“Improving the Implementation of Menu Dietary Guidelines in Childcare Services”

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A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy in Behavioural Science

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Name: Kirsty Louise Seward

Date: 22nd March 2019

THESIS BY PUBLICATION

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CONFLICT OF INTEREST STATEMENT

Kirsty Seward reports no conflict of interest.

LIST OF PUBLICATIONS FROM THESIS CHAPTERS

This thesis is presented as a series of five papers. At the time of submission, all five of these papers were either published or under editorial review in peer reviewed journals.

Table 1.1: Outline of Thesis Chapters and associated publications.

CHAPTER	CHAPTER TITLE	RESEARCH PAPERS
Two	Factors that influence the implementation of dietary guidelines regarding food provision in centre based childcare services: A systematic review	**Kirsty Seward**, Meghan Finch, Sze Lin Yoong, Rebecca Wyse, Jannah Jones, Alice Grady, John Wiggers, Nicole Nathan, Kathleen Conte, and Luke Wolfenden. Factors That Influence the Implementation of Dietary Guidelines Regarding Food Provision in Centre Based Childcare Services: A Systematic Review. Preventive Medicine. 2017;105:197-205.
Three	Measuring implementation behaviour of menu guidelines in the childcare setting: Confirmatory Factor Analysis of a Theoretical Domains Framework Questionnaire (TDFQ).	**Kirsty Seward**, Luke Wolfenden, John Wiggers, Meghan Finch, Rebecca Wyse, Christopher Oldmeadow, Justin Presseau, Tara Clinton-McHarg, Sze Lin Yoong. Measuring implementation behaviour of menu guidelines in the childcare setting: Confirmatory Factor Analysis of a Theoretical Domains Framework Questionnaire (TDFQ). International Journal of Behavioural Nutrition and Physical Activity. 2017;14:45.
Four	A multi-strategy childcare-based intervention to improve compliance with nutrition guidelines versus usual care in long day services: a study protocol for a randomised controlled trial.	**Kirsty Seward**, Sze Lin Yoong, Meghan Finch, John Wiggers, Rebecca Wyse, Jannah Jones, Karen Gillham, Luke Wolfenden. A multi-strategy childcare-based intervention to improve compliance with nutrition guidelines versus usual care in long day services: a study protocol for a randomised controlled trial. BMJ Open. 2016; 6.
Five	Improving the implementation of nutrition guidelines in childcare centres improves child dietary intake: Findings of a randomised trial of an implementation intervention	**Kirsty Seward**, Luke Wolfenden, Meghan Finch, John Wiggers, Rebecca Wyse, Jannah Jones, Sze Lin Yoong. Improving the implementation of nutrition guidelines in childcare centres improves child dietary intake: Findings of a randomised trial of an implementation intervention. Public Health Nutrition. 2018; 21:3:607-617. DOI: 10.1017/S1368980017003366.
Six	The impact of a childcare food service intervention on child dietary intake in care: an exploratory cluster randomised controlled trial	Sze Lin Yoong, Alice Grady, **Kirsty Seward**, Meghan Finch, John Wiggers, Christophe Lecathelinais, Taya Wedesweiler and Luke Wolfenden. The impact of a childcare food service intervention on child dietary intake in care: an exploratory cluster randomised controlled trial. American Journal of Health

CHAPTER	CHAPTER TITLE	RESEARCH PAPERS
		Promotion. Accepted 21st February 2019.

CO-AUTHOR STATEMENTS FOR CHAPTER 2

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Factors that influence the implementation of dietary guidelines regarding food provision in centre based childcare services: A systematic review

By:

- Developing the research question
- Determining the research design
- Developing the search strategy
- Undertaking screening, data extraction and quality assessment
- Analysis and interpretation of the data
- Leading the writing of the manuscript

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Measuring implementation behaviour of menu guidelines in the childcare setting: Confirmatory Factor Analysis of a Theoretical Domains Framework Questionnaire (TDFQ).

By:

- Developing the research question
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- Development of measures to be used
- Overseeing data collection
- Assisting in the analysis and interpretation of the data
- Leading the writing of the manuscript

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By:

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- Determining the research design
- Development of measures to be used
- Leading the writing of the manuscript

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Improving the implementation of nutrition guidelines in childcare centres improves child dietary intake: findings of a randomised trial of an implementation intervention

By:

- Developing the research question
- Determining the research design
- Development of measures to be used
- Developing, delivering and overseeing intervention delivery
- Overseeing data collection
- Analysis and interpretation of the data
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The impact of a childcare food service intervention on child dietary intake in care: an exploratory cluster randomised controlled trial

By:

- Developing the research question
- Determining the research design
- Development of measures to be used
- Developing, delivering and overseeing intervention delivery
- Overseeing data collection
- Analysis and interpretation of the data
- Co-authoring the manuscript

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ADDITIONAL PUBLICATIONS, PRESENTATIONS AND AWARDS ASSOCIATED WITH THE THESIS

PUBLICATIONS

Lee H, Hall A, Nathan N, Reilly KL, **Seward K**, Williams CM, et al. Mechanisms of Implementing public health interventions: a pooled causal mediation analysis of randomised trials. Implementation Science. 2018;13(1):42.

Finch M, **Seward K**, Wedesweiler T, Stacey F, Grady A, Jones J, Wolfenden L & Yoong S. Challenges of increasing childcare centre compliance with nutrition guidelines: A randomized controlled trial of an intervention providing training, written menu feedback and printed resources. American Journal of Health Promototion. 2018;1. DOI: 10.1177/0890117118786859.

Jones J, Wyse R, Wiggers J, Yoong SL, Finch M, Lecathelinais C, Fielding A, Clinton-McHarg T, Hollis J, **Seward K**, Wolfenden L. Dietary intake and physical activity levels of children attending Australian childcare services. Nutrition & Dietetics. 2017; 74(5):446-453. DOI: 10.1111/1747-0080.12375

Wolfenden L, Jones, J, Williams C, Finch M, Wyse RJ, Kingsland M, Tzelepis F, Wiggers J, Williams AJ, **Seward K**, Small T, Welch V, Booth D, Yoong S. Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services. Cochrane Database of Systematic Reviews. 2016(10).

Yoong S, Jones J, Marshall J, Wiggers J, **Seward K**, Finch M, Fielding A, Wolfenden L. A theory-based evaluation of a dissemination intervention to improve childcare cooks' intentions to implement nutritional guidelines on their menus. Article in Implementation Science. 2016;11(1).

PRESENTATIONS

International Society of Behavioral Nutrition and Physical Activity 2018 Annual Meeting June 2019 Prague

Accepted Oral Presentation: A randomised 3 arm trial of high and low intensity interventions to support implementation of nutrition guidelines in childcare centres: menu compliance at 12 months

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Oral Presentation: Application of the theoretical domains framework to identify barriers to the implementation of food service nutrition guidelines by centre based childcare services: Systematic Review.

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Oral Presentation: An intervention to improve nutrition guideline compliance in childcare services.

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Poster presentation: Measuring implementation behaviour of menu guidelines in the childcare setting: Confirmatory Factor Analysis of a Theoretical Domains Framework Questionnaire (TDFQ)

Global Implementation Conference June 2017 Toronto, Canada.
Poster presentation: A theory-based implementation intervention to improve compliance with nutrition guidelines in centre based childcare services: practice implications from a three-arm randomized controlled trial.

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Poster presentation: Application of a theoretical domains framework to identify barriers to the implementation of food service nutrition guidelines by centre based childcare services: Systematic review.

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Australian Health Promotion Association Conference 2016 Perth, Australia.
Oral Presentation: Child care service cooks barriers to implementing nutrition guidelines – applying a theoretical framework.

3rd Biennial Australasian Implementation Conference 2016 Melbourne, Australia.
Oral Presentation: An intervention to improve the implementation of nutrition guidelines in childcare services – Preliminary results.

3rd Biennial Australasian Implementation Conference 2016 Melbourne, Australia.
Poster Presentation: The psychometric properties of a theoretical domain framework questionnaire for the non-health care setting.

Population Health Congress 2015 Hobart, Australia.
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ABSTRACT

BACKGROUND AND AIMS

Dietary risk factors are a leading contributor to the global disease burden of non-communicable diseases (NCDs). To reduce the health burden of dietary risk factors, the World Health Organisation recommends that countries develop national dietary guidelines providing guidance on food, food groups and dietary patterns known to protect against the development of NCDs, and that such guidelines are implemented in various community settings such as schools and childcare services. As dietary risk factors are prevalent from an early age in young children and have been shown to track into adulthood, implementing dietary guidelines within the childcare setting represents a promising strategy to improve the health of the population. In order to realise the potential benefits of doing so, strategies that are effective in improving implementation within this setting are needed. However, evidence regarding the barriers and/or facilitators of guideline implementation and of the effectiveness of strategies to support such implementation in the childcare setting is limited. This thesis sought to address these evidence gaps to better guide efforts to improve the implementation of menu dietary guidelines in childcare. Specifically, it aimed to:

- Comprehensively and systematically review and synthesise the literature that reports factors (barriers and/or facilitators) which influence the implementation of menu dietary guidelines within the childcare setting (Chapter 2).

- Describe the psychometric properties of a measure, based on the Theoretical Domains Framework, to assess factors that influence the implementation of menu dietary guidelines in the childcare setting (Chapter 3).

- Assess the effectiveness of an intervention to improve the implementation of menu dietary guidelines in the childcare setting and the impact on food provision and child food intake while in care; as measured: i) at the service level, ii) at the individual level (Chapters 5 & 6).

- Provide recommendations for future research and practice to improve the implementation of menu dietary guidelines in childcare services (Chapter 7).

RESULTS

Through the systematic review (Chapter 2), this thesis demonstrated that the most commonly identified factors related to the implementation of childcare sector menu dietary guidelines were the 'environmental context and resources' such as insufficient menu planning tools and resources and insufficient time.

A tool to assess factors which influence the implementation of menu dietary guidelines was shown to have good discriminant validity and internally consistency. Using a parallel group randomised controlled trial with 45 New South Wales childcare services a multi-strategy intervention designed to address service level barriers was effective in improving implementation of sector menu dietary guidelines (Chapters 4, 5 & 6). Specifically, relative to control services, intervention services were more likely to be compliant with guidelines related to the provision of fruit; meat and meat alternatives; dairy; and discretionary foods. Furthermore, the intervention resulted in a significant increase in service-level child serve consumption for fruit and vegetable food groups, and individual level serve consumption for vegetable; wholegrain cereals; and meat/meat alternatives food groups, compared to the control group. This thesis recommends investigating the use of technology such as web-based programs and leveraging the existing infrastructure and expertise of external catering services to scale up the implementation of menu dietary guidelines in the childcare setting. Furthermore it recommends that research targeting the implementation of menu dietary guidelines in childcare services should include cost-effectiveness measures, to assist policy makers and practitioners to choose future support strategies.

CONCLUSION

The findings of this thesis provide new evidence for enhancing the implementation of dietary guidelines by child care services. Further the evidence demonstrates that by enhancing such implementation, the quality of child diet is significantly enhanced.

CONTRIBUTION STATEMENT

I was the sole PhD student on this study and was intricately involved in all aspects of the study conceptualization, design, development, implementation, and evaluation. I was the contact person for schools, principals and canteen managers throughout the study and was responsible for managing all enquiries. A summary of the various contributions I made to the studies reported in this thesis is provided below.

PROGRAM DESIGN AND DEVELOPMENT

I took a lead role in program design and development and was responsible for a team of staff involved in the implementation of the multi-strategy intervention described in chapters 4, 5 & 6. With guidance from my supervisors, I led the development of the randomised controlled trial. This required the creation of a range of program components and resources. The trial included: the development and delivery of childcare menu planning workshops, development of tools and resources for childcare service directors and service cooks, development of a menu feedback report, and a suite of resources designed to monitor the implementation of the trial.

ETHICS APPROVAL AND CLINICAL TRIAL REGISTRY

I was responsible for correspondence with the Hunter New England Local Health District Human Research Ethics Committee (06/07/26/4.04), including drafting applications and addressing feedback from committees. I was responsible for completing all ethics forms, designing the program recruitment material and developing the information statements for childcares service directors and service cooks. I was responsible for the initial registration of the trial with ANZCTR and any required updates.

STUDY MEASURES

In consultation with my supervisors, I developed and validated the theoretical domain framework questionnaire. I collaborated with my supervisors and the 'Good for Kids Good for Life' childcare dietitian team for the development of the comprehensive menu review protocol, the child food intake questionnaire and the aggregate plate waste measure protocol. I developed the nominated supervisor and service cook pen and paper survey items.

DATA COLLECTION, ENTRY, AND MANAGEMENT

I was responsible for planning and coordinating the data collection procedure for childcare service menu assessments and child food intake measures. This involved developing the training protocols and training a team of research assistants to collect child food intake data via aggregate plate waste measures and child food intake questionnaires. Throughout the execution of the intervention, I managed three dietitians and two project officers delivering the intervention and assisting with aspects of the data management. Data collection was undertaken over a 12-month period on three separate occasions. I also trained Computer Assisted Telephone Interviews (CATI) staff and I was responsible for overseeing the completion of the service cook CATI to validate the theoretical domain framework questionnaire.

