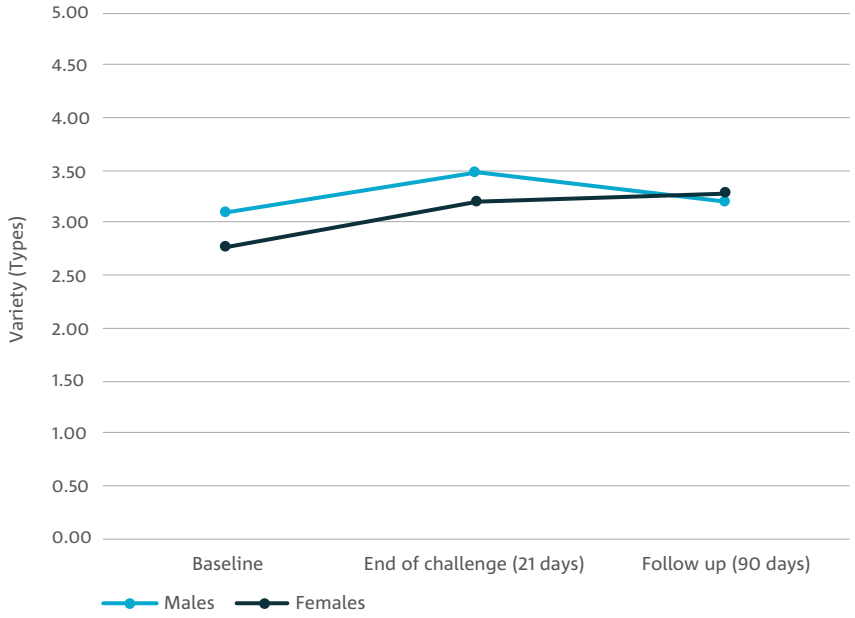


FIGURE 48 **VEGETABLE VARIETY (TYPES) AT BASELINE, 21 AND 90 DAYS BY GENDER (N=273)**

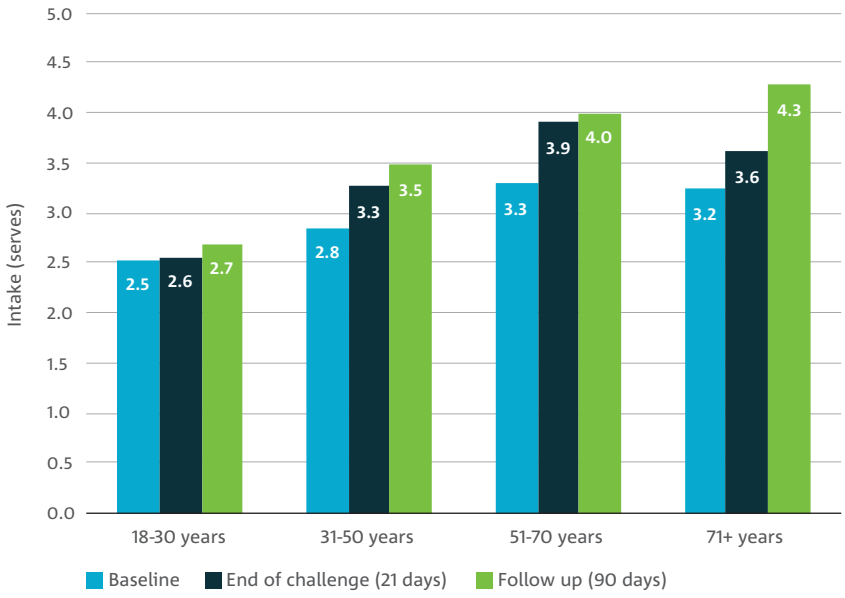


Differences by age group and weight status

Younger vs older

The impact of the VegEze app over the 90-day study period varied by age group. The increase in vegetable intake was greatest in the older age groups. Participants aged 18-30 years reported a small, non-significant increase in vegetable intake between baseline and the end of the 90-day follow-up (0.15 serves). Participants aged 31-50 years increased their intake by 0.63 serves per day between baseline and the end of the 90-day follow-up ($p<0.01$), those aged 51-70 years increased by 0.70 serves ($p<0.001$), and those aged 71+ years increased by 1.04 serves ($p<0.05$) (Figure 49).

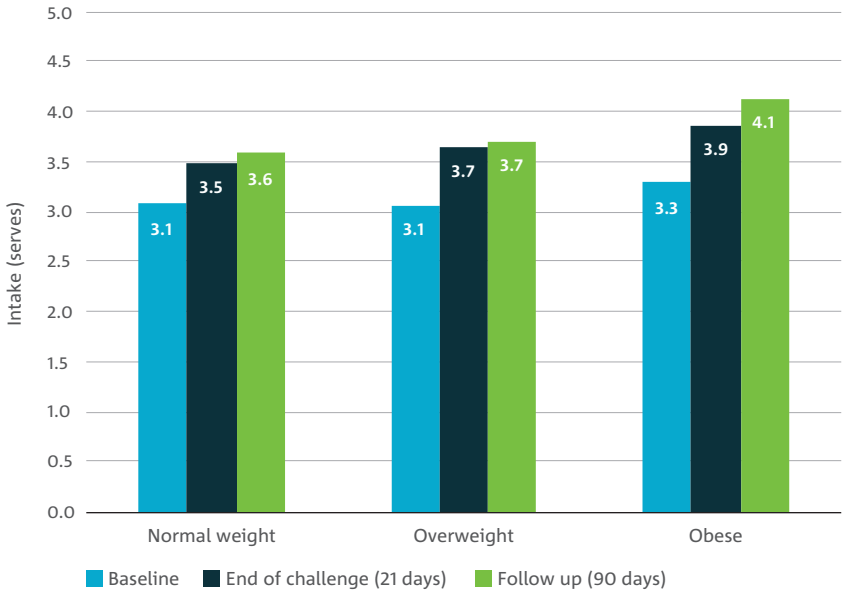
FIGURE 49 **VEGETABLE INTAKE (SERVES) AT BASELINE, 21 AND 90 DAYS BY AGE GROUP (N=273)**



Differences by healthy weight, overweight and obese

The impact of the VegEze app over the 90-day study period varied by weight status. The increase in vegetable intake improved incrementally with increasing weight status. Normal weight participants reported a 0.51 serve per day increase in vegetable intake between baseline and the end of the 90-day follow-up. Overweight participants significantly increased their intake by 0.64 serves between baseline and the end of the 90-day follow-up ($p<0.01$), and obese participants increased by 0.84 serves per day ($p<0.001$) (Figure 50).

FIGURE 50 **VEGETABLE INTAKE (SERVES) AT BASELINE, 21 AND 90 DAYS BY WEIGHT STATUS (N=273)**



Secrets of success

Who benefits most from VegEze and future recommendations for the app

FAST FACTS

VegEze is effective at increasing vegetable consumption especially in hard to reach groups

Finding ways to increase app usage could lead to increased vegetable consumption

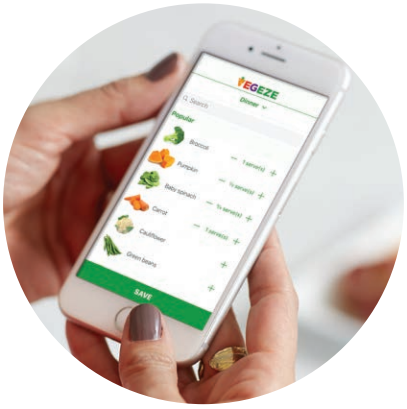
Health professionals, health institutions and insurers could all benefit from promoting VegEze

Who benefits the most from VegEze?

From this research study it appears that, overall, the VegEze 21-day challenge has been successful in increasing vegetable intake by about half a serve per day. It also resulted in an increased variety of vegetables being consumed. By the end of the 21-day challenge, 81% of participants were reporting to 'always' or 'usually' have 3 different types of vegetables at their evening meal. These changes were maintained at 90 days. However, VegEze appears to have been particularly effective for the following groups of participants.

Low vegetable consumers

Participants who had the lowest vegetable intakes at baseline appeared to benefit more than those with higher intakes. For example, participants in the lowest quintile of vegetable intake at baseline increased their intake by an average of 1.2 serves per day and 0.7 types per day over the 21-day challenge period. In addition, those who 'never' or only 'sometimes' achieved the target behaviour of 3 vegetables at dinner at baseline, increased their intake by 1 and 0.7 serves of vegetables respectively.



Those who engage most with the app

Participants with the highest app usage increased their vegetable intake by 0.6 serves per day over the 21-day challenge period. Their variety of vegetables also increased by almost 1 type per day. Among the highest app users, those reporting to 'always' have 3 different types of vegetables at dinner increased from 24.8% to 34.9%, and those reporting to 'always' or 'usually' have 3 different types of vegetables increased from 70.3% to 87.4%.