PROGRAM IMPLEMENTATION

With support from my supervisors and the project team, I oversaw the implementation of the multi-strategy intervention. I was responsible for managing the intervention delivery.

DATA CLEANING AND ANALYSIS

In correspondence with my supervisors, the methods of statistical analysis were decided upon and I led the data analysis process. I was also responsible for interpreting the results and presenting the data in either text, table or figure formats.

PRESENTATION OF STUDY RESULTS

During my candidature, the results of the research have been presented at five international and three national conferences.

CHAPTER 1

Introduction

CHAPTER OVERVIEW

This introductory chapter presents an evidence-based rationale for the studies that comprise this thesis. The chapter begins by outlining the health and economic burden of non-communicable disease attributable to poor diet, both internationally and in Australia. It describes population level dietary guidelines developed to address this burden, and evidence regarding the prevalence of adherence to such guidelines by adults and children, identifying a substantial gap between guideline recommendations and population dietary patterns. The chapter then describes the opportunities afforded by the child care setting to support healthy eating habits by children through the implementation of menu dietary guidelines. The inadequate implementation of such guidelines by childcare services locally, nationally and internationally is then described, as are gaps in the evidence base regarding strategies for enhancing such implementation. The chapter concludes by highlighting opportunities for research in the area and outlines the specific aims of the thesis.

THE BURDEN OF NON-COMMUNICABLE DISEASE ATTRIBUTABLE TO DIETARY RISK FACTORS

Non-Communicable Diseases (NCDs), also known as chronic diseases, persist over a long time period, and are the result of an interplay of genetic, physiological, environmental and behavioural factors (1). Internationally, NCDs are responsible for a significant proportion of the total burden of disease. The World Health Organisation (WHO) reports that globally NCDs account for 40 million deaths each year, which is equivalent to 70% of all deaths (1). Four major NCDs are responsible for over 80% of the total NCD deaths worldwide (cardiovascular disease, cancer, diabetes and respiratory diseases) (1). In 2016 WHO data suggest that the number of deaths attributable to these NCDs was 17.9 million (cardiovascular disease), 9.0 million (cancers), 3.9 million (respiratory diseases) and 1.6 million (diabetes) (1).

The primary risk factors for NCDs relate to exposure to tobacco smoke, the harmful use of alcohol, physical inactivity and dietary risk factors. Of these, dietary risk factors account for the greatest NCD burden, with the 2016 Global Burden of Disease (GBD) study estimating that 26.1% of the total NCD deaths were attributable to dietary risk factors. This burden is greater than inflicted by smoking, the harmful use of alcohol, or inadequate

physical activity combined (23.3%) (See Table 1.2) (2). Similarly, dietary risk factors are also the leading cause of Disability-Adjusted Life Years (DALYs) related to NCDs, and in 2016 they accounted for over 15% of DALYs (see Table 1.2) (2).

Table 1.2 Number of Deaths and DALYs attributable to Non-Communicable Disease in 2005 and 2016 associated modifiable risk factors obtained from the Global Burden of Disease Study

	Deaths n '000 (%)		Disability-Adjusted Life Years (DALYs) n '000 (%)	
	2005	**2016**	**2005**	**2016**
Smoking	5.7 (16.7)	5.8 (14.8)	141.6 (10.9)	142.8 (9.8)
Harmful use of alcohol	1.7 (5.1)	2.0 (5.0)	59.6 (4.6)	65.4 (4.5)
Low physical activity	1.2 (3.4)	1.4 (3.5)	21.1 (1.6)	24.3 (1.7)
Dietary risks: combined	9.3 (27.4)	10.3 (26.1)	211.9 (16.3)	229.0 (15.7)
Diet low in fruits	2.3 (7.0)	2.4 (6.0)	61.9 (4.8)	61 (4.0)
Diet low in vegetables	1.5 (4.4)	1.5 (3.8)	35.4 (2.7)	35.5 (2.4)
Diet low in whole grains	2.3 (6.7)	2.5 (6.3)	57.6 (4.4)	62.6 (4.3)
Diet low in nuts and seeds	1.9 (5.5)	2.2 (5.5)	44.7 (3.4)	49.5 (3.4)
Diet low in milk	0.09 (0.3)	0.12 (0.3)	2.1 (0.2)	2.6 (0.2)
Diet high in red meat	0.02 (0.06)	0.03 (0.08)	0.8 (0.07)	1.2 (0.08)
Diet high in processed Meat	0.15 (0.4)	0.14 (0.4)	3.5 (0.3)	3.2 (0.2)
Diet high in sugar sweetened beverages	0.018 (0.05)	0.022 (0.06)	0.60 (0.05)	0.78 (0.05)
Diet low in fibre	0.77 (2.3)	0.88 (2.2)	18.5 (1.4)	20.1 (1.4)
Diet low in calcium	0.13 (0.4)	0.16 (0.4)	2.9 (0.2)	3.4 (0.2)
Diet low in seafood omega-3 fatty acids	1.3 (4.0)	1.5 (3.9)	30.2 (2.3)	33.3 (2.3)
Diet low in polyunsaturated fatty acids	0.38 (1.1)	0.40 (1.0)	8.2 (0.6)	8.4 (0.6)
Diet high in trans fatty Acids	0.24 (0.7)	0.22 (0.6)	5.6 (0.4)	5.1 (0.4)
Diet high in sodium	2.1	2.3	44.4	47.6

	(6.2)	(5.8)	(3.4)	(3.3)

The GBD study also provides detailed information about the relative impact on morbidity and mortality of a range of specific dietary risks on the global population. In 2016, the main dietary risk factors for global NCD deaths (responsible for >3% of the mortality) and DALYs were; a diet low in wholegrains (6.3% deaths, 4.3% DALYs); a diet low in fruits (6.0% deaths, 4.0% DALYs); a diet low in nuts and seeds (5.5% deaths, 3.4% DALYs); a diet high in sodium (5.8% deaths, 3.3% DALYs); a diet low in seafood omega-3 fatty acids (3.9% deaths, 2.3% DALYs); and a diet low in vegetables (3.8% deaths, 2.4% DALYs). These have remained the main dietary risk factors contributing to high mortality and DALYs globally since 2005 (2).

Similarly, in Australia, dietary risk factors are the major contributors to the NCD burden. However, the proportion of NCD deaths and DALYs attributable to dietary related risk factors has slightly decreased over the decade from 2005 (deaths 21.4% to 13.3%; DALYs 10.5% to 9.0%). The burden however remains high among Australians where a diet low in wholegrains was found to be the leading dietary risk factor for NCDs (accounting for 4.9% of NCD deaths and 2.8% of DALYs); followed by a diet low in fruits (3.6% of deaths, 2.1% of DALYs); a diet low in nuts and seeds (3.3% of deaths, 1.6% of DALYs); a diet low in vegetables (2.9% of deaths, 1.4% of DALYs); a diet low in fibre (2.1% of deaths, 1.0% of DALYs); and a diet high in sodium (1.8% of deaths, 0.8% of DALYs) (2).

Table 1.3 Australia - Number of Deaths and DALYs attributable to non-communicable disease associated risk factors in 2005 and 2016.

	Deaths n '000 (%)		Disability-Adjusted Life Years (DALYs) n '000 (%)	
	2005	**2016**	**2005**	**2016**
Smoking	17.8 (14.6)	20.7 (13.8)	364.5 (9.2)	395.5 (8.4)
Harmful use of alcohol	4.4 (3.7)	6.1 (4.1)	161.9 (4.1)	203.5 (4.3)
Low physical activity	4.7 (3.9)	5.2 (3.5)	63.3 (1.6)	65.3 (1.4)
Dietary risks: all causes	**25.9 (21.4)**	**27.5 (18.3)**	**419.0 (10.5)**	**425.6 (9.0)**
Diet low in fruits	4.9 (4.1)	5.5 (3.6)	90.4 (2.3)	97.1 (2.1)
Diet low in vegetables	4.3 (3.5)	4.4 (2.9)	65.2 (1.6)	64.1 (1.4)

Diet low in whole grains	7.0 (5.8)	7.4 (4.9)	129.6 (3.3)	131.7 (2.8)
Diet low in nuts and seeds	5.1 (4.2)	4.9 (3.3)	82.4 (2.1)	74.1 (1.6)
Diet low in milk	0.49 (0.4)	0.57 (0.4)	9.0 (0.2)	9.9 (0.2)
Diet high in red meat	0.42 (0.4)	0.54 (0.4)	12.8 (0.3)	15.6 (0.3)
Diet high in processed meat	0.54 (0.5)	0.60 (0.4)	11.0 (0.3)	11.9 (0.3)
Diet high in sugar sweetened beverages	0.07 (0.1)	0.086 (0.1)	2.2 (0.1)	2.7 (0.1)
Diet low in fibre	3.1 (2.5)	3.1 (2.1)	49.7 (1.3)	47.6 (1.0)
Diet low in calcium	0.8 (0.7)	0.9 (0.6)	14.5 (0.4)	15.1 (0.3)
Diet low in seafood omega-3 fatty acids	2.9 (2.4)	2.7 (1.8)	42.0 (1.1)	36.5 (0.8)
Diet low in polyunsaturated fatty acids	1.2 (1.0)	1.5 (1.0)	17.5 (0.4)	19.9 (0.4)
Diet high in trans fatty acids	1.0 (0.8)	0.6 (0.4)	15.3 (0.4)	9.0 (0.2)
Diet high in sodium	2.6 (2.1)	2.8 (1.8)	36.7 (0.9)	36.5 (0.8)

ECONOMIC BURDEN OF DIET RELATED NCDS AND DIETARY RISK FACTORS

INTERNATIONAL EVIDENCE

Dietary related illnesses and NCDs pose a significant economic burden on health care systems throughout the world. From 2006-07, in the United Kingdom (UK), ill health directly related to poor diet cost the National Healthcare System £5.8 billion (AUD $10.35 billion) (3). A 2015 Canadian study estimated that the inadequate intake of fruit and vegetables cost the national economy $3.3 billion CAD (AUD $3.39 billion) per year, with 31% due to direct health care costs (e.g. hospital care, drugs etc.) and 70% due to indirect costs (e.g. productivity losses etc.) (4).

AUSTRALIAN EVIDENCE

In 2012, in Australia, it was estimated that diet related illness cost $5 billion annually, $3 billion of which was due to direct health care costs (5). In 2008, the economic burden

directly attributable to low fruit and vegetable intake alone, was estimated to be $269 million; which was larger than the economic burden attributable to any other modifiable NCD risk factor including smoking and low physical activity (6).

DIETARY GUIDELINES

To address the impact of poor diet on health and wellbeing many countries have developed population level dietary guidelines. Such guidelines provide guidance on intake of food, food groups and dietary patterns that are known to protect against the development of NCDs (7). The development of such dietary guidelines are commonly based on the systematic identification and synthesis of the best available scientific evidence as well as an expert consensus processes regarding suitability to the population context (8). Population level dietary guidelines are designed to achieve and maintain the optimum health of the general population rather than to provide dietary advice for specific clinical or acute care groups or individuals (7). The WHO has developed a series of principles for the development of dietary guidelines, and recommends that member countries include these in their national dietary guidelines to maximize their impact in reducing the burden of dietary related risk factors on health (Table 1.4) (9).

High-income countries such as the United States (US), UK, Canada and Australia have all developed national dietary guidelines that are consistent with such principles, encouraging the consumption of core food groups and water, and discouraging the consumption of discretionary energy-dense, nutrient-poor foods and sugar sweetened beverages (7, 10-12). Core foods are those which provide essential vitamins and nutrients that are important for good health, growth and development and include breads and cereals, dairy, meat and meat alternatives, vegetables and fruit (13). Furthermore, the dietary guidelines from those countries also quantify the recommended volume or number of serves of core food groups for children and adults to consume in order to maintain health and prevent illness.

Table 1.4 WHO principles of a healthy diet for 'Adults' and 'Infants and Young Children' (9)

ADULTS	INFANTS AND YOUNG CHILDREN
A healthy diet contains: • Fruits, vegetables, legumes (e.g. lentils, beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat, brown rice). • At least 400 g (5 portions) of fruits and vegetables a day. Potatoes, sweet potatoes, cassava and other starchy roots are not classified as fruits or vegetables. • Less than 10% of total energy intake from free sugars which is equivalent to 50 g (or around 12 level teaspoons) for a person of healthy body weight consuming approximately 2000 calories per day, but ideally less than 5% of total energy intake for additional health benefits. Most free sugars are added to foods or drinks by the manufacturer, cook or consumer, and can also be found in sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates. • Less than 30% of total energy intake from fats. Unsaturated fats (e.g. found in fish, avocado, nuts, sunflower, canola and olive oils) are preferable to saturated fats (e.g. found in fatty meat, butter, palm and coconut oil, cream, cheese, ghee and lard). Industrial trans fats (found in processed food, fast food, snack food, fried food, frozen pizza, pies, cookies, margarines and spreads) are not part of a healthy diet. • Less than 5 g of salt (equivalent to approximately 1 teaspoon) per day and use iodized salt.	In the first 2 years of a child's life, optimal nutrition fosters healthy growth and improves cognitive development. It also reduces the risk of becoming overweight or obese and developing NCDs later in life. Advice on a healthy diet for infants and children is similar to that for adults, but the following elements are also important. • Infants should be breastfed exclusively during the first 6 months of life. • Infants should be breastfed continuously until 2 years of age and beyond. • From 6 months of age, breast milk should be complemented with a variety of adequate, safe and nutrient dense complementary foods. Salt and sugars should not be added to complementary foods.

The US national dietary guidelines, developed by the US Department of Agriculture and updated most recently in 2015, use the 'MyPlate' food guidance system to provide simple healthy eating recommendations for the core food groups (i.e. fruits, vegetables, grains, protein foods and dairy) (12). The recommended quantity of each food group to be consumed each day is calculated based on an individual's age, gender and daily activity level (Table 1.5).

Table 1.5 Excerpt from US National Dietary Guidelines for adults and children.

	Recommended daily serves from each core food group				
	Fruits	**Vegetables**	**Grains**	**Protein foods**	**Dairy Foods**
Child (Male or female 2-3 years of age active for <30 min/day)	1 cup	1 cup	3 ounces	2 ounces	2 cups
Female (21-25 years of age active for <30 min/day)	2 cups	2 ½ cups	6 ounces	5 ½ ounces	3 cups

In 2016, the UK national dietary guidelines were updated and released by Public Health England in the 'Eatwell Guide' (10). The Guide recommends that all children aged greater than 5 years and all adults adhere to the following dietary principles: i) consume at least five portions of fruit and vegetables daily; ii) form the base of meals with starchy carbohydrates such as potatoes, bread, pasta and rice; iii) choose wholegrain varieties when possible; iv) consume some dairy and/or dairy alternatives daily; and v) consume some beans, pulses, meat, fish and other proteins daily.

Canada's dietary guidelines 'Eating Well with Canada's Food Guide' were reviewed and updated in 2007 by Health Canada (11). Similar to the US Guidelines, the guidelines provide recommendations for the daily intake of core food groups, based on gender and age (Table 1.6).

Table 1.6 Excerpt from Canadian National Dietary Guidelines for adults and children.

	Recommended daily serves from each food group			
	Fruits & Vegetables	**Grains**	**Milk & Milk Alternatives**	**Meat & Meat Alternatives**
Child (Male or female) 4-5 years of age	5 serves	4 serves	2 serves	1 serve
Adult (Female 19-50 years of age)	8 serves	6-7 serves	2 serves	2 serves

PREVALENCE OF ADHERENCE TO DIETARY GUIDELINES

A joint expert consultation on diet, nutrition and the prevention of chronic diseases conducted by the Food and Agriculture Organisation (FAO) and the WHO recommend that combined daily adult fruit and vegetable intake should be a minimum of 400 grams (excluding potatoes and other starchy tubers)for the prevention of chronic diseases (14). Despite this recommendation, the GBD study estimated mean global vegetable and fruit intake to be only 208 grams per day (range 34.6–493.1 g/day) and 81.3 grams per day (range 19.2–325.1 g/day) respectively. Of the 187 countries that participated in the study, only four countries (Greece, Botswana, Swaziland, Zimbabwe) had a mean vegetable intake that was aligned with the WHO recommendation for prevention of NCDs (14). This equates to only 0.4% of the global adult population consuming adequate vegetables for optimum health. Data from population-based studies in high-income countries are consistent with such broader findings from the GBD Study. For example, the 2004 Canadian community health survey revealed that 74% of Canadians aged 2 years and over, and 46% of children aged 2-3 years, consumed less than the recommended daily number of servings of vegetables and fruit (15). Similarly, data from the 2016 Health Survey for England (HSE), found that 74% of adults and 84% of children were not eating the recommended five portions of fruit and vegetables per day (16).

AUSTRALIAN DIETARY GUIDELINES

The most recent Australian Dietary Guidelines were released by the National Health and Medical Research Council in 2013 (7). The guidelines include five principal recommendations for healthy eating across all age groups and are consistent with the five WHO recommendations. The principal recommendations have been translated into 'The Australian Guide to Healthy Eating' (AGHE), a resource which recommends the specific quantity of each food group to be consumed each day, based on gender, age group and

activity level (See Table 1.7) (7). The 'Australian Guide to Healthy Eating' five core food groups include i) Vegetables & legumes/beans, ii) Fruit, iii) Breads and cereals, iv) Meat and meat alternatives, and v) Dairy foods. In addition to the five core food groups the AGHE also includes specific recommendations regarding the consumption of 'Discretionary' foods (or 'extra foods'); foods that are energy dense and contain few micronutrients and high amounts of fat and/or sugar and/or salt (7). The AGHE recommends that Australians limit the consumption of discretionary foods, and for example, recommends that adults consume discretionary foods only occasionally and in small amounts (7).

Table 1.7 The AGHE daily food group recommendations for each age group and sex.

Recommended average daily number of serves from each of the five food groups*						Additional serves for taller or more active men and women
	Vegetables & legumes/beans	**Fruit**	**Breads & cereals**	**Meat & meat alternatives**	**Dairy foods**	**Approx. number of additional serves from the five food groups or discretionary choices**
Men						
19-50	6	2	6	3	2 ½	0-3
51-70	5 ½	2	6	2 ½	2 ½	0-2 ½
70+	5	2	4 ½	2 ½	3 ½	0-2 ½
Women						
19-50	5	2	6	2 ½	2 ½	0-2 ½
51-70	5	2	4	2	4	0-2 ½
70+	5	2	3	2	4	0-2
Pregnant	5	2	8 ½	3 ½	2 ½	0-2 ½
Lactating	7 ½	2	9	2 ½	2 ½	0-2 ½

Recommended average daily number of serves from each of the five food groups*						Additional serves for taller or more active boys and girls.
	Vegetables & legumes/beans	**Fruit**	**Breads & Cereals**	**Meat & Meat Alternatives**	**Dairy Foods**	**Approx. number of additional serves from the five food groups or discretionary choices****
Toddlers **						
1-2	2-3	½	4	1	1-1½	

Boys						
2-3	2 ½	1	4	1	1 ½	0-1
4-8	4 ½	1 ½	4	1 ½	2	0-2 ½
9-11	5	2	5	2 ½	2 ½	0-3
12-13	5 ½	2	6	2 ½	3 ½	0-3
14-18	5 ½	2	7	2 ½	3 ½	0-5
Girls						
2-3	2 ½	1	4	1	1 ½	0-1
4-8	4 ½	1 ½	4	1 ½	1 ½	0-1
9-11	5	2	4	2 ½	3	0-3
12-13	5	2	5	2 ½	3 ½	0-2 ½
14-18	5	2	7	2 ½	3 ½	0-2 ½
Pregnant	5	2	8	3 ½	3 ½	0-3
Breastfeeding	5 ½	2	9	2 ½	4	0-3

** Includes an allowance for unsaturated spreads or oils, nuts or seeds (4 serves [28-40g] per day for men less than 70 years of age; 2 serves [14-20g] per day for women and older men. ** Additional serves for more active, taller or older children and adolescents*

PREVALENCE OF ADULT AND CHILD ADHERENCE TO AUSTRALIAN DIETARY GUIDELINES

Australian Adults

Routine prevalence data regarding population dietary intake in Australia is collected via 'The Australian Health Survey' (AHS). The AHS is a national health survey conducted by the Australian Bureau of Statistics (ABS) in all states and territories.

The NHS is designed to collect information about the health of Australians broadly including: the prevalence of long term health conditions (including two NCDs: cancer and diabetes); NCD risk factors (smoking, alcohol consumption, physical inactivity, consumption of fruit and vegetables, waist circumference, and overweight and obesity); the use of health services; and demographic and socioeconomic statistics (17). The NHS has been conducted in 1989-90, 1995, 2001, 2004-05, 2007-08, 2011-12, 2014-15 and 2017-18. The 2017-18 NHS was completed by over 21,000 participants. Data from each NHS is publicly available online (17).

As part of the AHS, population food intake data is collected via two surveys i) the 'National Health Survey' (NHS)(17) and ii) the National Nutrition and Physical Activity Survey (NNPAS) (18). Both surveys collect food intake data via 24-hour dietary recalls, collected either face-to-face or via telephone.

The NNPAS has only been included in the AHS on two occasions; 2011-13 and in 1995 (18). The most recent NNPAS (2011-2013) involved over 12,000 participants and collected detailed information on dietary intake and foods consumed via 24-hour dietary recalls over the telephone. The NNPAS reports on consumption of all five core AGHE food groups, unlike the NHS which only reports on fruit and vegetable intake. The prevalence of Australian adults meeting the Australian Dietary Guidelines from this NNPAS data is presented in Table 1.8 (18).

Table 1.8 The proportion of Australian adults meeting the recommended daily intake of the AGHE core food groups in 2012 (18)

	% of Australian adults who met recommendation					
	Males			Females		
Food Group	**19 years+**	**19-50 years**	**50-70 years**	**19 years+**	**19-50 years**	**50-70 years**
Vegetables & Legumes/beans	3.5%	6.0%	9.6%	5.2%	4.2%	7.4%
Fruit	29.3%	25.9%	32.8%	23.0%	20.0%	27.2%
Breads & Cereals	33.4%	34.7%	24.5%	24.4%	8.5%	38.9%
Meat & Meat Alternatives	20.9%	17.5%	29.5%	13%	5.3%	27.7%
Dairy	10.1%	13.9%	5.4%	3.5%	6.0%	1.0%

Findings from the NNPAS survey indicates that over 90% of Australian adults did not meet daily recommended intakes of each of the five core AGHE food groups (Table 1.7), only 8.3% met the daily recommendations for vegetables and 48.3% met the daily recommendations for serves of fruit (18). A total of 5.6% of Australian adults met the daily recommendations for both fruit and vegetables (18).

Findings from the 2017-18 NHS data show that half (51.3%) of Australian adults met the guideline for daily fruit consumption and 7.5% of adults met the daily recommendation for vegetable intake (17). Based on data from these two surveys, the proportion of Australian adults meeting the daily recommended serves of both fruit and vegetables remained steady during the 6-year period from 2012 (18) to 2018 (17).

Australian Children

Among Australian children, adherence to national dietary guidelines has been found to vary based on the specific food group and the age of the child (Table 1.9). The 2012 NNPAS found that only 1% of boys aged 2-3 years met daily recommendations for vegetable intake while 79.7% met daily fruit intake compared to 0% and 61.8% respectively for boys aged 4-8 years (18). Similarly, for girls aged 2-3 years, only 0.1% met the daily recommendations for vegetable intake and 76.0% for daily fruit intake, compared to 0.0% and 56.7% for vegetables and fruit respectively among girls aged 4-8 years (18).

Data from the 2017-18 NHS indicated that only 6.3% of children aged 2-17 years met the daily recommendation for vegetable intake and 73.0% met the daily recommendations for fruit (17). Furthermore, in 2017-18, only 6.0% of children of all ages met the daily recommended intake for both vegetables and fruit (17). The NHSS and NNPAS data show that since the surveys commenced in 1989, Australian children have consistently consumed inadequate serves of vegetables and fruit (17, 18).

Table 1.9 Percent of Australian children meeting recommended daily intake of the AGHE core food groups in 2012 (18)

	% of Australian children who met recommendations					
	Boys			Girls		
Food Group	**2-3 years**	**4-8 years**	**2-18 years**	**2-3 years**	**4-8 years**	**2-18 years**
Vegetables & Legumes/beans	1.0%	0.0%	3.5%	0.1%	0.0%	0.3%
Fruit	79.7%	61.8%	46.5%	76%	56.7%	46.0%
Breads & Cereals	26.0%	58.4%	39.5%	13.5%	40.0%	26.3%
Meat & Meat Alternatives	15.9%	0.4%	7.6%	5.9%	0.1%	1.3%
Dairy	70.3%	26.3%	19.6%	60.3%	40.2%	20.2%

Given the significant health and economic burden of dietary risk factors on the population, and given the large proportion of the population that do not meet dietary guidelines, public health strategies and initiatives to reduce the prevalence of such risk factors in the community are urgently needed (9).

THE OPPORTUNITY TO IMPROVE DIET IN EARLY CHILDHOOD

The early childhood years, defined as birth to five years of age, have been recognised by the WHO as an important time in the development of dietary food habits and preferences (9). A 2012 systematic review that included 11 papers from five British and European longitudinal studies, found significant associations between dietary behaviours in early childhood and dietary behaviours subsequently in adulthood (19). The studies were published between 1997 and 2009, and the number of participants ranged from 500 to 3,596, with follow-up study periods ranging from 6 to 24 years (19). The review's findings confirmed that early childhood is a fundamentally important period for establishing healthy eating patterns and supporting and maintaining healthy eating behaviours as children develop. Given this, the WHO and governments internationally recommend implementing dietary guidelines in community and clinical settings that young children access as a way to support the development of healthy eating behaviours in young children (20). These recommendations are relevant to childcare centres as key public institutions with specific responsibility for caring for and educating large numbers of young children.