Overweight and obese women made good gains

Overweight and obese women increased their vegetable consumption by 0.6 serves per day. At the end of the 21-day challenge, 25% of overweight and obese women met the *Australian Dietary Guidelines* recommendation for vegetables – which was higher than all other weight status groups. The variety of vegetables these women consumed significantly increased as well.

Women were able to maintain their increased intake

Women significantly increased their intake over the 21-day challenge period, and were able to maintain this increase through to follow-up.
Over the 21-day challenge, women significantly increased their intake by 0.5 serves, and then continued to make small improvements through to 90 days. From baseline to the end of the 90-day follow-up, women increased their intake by 0.73 serves per day, and 27% were consuming enough vegetables to meet the *Australian Dietary Guidelines* recommendations.

Normal weight and overweight men made more gains than obese men

Normal weight and overweight men increased their vegetable intake by about 0.3 serves per day compared to 0.16 serves for obese men. The percentage of overweight men who met the *Australian Dietary Guidelines* recommendations for vegetables increased from 7.8% to 17.2% over the 21-day challenge.
In comparison, 8.2% of obese men met the *Australian Dietary Guidelines* recommendations for vegetables at the end of the 21-day challenge.

Recommendations for VegEze

VegEze is one of the few scientifically-validated health apps in the App Store®. Given the app's overall efficacy, the project team make the following recommendations.

The first step in improving diet quality

Improving overall diet quality is a complex process and adults often struggle to adhere to the diet advice provided by health professionals. Given the success of VegEze in hard-to-reach groups such as those with low vegetable intake, we believe there is a role for VegEze to be recommended by doctors and other health professionals. In this scenario, VegEze acts as a simple, entry-level tool to help adults take the first step in improving their overall diet quality.

Develop partnerships to drive usage

VegEze demonstrated higher app usage was associated with higher vegetable consumption. Evolving the app to encourage higher usage could lead to more adults increasing their vegetable consumption. Strategies to boost usage could include making VegEze competitive e.g. as part of a workplace wellness challenge, or offering incentives to complete VegEze, such as reward points offered by the major supermarkets.

Preventative health promotion

There are many institutions with a vested interest in improving diet quality to help manage the risks associated with chronic disease and obesity. These include life insurers, health insurers and state and federal health departments. Given these institutions already support various health promotion activities, they could consider including VegEze as part of their campaigns. This would not only get VegEze into the hands of more Australians, but it would help boost sales for Australian vegetable growers who showed vision and leadership by investing in the VegEze research study.

Considerations

This report presents the findings of the reach, adoption and impact of VegEze on participants' vegetable consumption. The 21-day challenge resulted in an average increase of 0.5 serves of vegetables per day and increase in variety of 0.35 types per day. Women increased their intake more than men during the challenge, and were able to maintain this increase through to the 90-day follow-up. However, as with many health-related research trials, females were more likely to participate in the trial and made up the large majority of the sample. Further implementation and evaluation of VegEze should target men as they could also benefit from additional support to improve their diet quality.

Given the nature of this research trial, these findings should be interpreted with caution. It is likely that the participants who have enrolled in this study are more health conscious, and those who completed the 21-day challenge more motivated than the general population. Nonetheless, VegEze has successfully reached over 5,000 Australians and over 1,000 have provided data to evaluate the impact of VegEze on vegetable consumption. This is considered a large enough sample to evaluate the effectiveness of a mobile app with validated outcome measures.

One strength of this study is that the evaluation surveys are contained within the app using Apple® ResearchKit® software. However, this means that these data collected via survey are self-reported. Self-reported data has some limitations. For example, people tend to overestimate the healthiness of their diets and have a tendency to over report their vegetable consumption.

To replicate a real world setting as best as possible and maximise the accessibility of VegEze, an uncontrolled study design was chosen and the app placed in the Apple® App Store® similar to other commercial health-related apps. This has helped to maximise the reach of VegEze, however makes a more robust study design, such as a randomised control trial, more difficult to achieve.

Download the VegEze app

VegEze helps you get into the healthy habit of eating more veggies, starting with 3 at dinner. Download the app today, take the 21-day challenge and be rewarded for eating more veggies.

Download on the App Store

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