THE CHILDCARE SETTING

Childcare centres are a recommended setting for the implementation of dietary guidelines to improve child diet (9). Such centres provide care and supervision for children, typically from the age of six weeks to six years, and include preschools, long daycare services and kindergartens (21). In most developed countries the childcare setting provides access to a large proportion of young children who spend a considerable amount of their time within the setting. In the US, approximately one third of children aged 5 years or younger attend centre based childcare services (22). In the UK in 2011, 90% of children aged 3-4 years and 55% of children aged 0-2 years, were enrolled in childcare services (23). In Canada during 2011, almost half (46%) of all parents with children aged 4 years and under, reported using centre based childcare. The latest available Australia data show that 1.9 million children aged up to 6 years (52%) attend some type of childcare (24) for an average of 18 hours per week (25). Australian preschool and kindergarten services are typically open for less than eight hours per day, five days per week, whereas long day care services are open for more than eight hours per day, five days per week (21). Over 40% of children attending formal care are enrolled at a preschool or long day care centre (24). Given the large proportion of young children that are attending centre based childcare services, interventions within this setting to improve the provision of food consistent with

dietary guidelines is likely to reach a large and representative segment of the population, at a critical point in the development of their lifelong dietary patterns. The following section describes a number of reasons that support the implementation of dietary guidelines in childcare settings.

EVIDENCE SUPPORTS THE ABILITY OF CHILDCARE SERVICES TO IMPROVE CHILD DIET

Evidence suggests that childcare based nutrition interventions have the potential to positively influence children's dietary intake while in care. A 2017 review of reviews identified six systematic reviews that examined childcare based interventions to improve child diet (28). Table 1.10 summarizes six included reviews the findings of which suggest that improving the childcare environment can improve the diet of children in care. Collectively, findings from the included studies suggest that intervention strategies such as provision of a nutrition curriculum, professional development for staff and nutrition resources can positively influence children's intake of core food groups while in care.

Table 1.10 Systematic review evidence that demonstrates that improvements in the childcare environment can influence children's diet while in care (28).

First Author, year	Evidence of study effectiveness
Mikkeleson 2014 (29)	The review included 8 single strategy studies (2 RCT, 4 quasi-experimental, 1 pre-post, 1 randomised crossover trial). 8/8 interventions positively influenced diet. Example intervention: Serving unfamiliar vegetables repeatedly over a 6 week period.
	The review included 11 educational interventions (5 RCT, 1 cluster RCT, 4 quasi-experimental, 1 pre-post). 1/11 interventions demonstrated a statistically significant increase in fruit and vegetable consumption. Example intervention: Education sessions and interactive classroom activities.
	The review included 7 multicomponent interventions (4 RCT, 2 cluster RCT, 1 quasi-experimental): 6/7 interventions had a significant positive impact on children's consumption of fruit and vegetables and the remaining study found a positive impact on children's intake of fruit, however not vegetables. Example intervention: Professional development for childcare service staff, provision of resources and the provision of health food messages to parents via newsletters.
Hesketh 2010 (30)	The review included 3 studies (2 RCT, 1 non randomised control trial) that targeted diet in the childcare setting. 1/3 interventions demonstrated a positive impact on child diet (a significant decrease in saturated fat consumption), while the effect of the remaining 2 interventions was unclear. Example intervention: Staff professional development and action planning.
Sisson 2016 (31)	The review included 45 intervention studies which included at least one measure of dietary behaviour as an outcome. Of these, 39 studies had a positive change on at least one nutrition outcome. The evidence from these RCTs, quasi-experimental, pre-post and non-experimental studies suggests that interventions focused on the childcare environment (e.g. Educational curriculums for children, provision of resources, enhancing the childcare service environment, policies, practices and menus) found positive effects on child nutrition.
Ward 2015 (32, 33)	Evidence from 5 included studies (1 RCT, 2 pre-post, 2 quasi-experimental) suggests that children's eating behaviours during care are positively influenced when educator's implement recommended practices during mealtimes. Practices included the use of non-food rewards, encouraging children to 'try one bite', modelling (silent and enthusiastic), allowing children to self-select food rather than serving pre-portioned foods; positive verbal reinforcement and serving fruits and vegetables before other foods.
Zhou 2014(34)	Evidence from 13 included studies (12 cluster RCT, 1 non-randomised control trial) suggests that nutrition interventions with components such as structured nutrition education sessions for children (for example cooking classes and games) positively influenced children's dietary intake and eating habits (a higher intake of fruit and vegetables, consuming a lower percentage of calories from saturated fat.

Laws 2014(35)	The review included 7 studies (6 RCT, 1 quasi-experimental). None of the included studies had a significant positive impact on child diet. The review suggested that parental engagement in the intervention is a critical factor to the success of interventions in the childcare setting.

DELIVERY OF DIETARY INTERVENTIONS IS CONSISTENT WITH CHILDCARE SERVICE OPERATIONS, INFRASTRUCTURE AND ACCREDITATION REQUIREMENTS

Childcare services have existing infrastructure to facilitate, support and promote the development of healthy eating behaviours within children. Furthermore surveys of childcare service staff indicate that they perceive that creating supportive environments conducive to healthy eating is a core part of their role (36, 37). Operational aspects of childcare services, such as the daily meal and snack times, provide staff explicit opportunities to promote healthy eating behaviours, expose children to new foods and provide education on healthy eating. In addition, internationally, childcare services are required to comply with accreditation requirements and quality standards that promote the health, safety and physical development of children in their care. These typically include a quality standard regarding food provision or encouraging services to provide foods consistent with sector menu dietary guidelines (described in the next section of this chapter). In the UK, one of the fourteen mandatory standards for the sector states that "children are to be provided with regular drinks and food in adequate quantities for their needs. Food and drink must be properly prepared, nutritious and comply with dietary and religious requirements" (38). In the US, the presence of quality standards relating to food provision vary from state to state, and similarly in Canada the standards vary between regions, however they all support services to encourage healthy eating (39-41).

In Australia, the 'Australian Children's Education & Care Quality Authority' (ACEQUA) has set a national benchmark, the National Quality Standard (NQS), for all childcare services (42). The NQS includes seven quality areas and is mandatory for all Australian licensed childcare services in order to receive sector accreditation. Quality area 2, 'Children's Health and Safety', directly relates to food provision and states that "healthy eating and physical activity are promoted and appropriate for each child". Through this requirement, childcare services are mandated to provide foods consistent with the Australian Dietary Guidelines. As such, centre based childcare represents an opportunity to positively impact on the food intake of children, and to potentially influence the development of life long healthy eating habits.

CHILDCARE CENTRE MENU DIETARY GUIDELINES

For the reasons described above and in response to the WHO principles for the prevention

and control of chronic diseases, many countries have developed sector specific menu dietary guidelines aligned with their national dietary guidelines that support the provision of healthy foods to children in centre based childcare. These guidelines are designed to be used by childcare service staff when planning their service menus.

CHILDCARE MENU DIETARY GUIDELINES: INTERNATIONALLY

A summary of menu-planning guidelines for childcare services in four high income countries is shown in Table 1.11. Broadly all guidelines require childcare services to provide food consistent with the national guidelines within that country. In the US, despite variations in State regulations, it is recommended by the American Dietetic Association (ADA) that the sector menu dietary guidelines align with the benchmarks outlined by the ADA. Specifically, childcare services should aim to provide 50-70% of a child's total daily allowance during eight hours of care, via one main meal and two snacks (43). It is recommended that childcare services provide foods from the core food groups and in appropriate portion sizes consistent with the Dietary Guidelines for Americans (43).

The menu dietary guidelines for childcare centres in the UK are outlined in the "Eating Well for Under 5's in Childcare: Practical and Nutritional Guidelines" resource (44). The resource was originally produced in 1998 and updated and re-released in 2014. The nutrient-based guidelines require childcare centres to provide children with 70% of their total daily dietary requirements during 8 hours of care. The standards encourage services to provide specific serves of each of the core food groups that are included in the UK dietary guidelines, at different meal times throughout the day to ensure children's nutritional needs are met. For example, it is recommended that childcare services provide different types of fruits and vegetables to children at each meal and snack occasion, and that children should be given the opportunity to try four to five different fruits and vegetables over an 8-hour day. Similarly, milk and milk products should be offered at two to three meal and snack occasions throughout the day. The "Eating Well for Under 5's in Childcare" resource provides a comprehensive overview of the nutrient-based standards for food prepared and provided in childcare, as well as some practical menu planning recommendations and a variety of sample menus that meet the nutrient based standards (44).

Table 1.11 Childcare sector menu dietary guidelines.

COUNTRY	CHILDCARE SECTOR MENU DIETARY GUIDELINE
Australia (45)	Childcare sector guidelines recommend services provide at least 50% of children's recommended daily dietary intake of the five core food groups, during 8 hours of care via one main meal and two snacks, based on the national dietary guidelines. Specific serves of core food groups vary across states.
US 2016 (43)	The American Dietetic Association recommends that centre based childcare services provide meals and snacks that make up 50% to 70% of the child's recommended daily allowance (RDA) during 8 hours of care.
United Kingdom 2016 (44)	The UK Food Standards Agency recommends centre based childcare services provide 70% of children's daily dietary requirements while in 8 hours of care, via two main meals and two snacks.
Canada (46)	Nutrition guidelines vary across provinces. Some provinces (including Alberta, New Brunswick and Saskatchewan) recommend each main meal includes food items from each of the four "Canada's Eating Well with Canada's Food Guide" core food groups and snacks include food items from at least two of the core food groups. Others (including Nova Scotia) define a specific number of serves per day from each of the four core food groups.

CHILDCARE MENU DIETARY GUIDELINES: AUSTRALIA

In Australia, childcare service menu dietary guidelines vary between states and territories. Each specify that childcare services are required to provide sufficient amounts of core food groups and no discretionary foods consistent with the Australian Dietary Guidelines, however variations exist regarding the specific quantities of each food group to be provided to children while in care. The number of serves of each food group for three states and 1 territory are shown in Table 1.12. In NSW, guidance on food provision during care is provided via the Caring for Children (CFC) Handbook published in 2014 (45), which recommends that childcare menus must provide approximately 50% of the recommended daily serves of the five food groups specified in the Australian Guide to Healthy Eating (AGHE) across a two week menu cycle (10 days), depending on number of hours attending care. The CFC resource also provides a range of tools to assist the service to plan a compliant menu such as a menu planning checklist, recipes and budgeting fact sheets.

The Victorian childcare sector menu dietary guidelines were released in 2014 by the Healthy Eating Advisory Service (HEAS). The HEAS is an advisory service provided by experienced nutritionists and dietitians at Nutrition Australia Victoria (VIC) division. They assist organisations to provide and promote healthier foods and drinks to improve the health of all Victorians (47). The Victorian guidelines are almost identical to those from NSW (see table 1.12) and focus on the provision of the five core AGHE food groups.

However for some food groups (fruit; lean meat and poultry; milk, yoghurt, cheese and alternatives) they provide portion recommendations in child portion sizes, which are typically half the serving of a standard adult AGHE portion size. Similar to the NSW resources, the HEAS have also developed menu planning checklists and sample compliant service menus to support childcare services to provide foods in line with the sector menu dietary guidelines. The South Australian sector guidelines are in alignment with the NSW guidelines and are included in Table 1.12.

The Northern Territory (NT) sector menu dietary guidelines were updated and released in 2016 by the NT Government Department of Health. The guidelines are again in alignment with those of NSW, with the exception of two core food groups (meat and vegetables), where services are required to provide children aged greater than 3 years slightly more serves than younger children (48). The NT government developed a menu-planning checklist for services, which details the recommended number of serves for each food group and what constitutes a serve of each food group. The checklist also provides a menu-planning template.

Four states and territories, Queensland (QLD), Western Australia (WA), Tasmania (TAS) and the Australian Capital Territory (ACT), have not yet developed any specific sector menu dietary guidelines or resources to assist childcares services to plan compliant menus. However, these states and territories encourage childcare services to provide children with 50% of their daily food group requirements via two snacks and one main meal, as per the NSW sector guidelines (45).

Table 1.12 Australian state and territory specific recommendations regarding the daily number of food group serves to provide per child attending for 8 or more hours of care.

	Recommended daily food group serves to provide per child attending for 8 or more hours of care (2–5 years old)			
	NSW	VIC	NT**	SA
Vegetables and legumes/beans	2	1-1 ½	2 (2 ½)	1
Fruit	1	1*	1 (1)	1*
Wholegrain cereal foods and breads	2	2	2 (2)	2
Lean meat and poultry, fish, eggs, tofu, seeds and legumes	0.75	1*	½ (1)	1*
Milk, yoghurt, cheese and alternatives	1	2*	1 (1)	2*

*Children's serve (typically half the serve size of a standard AGHE serve)
** Up to 3 years of age (>3 years of age)

The presence of these guidelines and implementation resources specific to the childcare sector provide a key mechanism through which to support childcare services to provide food consistent with national dietary guidelines in order to improve child diet.

IMPLEMENTATION OF DIETARY GUIDELINES IN THE CHILDCARE SETTING

Despite childcare services being an opportune and recommended setting to influence children's dietary intake, numerous studies have consistently shown that childcare services, both internationally and nationally, fail to provide foods that are consistent with menu dietary guidelines. A study conducted in the US with 92 childcare services, found that while 77% of services used or referred to menu dietary guidelines in the menu planning process, only 14% of services had menus that provided sufficient total energy (49). Another US study analyzed lunch menus from 83 childcare centres in Oklahoma and concluded that the menus did not provide sufficient carbohydrates, dietary fibre, iron, Vitamin D or Vitamin E, and provided excessive sodium (50). One English study, assessed menus from 118 nurseries and found that all service menus failed to comply with sector menu dietary guidelines (51). Furthermore, in 2014 researchers in New Zealand reviewed 57 childcare menus and scored them for compliance against guidelines for food quantity, variety, and quality, and for the frequency 'occasional' foods were listed on the menu (52). Only three service menus (5%) met all ten scoring criteria (mean 6.8/10), indicating that majority of childcare menus do not meet sector menu dietary guidelines (52).

In Australia, research suggests that very few childcare services comply with sector menu dietary guidelines (53). For example, in the Hunter New England region of NSW, a 2012 menu audit of 46 long day care service menus found that no service provided food that was compliant with the sector menu dietary guidelines (54). In particular, compliance with the vegetable guidelines was very poor with no services (0%) providing children with the recommended serves from this food group (54).

BARRIERS RELATED TO THE IMPLEMENTATION OF NUTRITION GUIDELINES IN THE CHILDCARE SETTING

In order to improve the implementation of menu dietary guidelines in this setting to positively impact child diet, a better understanding of the factors that impede dietary guideline implementation is required. There is a growing body of research internationally and within Australia that seeks to identify and investigate barriers to dietary guideline implementation (37, 55-60). However, to date there has been no formal synthesis of these study findings in a systematic review of barriers to menu guideline implementation within the childcare sector, a significant gap in the evidence.

INTERNATIONAL EVIDENCE

A systematic review of the literature (unpublished) conducted by the candidate identified three studies outside of Australia that investigated barriers to the implementation of child care sector menu dietary guidelines. The studies were conducted in the US, UK and New Zealand with childcare service providers and directors. One of the surveys was quantitative and investigated barriers using an online survey completed by 257 childcare directors in New Zealand (57), one study in the UK utilised both a written survey and interviews with 194 childcare providers (56), the third study was qualitative and investigated barriers via semi-structured interviews with nine childcare centre directors in the US (55). All three studies identified barriers relating to individual characteristics of service staff responsible for the provision of foods, as well as structural or environmental barriers.

Specifically, the three studies identified that service cooks had limited nutrition knowledge and limited skills to plan a menu that is compliant with sector menu dietary guidelines (55-57). The semi-structured interviews conducted in a study by Briley et al also identified that service cooks had a poor understanding of the sector menu dietary guidelines and that they lacked confidence in their skills to plan compliant menus. In addition, the other two studies identified that a lack nutrition training for staff influenced the provision of healthy foods consistent with dietary guidelines (56, 57). The consistency of these findings across different countries and service structures (two of the three studies were conducted in centre based childcare services, and the third conducted within private nurseries) suggest that limited staff knowledge may be significant barrier to the implementation of sector menu dietary guidelines.

The studies also highlighted several structural and environmental barriers that impact on the implementation of the child care menu dietary guidelines. Gerritsen et al identified insufficient budget and a lack of support from parents and families in regards to the provision of healthy foods as important barriers to such implementation(57). Moore also reported that the limited availability of practical menu planning resources adversely affected guideline implementation (56), and Briley et al highlighted that food service staff were only employed for limited hours due to budget restrictions limiting the time available for menu planning (55).

AUSTRALIAN EVIDENCE

The literature review identified only one Australian study that investigated barriers to menu dietary guideline implementation within childcare centres. A 1996 telephone survey with 330 coordinators of Western Australian childcare services (58) identified similar barriers as were reported in the international literature, such as a lack of nutrition knowledge and skills among childcare service staff, and limited resources. For example, the study found that 20% of service staff surveyed had no formal training in nutrition, and 72% of coordinators identified that they lacked nutrition resources to use when planning service menus (58).

The review of the literature suggests that, despite a limited number of studies, both individual and environmental factors have been consistently identified to impede the implementation of the sector menu dietary guidelines. However, the existing literature is limited by the absence of studies describing the nature and prevalence of barriers utilising an accepted theoretical framework. The use of implementation theories or frameworks are recommended to provide a comprehensive identification of barriers to recommended provider behaviours and to help identify behaviour change strategies to address such barriers and hence to support guideline implementation (61).

IMPLEMENTATION THEORIES AND FRAMEWORKS

A number of theories and frameworks have been developed that describe the domains and characteristics that are considered to be important for the implementation of policies, practices and guidelines (61, 62). The use of comprehensive theoretical frameworks, particularly those operating at multiple levels within complex systems (i.e. the individual level and the organisational level), has been recommended to guide the development of

implementation interventions (61). A number of selected implementation frameworks that are commonly used are described below and include capacity building frameworks such as the Diffusion of Innovation Theory, the Consolidated Framework for Implementation Research (CFIR), and the Theoretical Domains Framework (TDF).

The Diffusion of Innovation (DOI) Theory, developed in 1962, aims to explain how an innovation or program can gain momentum overtime and diffuse throughout a target population, ending in the uptake of the innovation or program by those within the target population (63). The DOI covers four key constructs; the innovation, the communication channel, time, and the social system, and identifies five adopter categories into which people typically fall (innovators; early adopters; early majority; late majority; laggards). The DOI proposes that different strategies must be used to appeal to people in each category (63). Limitations of the DOI include that it was not developed to explicitly apply to the adoption of new health behaviours or health innovations. In addition, it does not take into account an individual's resources or social support to adopt a new program or innovation (63).

The Consolidated Framework for Implementation Research (CFIR), developed in 2009 integrates 19 implementation theories and is composed of five major domains that have been identified as influential in successful intervention implementation: intervention characteristics, the outer setting (i.e. patient needs and resources; peer pressure; external policies and incentives), the inner setting (i.e. structural characteristics; networks and communications; culture; implementation climate), and characteristics of the individuals involved and the process of implementation (64). The CFIR addresses some of the limitations of the DOI by giving greater consideration to the characteristics of the individual including their self-efficacy, knowledge and beliefs about the interventions and how they interact with their environment, as well as considering the outer setting for implementation.

The Theoretical Domains Framework (TDF) is a comprehensive implementation framework that aims to synthesize behaviour change constructs covered in 33 theoretical models or frameworks, that may either enable or impede the implementation of evidenced-based practices and guidelines (65, 66). The TDF was developed using a rigorous consensus and validation process and expands on the DOI and CFIR as it covers a very broad range of current scientific constructs of human behaviour (65, 66). The initial version of the framework published in 2014 described 12 domains; however further

construct validation research led to a 14 domain framework that is suggested to more comprehensively describe relevant behaviour change constructs (65, 66).

Applying theoretical frameworks such as those described above to the development of interventions to enhance guideline implementation can assist researchers and practitioners to better understand: the factors that may influence the implementation behaviours being targeted; the strategies that may be effective at eliciting behaviour change; and the mechanism by which these strategies may work (67). However, very few theoretical frameworks have comprehensively psychometrically evaluated tools that can be used to assess the extent to which an intervention takes into account or acts on each construct in various settings (68). The lack of such measures/tools limits the utility and application of such frameworks and their ability to inform the design of strategies to enhance the implementation of guideline recommendations, and the e conclusions that can be drawn regarding the key constructs influencing the behaviour change of interest (68). Furthermore, there is no such tool that has been developed and validated for use specifically in the childcare setting.

While a number of non-validated tools have been used in the childcare setting to identify factors associated with guideline implementation, the range of implementation constructs assessed in such studies has been limited, tending to focus on individual constructs such as staff knowledge and skills and attitudes rather than organisational constructs or those of the outer or inner settings (69-72). In order to design more effective implementation interventions, a greater understanding of the broad constructs which influence the implementation of the menu dietary guidelines in the childcare setting is required. The development of a specific tool to assess implementation constructs within the childcare setting would represent an advancement in implementation science in this context and would support the development of more effective implementation interventions.

PREVIOUS INTERVENTIONS TO SUPPORT CHILDCARE SERVICES TO IMPLEMENT THE SECTOR MENU DIETARY GUIDELINES

Few trials have been reported that have investigated how to best support childcare services to implement menu dietary guidelines. A 2016 systematic review of strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programs within childcare services identified eight studies (73)(See

appendix 1.1). Although two of these studies aimed to improve the provision of healthy food within childcare services, only one specifically sought to improve the implementation of the menu dietary guidelines (53).

This two-year study employed a quasi-experimental design and compared 240 childcare services from the Hunter New England region of NSW receiving an intervention with 191 control services from the remaining regions of the state. The study aimed to evaluate the impact of a multi-component implementation intervention designed to introduce policies and practices supportive of healthy eating, including increasing service menu compliance with menu dietary guidelines. The intervention was based on practice change and capacity building theoretical frameworks, including the DOI. Strategies included: the provision of resources and training to childcare service staff; securing executive support; performance monitoring and feedback; and ongoing follow up support via telephone calls and newsletters (53). At follow-up, relative to the control group, child care services receiving the intervention had significantly reduced the provision of sweetened drinks, and had significantly increased the provision of fruit and vegetable serves. There was no change to the provision of processed food items that were high in fat, salt and/or sugar (53).

Findings from this study suggest that strategies such as resource provision, performance monitoring and feedback, ongoing support and professional development opportunities may be effective in changing food provision in line with the sector menu dietary guidelines (53). This study demonstrated that it was possible to positively shift the provision of foods to be more closely aligned with the menu dietary guidelines. As such, the study contributed important evidence to the field given the large number, and representativeness of participating childcare services. However, the trial did not employ a randomised design, limiting the ability to account for secular trends and events and existing confounders. Furthermore the primary trial outcomes of guidelines implementation relied on self-reported recipe and nutrient data from the service staff which could be subject to recall and response bias. Additional observation and weighing of foods to assess food provision are likely to increase accuracy of outcome assessment. Further, the impact of guideline implementation on child diet was not assessed, as such little is known about the impact of implementing dietary guidelines on child diet (53).

CHAPTER CONCLUSION

Dietary risk factors impose a significant economic and health burden on the community. These risk factors are common from an early ag. As dietary risk factors track from early childhood into adulthood, implementing dietary guidelines into childcare settings represents a promising strategy to improve the health of the population. Given the opportunity presented by the childcare setting to improve the diets of the children that attend care, the low levels of guideline implementation and lack of implementation design tools and interventions to address such barriers, this thesis presents a number of studies investigating opportunities for enhancing the implementation of menu dietary guidelines in childcare services.

THESIS AIMS

The specific chapters of this this and their respective aims are as follows:

Chapter 2 - To comprehensively review and synthesize the literature that reports factors (barriers and/or enablers) which influence the implementation of menu dietary guidelines within the childcare setting.

Chapter 3 – To describe the psychometric properties of a tool based on the Theoretical Domains Framework that assesses factors that influence the implementation of menu dietary guidelines in the childcare setting.

Chapter 4 - To comprehensively describe the study methods of a Randomised Controlled Trial of an intervention to improve the implementation of menu dietary guidelines in the childcare setting (Study protocol).

Chapter 5: To describe the effectiveness of an intervention to improve the implementation of menu dietary guidelines in the childcare setting and the impact on service-level child food intake while in care.

Chapter 6: To describe the impact of improving the implementation of menu dietary guidelines in the childcare setting on individual child food intake while in care.

Chapter 7: To summarize the overall results of the studies and discuss research and practice implications.

THESIS STRUCTURE

This thesis includes a series of papers that are published or submitted for publication, and conforms to the University of Newcastle rules regarding thesis submission by publication. Following this introductory Chapter, the subsequent Chapters, which address the thesis aims are as follows;

Table 1.13 Thesis chapters and publications

CHAPTER	CHAPTER TITLE	RESEARCH AIMS	RESEARCH PAPERS
Two	Factors that influence the implementation of dietary guidelines regarding food provision in centre based childcare services: A systematic review	To describe factors (barriers and facilitators) that may influence the implementation of menu dietary guidelines regarding food provision in childcare services and to map these factors to a theoretical framework.	**Seward K**, Finch M, Yoong S, Wyse R, Jones J, Grady A, Wiggers J, Nathan N, Conte K & Wolfenden L. Factors That Influence the Implementation of Dietary Guidelines Regarding Food Provision in Centre Based Childcare Services: A Systematic Review. Preventive Medicine. 2017;105:197-205.
Three	Measuring implementation behaviour of menu guidelines in the childcare setting: Confirmatory Factor Analysis of a Theoretical Domains Framework Questionnaire (TDFQ).	To develop and psychometrically assess a scale measuring each domain of the Theoretical Domains Framework for use in assessing the implementation of dietary guidelines within a non-health care setting (childcare services).	**Seward K**, Wolfenden L, Wiggers J, Finch M, Wyse R, Oldmeadow C, Presseau J, Clinton-McHarg T & Yoong S. Measuring implementation behaviour of menu guidelines in the childcare setting: Confirmatory Factor Analysis of a Theoretical Domains Framework Questionnaire (TDFQ). International Journal of Behavioural Nutrition and Physical Activity. 2017;14:45.
Four	A multi-strategy childcare-based intervention to improve compliance with nutrition guidelines versus usual care in long day services: a study protocol for a randomised controlled trial.	To describe the development of a multi-strategy childcare-based intervention to improve compliance with nutrition guidelines in long day care services.	**Seward K**, Yoong S, Finch M, Wiggers J, Wyse R, Jones J, Gillham K & Wolfenden L. A multi-strategy childcare-based intervention to improve compliance with nutrition guidelines versus usual care in long day services: a study protocol for a randomised controlled trial. BMJ Open. 2016; 6.
Five	Improving the implementation of nutrition guidelines in childcare centres improves child dietary intake: Findings of a randomised trial of an implementation intervention	To assess, relative to usual care, the effectiveness of a multi-strategy implementation intervention in improving childcare compliance with nutrition guidelines.	**Seward K**, Wolfenden L, Finch M, Wiggers J, Wyse R, Jones J & Yoong S. Improving the implementation of nutrition guidelines in childcare centres improves child dietary intake: Findings of a randomised trial of an implementation intervention. Public Health Nutrition. 2018; 21:3:607-617. DOI: 10.1017/S1368980017003366.

CHAPTER	CHAPTER TITLE	RESEARCH AIMS	RESEARCH PAPERS
Six	The impact of a childcare food service intervention on child dietary intake in care: an exploratory cluster randomised controlled trial	To assess the efficacy of a multi-strategy implementation intervention designed to increase provision of foods consistent with menu dietary guidelines on child consumption of fruit, vegetables, breads/cereals, meat/alternatives, dairy, and diet quality in care.	Yoong S, Grady A, **Seward K**, Finch M, Wiggers J, Lecathelinais C, Wedesweiler T & Wolfenden L. The impact of a childcare food service intervention on child dietary intake in care: an exploratory cluster randomised controlled trial. American Journal of Health Promotion. Accepted 21st February 2019.
Seven	A summary of thesis findings and implications for future research, policy and practice.	To provide recommendations for future research and practice regarding increasing the implementation of menu dietary guidelines in childcare services.	**N/A**

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CHAPTER 2

Factors that influence the implementation of dietary guidelines regarding food provision in centre based childcare services: A systematic review

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ABSTRACT

BACKGROUND

Children attending centre based childcare services consume as much as two thirds of their daily dietary requirements while in care. However, such services often fail to provide foods that are consistent with guideline recommendations. Developing strategies to improve childcare service adherence to menu dietary guidelines requires a comprehensive understanding of factors that may impede or promote implementation. The primary aim of this systematic review is to describe factors (barriers and facilitators) that may influence the implementation of menu dietary guidelines regarding food provision in centre based childcare services and to map these factors to a theoretical framework.

METHOD

Over 7000 citations were identified from all sources. Duplicate abstracts were removed and selection criteria applied. Twelve studies (1994-2015) were included in the review. Dual data extraction was conducted and the reported factors were synthesised using the theoretical domains framework (TDF).

RESULTS

Barriers and facilitators identified in qualitative studies were classified into eight and ten of the 14 TDF domains. Barriers and facilitators reported in quantitative studies covered six and three TDF domains respectively. The most common domain of which both barriers and facilitators to the implementation of menu dietary guidelines were identified was 'environmental context and resources'.

CONCLUSION

This is the first study that comprehensively assesses literature to identify factors that influence the implementation of menu dietary guidelines in childcare services utilising a theoretical framework. Findings provide guidance to support researchers and policy makers design strategies to improve menu dietary guideline implementation and, as such have the potential to improve food provision in care.

BACKGROUND

Poor dietary intake is a leading modifiable risk factor for non-communicable diseases including obesity, cardiovascular disease, stroke, type 2 diabetes and some cancers (1). For children, good nutrition is essential to support healthy growth and development (2). Furthermore, dietary patterns, food habits and food preferences developed in childhood track into adulthood and can prevent the onset of non-communicable disease (3). As such, interventions to improve dietary intake in children are recommended by the World Health Organisation (1).

Centre based childcare services, which include pre-schools and long day care services (open for greater than 8 hours per day) represent an opportunistic setting to improve the dietary intake of children as they provide access to large numbers of children during a key developmental period (4). In the United States (US) and United Kingdom (UK) approximately one third of children aged five years or younger attend childcare services (5). In Australia, over 80% of children aged four to five years attend centre based childcare services (6). Furthermore, many childcare services are responsible for providing meals to children whilst in care. Children attending such services consume as much as two thirds of their daily dietary requirements while in this setting (7). The implementation of dietary guidelines in childcare services therefore, have considerable potential to improve children's dietary intake (1).

A number of countries have developed specific recommendations to support the provision of healthy foods to children in childcare services. In the US, the American Dietetic Association recommends that childcare services provide meals and snacks that make up 50% to 70% of the child's recommended daily allowance (RDA) during eight hours of care (8). The UK Food Standards Agency (9) recommends childcare services provide 70% of children's daily dietary requirements while in eight hours of care, via two main meals and two snacks. In Australian states, such as New South Wales (NSW), childcare sector guidelines (10) recommend services provide at least 50% of children's recommended daily dietary intake, during eight hours of care, based on the national dietary guidelines (2).

Internationally, however, childcare services fail to provide foods that are consistent with such guideline recommendations. An analysis of menus from 83 childcare services in the US reported that the menus did not provide the recommended amount of carbohydrates,

dietary fibre, iron, vitamin D and Vitamin E; and provided excessive amounts of sodium (11). Similar findings also have been reported in the UK. One study audited 118 menus from nurseries (enrolling children under 5 years of age) and reported that none complied with nutrition guidelines (12). In Australia, a 2012 audit of 46 menus from childcare services within NSW found that no service provided food that was compliant with nutritional guideline recommendations (13). Such findings indicate that children's nutrition requirements are not being met while in care and highlight the need for interventions to improve the implementation of dietary guidelines in this setting (14, 15).

Developing strategies to improve childcare services' compliance with menu dietary guidelines requires a comprehensive understanding of factors that may impede or promote guideline implementation. A number of studies have identified that a lack of formal training and professional development opportunities for childcare service cooks, lack of time, and the limited availability of practical and up to date menu-planning resources impede the implementation of dietary menu guidelines (16-19). The application of theoretical frameworks, such as the theoretical domains framework (TDF), to assess factors that influence implementation, ensures a broad range of implementation factors are considered. However, to our knowledge, there has been no previous systematic review, that utilised a theoretical framework to describe factors that may influence the implementation of menu dietary guidelines by childcare services. Given this evidence gap, the primary aim of this systematic review is to describe factors (barriers and facilitators) that may influence the implementation of dietary guidelines regarding food provision in childcare services and to map these factors to the TDF. Given the extensive range of factors considered within the TDF, use of this theoretical framework will reduce the likelihood that any factors influencing guideline implementation are inadvertently missed.

METHODS

TYPES OF STUDIES

Non-experimental studies, of any design, which qualitatively and/or quantitatively examined factors (barriers or facilitators) that influence the implementation of dietary menu guidelines regarding food provision in centre based childcare services were included. Such factors could include those that impede or facilitate guideline implementation. Centre based childcare services included pre-schools, nurseries, long

day care services and kindergartens that enrol children prior to compulsory schooling (typically up to the age of five to six years). To be eligible, studies needed to be conducted in or with staff reporting childcare services that provide at least one main meal to children while in care. Manuscripts or reports not published in English were excluded as were studies of childcare services provided in the home.

TYPES OF PARTICIPANTS

Study participants could include managers, cooks, or other staff, involved in the operation of childcare services. Participants also included officials from other government or non-government organisations or regulatory agencies that may influence food provision in such services.

TYPES OF MEASURES

Any factors (barriers and facilitators) that were reported to influence the implementation of dietary menu guidelines were included. Data collected via a variety of methods, including childcare service records, interviews, questionnaires or surveys completed by childcare services cooks, managers and other staff or stakeholders that may influence guideline implementation were included. For this review, a barrier was defined as "a circumstance or obstacle that keeps people or things apart or prevents communication or progress" (20) whereas a facilitator was defined as "a person or thing that makes something possible"(20).

SEARCH METHODS FOR IDENTIFICATION OF STUDIES

Electronic Searches

We searched the following electronic databases: Medline, Medline in Process, PsycINFO, ERIC, Embase and CINAHL. The search strategy included filters for the setting (childcare) as well as terms for barriers or facilitators and dietary menu guidelines using terms from previous reviews and relevant studies (21). We adapted the Medline search strategy for the other databases (see Appendix 2.1). An experienced librarian assisted with developing search terms and mapping across electronic databases.

Searching Other Resources

We searched the reference lists of all included studies for citations of other potentially

relevant studies. We conducted hand searches of all publications in the past five years in the journal 'Implementation Science'. To identify published government reports and other grey literature we searched the web-engine 'Google' using the phrase 'barriers or enablers to dietary guideline implementation in childcare'. The first 200 google citations were examined. We also contacted the authors of all included trials (n=12), and experts in the field of implementation science to identify any relevant ongoing or unpublished studies, or grey literature publications.

DATA COLLECTION AND ANALYSIS

Selection of studies

Two review authors (KS and MF) independently screened all abstracts and titles. Review authors were not blind to author or journal information. Screening was conducted using a standardised screening tool developed for the review, which was piloted before use. The tool was piloted for comprehension and consistency of application by the review authors who conducted the screening on a sample of studies examining barriers to guideline implementation prior to the execution of the search strategy. For all potentially eligible studies, we obtained the full text of manuscripts for further examination. A verbal consensus process was used to resolve any discrepancies regarding study eligibility between review authors. In instances where the study eligibility could not be resolved via consensus, a third review author was consulted for a decision (JJ).

Data extraction and management

Two review authors (KS, MF), not blind to author or journal information, independently extracted information from the included studies. The data extraction form was piloted before the initiation of the review and any discrepancies between review authors regarding data extraction was resolved by consensus and, when required, via a third review author (JJ).

We extracted the following information:

1. Study design, sampling method and size, recruitment method, inclusion/exclusion criteria, year of publication, childcare service type, country and participant/service demographics and socioeconomic characteristics.
2. Data collection method (including whether factors were prompted or not), the factors (barriers and facilitators) identified, and the validity of measures used.

3. For qualitative studies, examples of participant quotes relating to each domain.
4. For quantitative studies, any reported measure of association with the implementation of menu dietary guidelines.

Data synthesis and analysis framework

Factors reported to influence implementation were synthesised using the TDF. The TDF includes 14 theoretical domains synthesised from 33 behaviour change theories and 84 theoretical constructs in a single framework (22). Factors (barriers and facilitators) which influence the implementation of dietary menu guidelines in childcare services were extracted from included trials and were then assigned to the relevant TDF domain according to definitions pre-specified in a coding manual developed by members of the research team. See Table 2.1 for definitions of each domain and associated constructs.

The TDF coding manual was developed by two authors for the purpose of this review using the domain definitions reported by Cane et al (22) and domain definitions for the childcare setting applied in previous studies by the research team (unpublished)(See Table 2.1). Two review authors (KS and MF) independently assigned the identified factors to the TDF domains using the manual. Discrepancies in domain allocated between the two review authors were resolved by a third author (JJ). For all included studies, we reported the number of studies reporting factors assigned to each of the TDF domains. In addition, for quantitative studies, we also reported the frequency with which factors were reported in individual studies. When examined within a study, the associations between reported factors to guideline implementation and a measure of actual implementation of dietary guidelines also were reported.

Table 2.1 Theoretical Domain Framework definitions

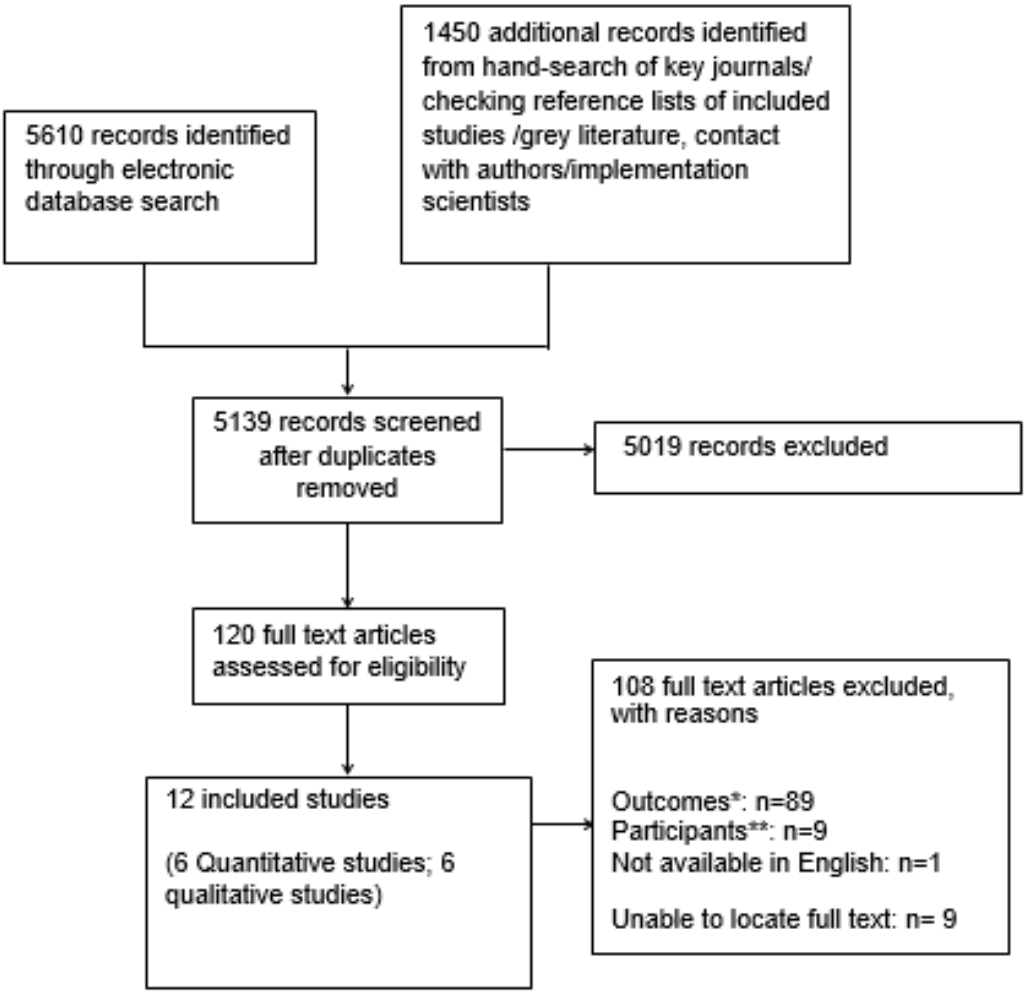
Domain	Constructs (22)	Definition (22)
1. Knowledge	Knowledge (including knowledge of condition /scientific rationale), Procedural knowledge, Knowledge of task environment	An awareness of the existence of something
2. Skills	Skills, Skill development, Competence, Ability, Interpersonal skills, Practice, Skill assessment, Coping strategies	An ability or proficiency acquired through practice
3. Professional role and identity	Professional identity, Professional role, Social identity, Professional boundaries, Professional confidence, Group identity, Leadership, Organisational commitment	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting
4. Beliefs about capabilities	Self-confidence, Perceived competence, Self-efficacy, Perceived behavioural control, Beliefs, Self-esteem, Empowerment, Professional confidence	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use
5. Optimism	Optimism, Pessimism, Unrealistic optimism, Identity	The confidence that things will happen for the best or that desired goals will be attained
6. Beliefs about consequences	Beliefs, Outcome expectancies, Characteristics of outcome expectancies, Anticipated regret, Consequents	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation
7. Reinforcement	Rewards (proximal / distal, valued / not valued, probable / improbable), Incentives, Punishment, Consequents, Reinforcement, Contingencies, Sanctions	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus
8. Intentions	Stability of intentions, Stages of change model, Trans-theoretical model	A conscious decision to perform a behaviour or a resolve to act in a certain way
9. Goals	Goals (distal / proximal), Goal priority, Goal / target setting, Goals (autonomous	Mental representations of outcomes or end states that an individual wants to achieve

	/controlled), Action planning (with relation to their intention to implement)	
10. Memory, attention and decision processes	Memory, Attention, Attention control, Decision making, Cognitive overload / tiredness	The ability to retain 45information, focus selectively on aspects of the environment and choose between two or more alternatives
11. Environmental context and resources	Environmental stressors, Resources / material resources, Organisational culture /climate, Salient events / critical incidents, Person x environment interaction, Barriers and facilitators	Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour
12. Social influences	Social pressure, Social norms, Group conformity, Social comparisons, Group norms, Social support, Power, Intergroup conflict, Alienation, Group identity, Modelling	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours
13. Emotions	Fear, Anxiety, Affect, Stress, Depression, Positive / negative affect, Burn-out	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event
14. Behavioural regulation	Self-monitoring, Breaking habit, Action planning (with relation to monitoring their habits)	Anything aimed at managing or changing objectively observed or measured actions

RESULTS

The electronic search, conducted on the 26 August 2016, yielded 5610 citations (Figure 2.1). We identified 1432 records via our additional search methods. Following the screening of titles and abstracts, we attempted to obtain the full text of 120 manuscripts for further review. Of these, 108 were excluded (89 due to study outcomes; 9 due to participants; 1 manuscript was not available in English; and 9 full text manuscripts were unable to be located) and 12 manuscripts were included (6 quantitative and 6 qualitative studies).

Figure 2.1 Study Flow Diagram



INCLUDED STUDIES

A full description of each included study is reported in Appendix 2.2.

Types of studies

The majority of the studies were conducted in Canada (n=5)(19, 23-25) and the US (n=4)(18, 26-29), followed by Australia (n=1)(16), Ireland (n=1)(30) and New Zealand (n=1)(31). Studies were conducted between 1994 and 2015, and 10 studies employed a cross-sectional design.

Types of participants

Participants were service cooks, educators, service directors or service managers from childcare services. The number of participants within the included studies ranged from eight to 2841. One study limited their study sample to 'Head-start' childcares services within the US (26). Head start is an early childhood education program of the US Department of Health and Human Services, which provides health care services, meals, snacks and nutrition education to low income families.

Types of measures

Qualitative

Six out of the 12 studies utilised qualitative methods. Four studies conducted face-to-face semi structured interviews (18, 23, 25, 29) and the remaining two studies undertook focus groups (24, 28). Two qualitative studies reported the duration it took participants to complete the semi-structured interview, which ranged from 30 to 60 minutes per interview (18, 23).

Quantitative

Six out of the 12 studies used quantitative methods (16, 19, 26, 27, 30, 31). The number of items in the surveys ranged from 49 to over 150 items. The method of administration of the surveys included telephone (n=2)(16, 30); pen and paper (n=2)(19, 26); and an online tool (31). One study did not describe the method of survey administration (27).

Study design characteristics

Eleven of the 12 included studies were cross-sectional (16, 18, 19, 24-31). One study employed a multi-case exploratory design, which explored the difference between two 'early adopter' urban childcare services (23). Early adopters were chosen for this study,

as they could provide key insights into the practices that facilitate the adoption of menu dietary guidelines.

Two studies reported on childcare service staff perceptions and experiences of their involvement in obesity prevention interventions that aimed to improve the implementation of healthy eating and physical activity policies and practices (18, 28). The remaining 10 studies aimed to assess factors such as the organisational characteristics; staff behaviours and practices that influence the services adoption of menu dietary guidelines. Of these, three studies also sought to identify the perceived needs of childcare services to enable them to implement the menu dietary guidelines (16, 27, 30).

OUTCOMES

QUALITATIVE STUDIES

Barriers

From the six qualitative studies, barriers that impede services' implementation of the menu dietary guidelines were identified for eight of the 14 TDF domains (Table 2.2). Across studies, the most frequently identified TDF domains were 'social influences' (e.g. staff perceptions of what foods children liked or disliked) (n=5); 'environmental context and resources' (e.g. insufficient menu planning tools and resources; insufficient time) (n=4); 'knowledge' (e.g. staff have limited general nutrition knowledge and poor knowledge of the sector menu dietary guidelines) (n=3); 'beliefs about capabilities' (e.g. food service staff lack confidence in their kitchen math skills and cooking skills) and 'beliefs about consequences' (e.g. the impact of menu changes on food budget; increased food wastage as a result of menu changes) (n=2). Examples of participant responses from included studies categorised by each TDF domain are included as Appendix 2.3.

Facilitators

From the six qualitative studies, ten of the 14 TDF domains were identified as facilitators that enable services' implementation of the menu dietary guidelines (Table 2.2). The most frequently identified TDF domains were 'environmental context and resources' (e.g. the availability of sample menus; the service creating a supportive environment by enforcing nutrition policies and role modelling healthy eating behaviours) (n=5); 'social influences' (e.g. staff communicating and collaborating; well established social networks

to share information) , 'skills' (e.g. highly trained and skilled staff for menu planning) and 'goals' (e.g. planning menus in advance; making a gradual transition to serving healthier foods; planning strategies to contain food costs as a result of menu changes) (n=3).

QUANTITATIVE STUDIES

Barriers

From the six quantitative studies, six of the 14 TDF domains were identified as barriers that impede services' implementation of the menu dietary guidelines (Table 2.2). Across studies the most frequently identified TDF domains were 'environmental context and resources' (n=5); 'social influences' and 'skills' (n=4); and 'knowledge' (n=3). Table 2.2 displays the prevalence of barriers reported by participants within included studies. Within studies participants reported barriers classified as the domain 'skills' as the most prevalent (Median 44%).

Facilitators

Within the six quantitative studies, three of the 14 domains were identified as facilitators that enable services' implementation of the menu dietary guidelines (Table 2.2). The most frequently identified TDF domains were 'environmental context and resources' (n=5); 'social influences' and 'skills' (n=1). The domain 'skills' was the most prevalent (70% of participants) facilitator reported within included studies (Table 2.2).

Association between barrier or facilitator and menu guideline implementation

We obtained only one study that included a measure of association (19). The study included 101 childcare services and aimed to determine menu planners' relevant knowledge, attitudes and practices in relation to menu planning and assess the nutritional adequacy and quality of service menus. Romaine et al reported that there was significant (p=0.016) association between menu planners attending menu planning training and higher 'menu quality' scores (19). However, no significant difference was observed between the menu quality scores for those who reported using the sector nutrition guideline manual and those who did not.

Table 2.2 Identified factor (barriers and facilitators) domains and factor prevalence

	Qualitative Studies (n=6)		Quantitative Studies (n=6)		
	Was the factor identified by one or more studies	No. of studies that identified factor	Was the factor identified by one or more studies	No. of studies that identified factor	Median (range)prevalence of barrier reported within studies
Barriers					
1. Knowledge	✔	3 out of 6 studies(24, 28, 29)	✔	3 out of 6 studies(19, 26, 30)	21% (11 – 33%) of participants identified this factor
2. Skills	✔	1 out of 6 studies(24)	✔	4 out of 6 studies(19, 27, 30, 31)	44% (4.3 – 98.1%) of participants identified this factor
3. Professional role and Identity	✔	1 out of 6 studies(29)	✔	1 out of 6 studies(27)	Not reported
4. Beliefs about capabilities	✔	2 out of 6 studies(24, 29)	X		
5. Optimism	X		X		
6. Beliefs about consequences	✔	2 out of 6 studies(28, 29)	X		
7. Reinforcement	X		X		
8. Intentions	X		✔	1 out of 6 studies(30)	14.8% of participants identified this factor
9. Goals	X		X		
10. Memory, attention and decision processes	X		X		
11. Environmental Context and Resources	✔	4 out of 6 studies(24, 25, 28, 29)	✔	5 out of 6 studies(16, 26, 27, 30, 31)	23.5% (5.2 – 72%) of participants identified this factor

12. Social Influences	✔	5 out of 6 studies(18, 24, 25, 28, 29)	✔	4 out of 6 studies(26, 27, 30, 31)	16.9% (4 - 42.5%) of participants identified this factor
13. Emotion	✔	1 out of 6 studies(24)	X		
14. Behavioural regulation	X		X		
Facilitators					
1. Knowledge	✔	2 out of 6 studies(18, 23)	X		
2. Skills	✔	3 out of 6 studies(23-25)	✔	1 out of 6 studies(16)	70% of participants identified this factor
3. Professional role and Identity	✔	2 out of 6 studies(23, 24)	X		
4. Beliefs about capabilities	✔	2 out of 6 studies(18, 29)	X		
5. Optimism	X		X		
6. Beliefs about consequences	✔	1 out of 6 studies (18)	X		
7. Reinforcement	✔	1 out of 6 studies(23)	X		
8. Intentions	✔	1 out of 6 studies(18)	X		
9. Goals	✔	3 out of 6 studies(18, 24, 28)	X		
10. Memory, attention and decision processes	X		X		
11. Environmental	✔	5 out of 6 studies(18, 23-25, 28)	✔	5 out of 6 studies(16, 19, 26, 27, 30)	43.5% (28 – 72% of participants identified this factor

context and resources					
12. Social influences	✔	3 out of 6 studies(18, 23, 24)	✔	2 out of 6 studies(19, 27)	51% of participants identified this factor
13. Emotion	✗		✗		
14. Behavioural regulation	✗		✗		

DISCUSSION

This is the first systematic review to comprehensively assess factors that influence the implementation of dietary guidelines in childcare services and synthesise findings using an implementation framework. The review identified that 'environmental context and resources' and 'social influences' were each the most common domains within which barriers and facilitators to the implementation of menu dietary guidelines were identified. Barriers in these domains reflect that implementing new guidelines require acquisition of new foods, cooking instruments, recipes and upskilling of staff that increase expenses incurred. These barriers are further complicated when staff believe or experience that children do not like the new healthy foods. Facilitators identified that could help alleviate these barriers included drawing on relationships with people who could provide assistance and support e.g. working with food vendors, experienced cooks and using pre-tested recipes. These findings provide guidance to researchers, policy makers and practitioners in the design of support strategies to improve dietary guideline implementation.

The factors identified by this review are consistent with those reported in the literature as influencing the implementation of nutrition policies and healthy eating practices in the childcare setting more broadly. For example, the implementation of policies and practices such as nutrition curricula, lunchbox guidelines and heathy eating learning experiences are reportedly impeded by a lack of suitable resources, support from service management or parents, and a lack of training, knowledge and skills (17, 21, 32, 33). Similarly, research in the primary school setting has identified a lack of resources, views of other school community groups, and difficulty in interpreting nutrition guidelines as barriers to the implementation of school nutrition policies targeting availability of healthy foods to children (34, 35). Collectively, such findings suggest that 'environmental context and resources', 'social influences' and 'skills' are key drivers of the implementation of menu dietary guidelines. Research by Michie et al suggests that strategies, such as the provision of resources, professional development opportunities and role modelling, may be particularly important in efforts to address these domains (36). Implementing such strategies will likely require investment by governments and childcare accreditation agencies responsible for providing oversight of childcare service operational standards. Specifically, investment in resource development, and incorporating skill development and role modelling strategies into professional development currently available to childcare services may facilitate improvements in guideline implementation.

Qualitative studies included in the review identified a greater number of TDF domains as barriers or facilitators, compared to included quantitative studies. Of the studies which employed quantitative methods, only one reportedly allowed respondents to report additional barriers or facilitators to guideline implementation than was listed in closed survey response options (26). In doing so, most quantitative studies presuppose the key factors influencing guideline implementation. The discrepancy between qualitative and quantitative findings in this review suggests that quantitative studies may have overlooked many important factors influencing guideline implementation in this setting. For example, in addition to the factors identified in quantitative studies, qualitative studies identified 'beliefs about capabilities', 'beliefs about consequences' and 'emotion' as domains impeding implementation and 'knowledge', 'professional role and identity', 'beliefs about capabilities', 'beliefs about consequences', 'reinforcement', 'intentions' and 'goals' as important domains enabling implementation. The inclusion of both quantitative and qualitative studies in this review, therefore, provides a more comprehensive understanding of factors that influence menu guideline implementation. The findings of the study, therefore, support recommendations for the application of mixed methods to improve assessment and understanding of factors that may impede or promote implementation (37).

None of the included studies reported barriers or facilitators to guideline implementation relating to the TDF constructs of 'optimism', 'memory', 'attention and decision processes' and 'behavioural regulation'. The absence of these constructs, coupled with the broad search strategy employed, suggests that the state of the literature on the implementation of dietary guidelines is focused on early implementation stages, that of adopting a new practice. During later stages of implementation, as practice becomes "embedded" or routinely incorporated into everyday work barriers captured by constructs that relate to sustaining a practice (e.g. attention and decision processes or behavioural regulation) may be anticipated (38). An understanding of barriers and facilitators to sustaining implementation of nutrition guidelines such as how supportive organisational policies may be or the presence (or absence) of monitoring systems would provide a valuable contribution to the literature. Such studies that utilise samples or subgroups of childcare services where sustained implementation has and has not been achieved would be particularly worthwhile.

The findings of this review also highlight that empirical evidence identifying associations between barriers or facilitators with guideline implementation is lacking. The review identified an association in just one such study which found there was significant evidence of a relationship between menu planning training and higher 'menu quality' scores. Such findings indicate that further research, including using prospective research designs such as cohort studies or mediation models, is warranted to confirm that reported barriers identified in this review are indeed impeding or facilitating guideline adherence.

LIMITATIONS

The research should be interpreted in the context of its methodological limitations. Although a comprehensive search of databases was undertaken, included studies were limited to those published in English. As such, relevant studies, particularly those arising from non-English speaking countries may have been missed. The majority of studies were conducted in North America. Barriers reported in other jurisdictions with alternative models of childcare operations may differ. Additionally, one study, although it reported using a quantitative survey, did not report quantified results for all factors investigated in the study (27). Notwithstanding these limitations, the review makes an important contribution to the literature, providing a basis for researchers to develop implementation strategies and highlighting key gaps in the evidence base.

CONCLUSION

This is the first review that comprehensively and systematically assesses the literature to identify factors that influence (impede or facilitate) the implementation of menu dietary guidelines in childcare services utilising a theoretical framework. While this review identifies important factors that may influence the implementation of menu dietary guidelines within childcare services, it also highlights the need for further research to better understand their influence on menu composition. The findings of this review provides guidance to researchers, policy makers and practitioners in the design of support strategies to improve menu dietary guideline implementation and as such, have the potential to impact on child food intake while in care.

DECLARATIONS

AVAILABILITY OF DATA AND MATERIALS

The datasets during and/or analysed during the current study are available from the corresponding author on reasonable request.

CONFLICT OF INTEREST

None.

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AUTHORS' CONTRIBUTIONS

First author K.S led the development of this manuscript. Authors L.W, S.Y, R.W and K.S, conceived the review. Authors K.S, M.F and J.J completed the screening and data extraction. Authors K.S and M.F completed the TDF coding of identified factors. All authors contributed to, read and approved the final version of this manuscript.

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CHAPTER 3

Measuring implementation behaviour of menu guidelines in the childcare setting: Confirmatory Factor Analysis of a Theoretical Domains Framework Questionnaire (TDFQ).

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ABSTRACT

BACKGROUND

While there are number of frameworks which focus on supporting the implementation of evidence based approaches, few psychometrically valid measures exist to assess constructs within these frameworks. This study aimed to develop and psychometrically assess a scale measuring each domain of the Theoretical Domains Framework for use in assessing the implementation of dietary guidelines within a non-health care setting (childcare services).

METHODS

A 75 item 14-domain Theoretical Domains Framework Questionnaire (TDFQ) was developed and administered via telephone interview to 202 childcare service cooks who had a role in planning the service menu. Confirmatory factor analysis (CFA) was undertaken to assess the reliability, discriminant validity and goodness of fit of the 14-domain theoretical domain framework measure.

RESULTS

For the CFA, five iterative processes of adjustment were undertaken where 14 items were removed, resulting in a final measure consisting of 14 domains and 61 items. For the final measure: the Chi-Square goodness of fit statistic was 3447.19; the Standardized Root Mean Square Residual (SRMR) was 0.070; the Root Mean Square Error of Approximation (RMSEA) was 0.072; and the Comparative Fit Index (CFI) had a value of 0.78.

CONCLUSION

While only one of the three indices support goodness of fit of the measurement model tested, a 14-domain model with 61 items showed good discriminant validity and internally consistent items. Future research should aim to assess the psychometric properties of the developed TDFQ in other community-based settings.

KEYWORDS

Psychometric properties, implementation, childcare, theoretical domains framework, guidelines

INTRODUCTION

The World Health Organisation reports that in 2012 68% of deaths globally were attributed to non-communicable diseases (1). Inadequate diet is a leading modifiable risk factor for non-communicable diseases including obesity, cardiovascular disease, stroke, type 2 diabetes and some cancers (2). In Australia, a large proportion of the population do not meet national dietary recommendations. The 2012 National Health Survey data showed that while 48% of Australian adults (aged 18 years and over) met the recommendations for daily fruit intake and only 8% met the recommendation for daily vegetable intake (3). For Australian children aged 12-17 only 20% consumed adequate serves of fruit and only 15% consumed the minimum recommendation for daily serves of vegetables (3).

Dietary patterns, food habits and food preferences developed in childhood track into adulthood and can impact on the onset of disease (4). Improving diet in childhood provides a critical opportunity to improve dietary behaviours in the overall population. Childcare is a particularly opportunistic setting in which to intervene to improve child dietary intake as it provides access to a large proportion of children at a key developmental period of their lives. Furthermore, children who attend childcare services consume up to 67% of their daily dietary intake while in care (5). In Countries such as the United States (US) and the United Kingdom (UK) approximately one third of children attend some form of childcare. During 2014, 54% of Australian children aged 2 to 3 years and 83% of Australian children aged 4 to 5 years attended childcare (6).

Ensuring the availability of healthy foods to children through the implementation of menu dietary guidelines by childcare services is recommended as a means of improving the dietary intake of young children (2). However, various studies have reported that the implementation of such guidelines by childcare services is sub-optimal (7-9). For example a review of 118 nursery menus in the UK found that none complied with the menu dietary guidelines (8). Similarly, in 2012, 46 menus from childcare services in the Hunter New England region of New South Wales (NSW) Australia were audited and the study concluded that none complied with the menu dietary guidelines (7).

To improve the implementation of such guidelines to enhance child health, a greater understanding of implementation processes is required. The use of implementation theories or frameworks can be useful in assessing the determinants of childcare provider

behaviour and inform the selection of strategies to support implementation (10). Many such frameworks exist (11), however few have comprehensive psychometrically

evaluated measures to assess their constructs, limiting their utility. Further, for those that have, none (to our knowledge) have been developed for use within childcare settings (12).

One framework for which measures have been psychometrically evaluated is the Theoretical Domains Framework (TDF). The TDF is an implementation framework that aims to synthesise behaviour change constructs that may affect (enable or impede) the implementation of evidenced based practices and guidelines (13). The TDF was developed using a rigorous consensus and validation process, and represents an attempt to systematically summarise behaviour change constructs covered in 33 theoretical models/frameworks. The initial version of the framework described 12 domains; however further construct validation research led to a 14 domain framework that is suggested to more comprehensively describe relevant behaviour change constructs (13, 14).

There have been just three previous studies that have empirically validated TDF constructs measures. These studies have been conducted with a sample of university students and two samples of health care professionals. While the psychometric properties of these measures of TDF constructs differed across the three studies, most constructs showed reasonable fit to the model based on confirmatory factor analysis (15-17). These studies collectively conclude that methodological improvements are required to enhance the utility of the existing measures including ensuring that at least three items are available per construct and adding additional contextually relevant items applicable to the specific study setting and target audience.

Given the existing gaps in the literature regarding how to best support the implementation of dietary guidelines in the childcare setting, the importance of context in assessing determinants of implementation and the absence of validated tools which can be applied to professional practice regarding nutrition in the childcare setting this study aims to:

1) Develop and establish content validity for a 14-domain TDFQ that is contextually relevant for the childcare setting to measure the implementation behaviour of sector specific menu dietary guidelines; and

2) Undertake a confirmatory factor analysis (CFA) and examine the psychometric properties of the developed measure (specifically reliability, discriminant validity and goodness of fit).

METHODS

DESIGN AND SETTING

A cross-sectional survey was undertaken in childcare services (specifically long day care services (LDC services)) in NSW, Australia. In Australia, LDC services are required to provide food which is consistent with the Australian Dietary Guidelines, as outlined in the dietary menu guidelines (18).

Ethical approval to conduct the study was obtained from the Hunter New England Human Research Ethics Committee (reference 12/08/15/5.01) and the University of Newcastle Human Research Ethics Committee (reference H-2012-0321).

SAMPLE AND RECRUITMENT

Long day care services

A list of all LDC services in NSW (n=2304) was provided to the research team by the NSW Ministry of Health. A random sample of 994 (43%) LDC services were selected by a statistician who had no further involvement in the study, using a random computer generator sequence. Of these, 342 (34%) LDC services met the eligibility criteria.

Service eligibility

Long day care services were eligible to participate if the service was located within NSW Australia, was open for greater than 8 hours per day; provided two mid-meals and one main-meal to children while in care; planned their menus onsite; prepared all their food onsite; and employed a service cook. LDC services that were externally catered for were excluded from the study. Services located in one region of NSW were also excluded, as they were participating in co-occurring research trials examining the implementation of nutrition-guidelines.

Service cook eligibility

Eligible service cooks had to be over 18 years of age, play a role in planning the service

menu and be aware of the childcare specific dietary menu guidelines (18).

Recruitment

Service managers and cooks of the randomly selected services were mailed recruitment letters. The letters informed them of the study, explained how their study eligibility had been assessed, and invited the service cook to participate in a telephone interview. Approximately one week after the letter was sent, a telephone call was made to the service. Verbal consent to participate in the study was obtained from the service cook. If service cooks were unable to complete the survey at the time of call an alternative time was scheduled. The service cooks were given the option to complete the survey across multiple calls. If the service employed more than one service cook, the cook who had the primary role in planning the service menu was asked to complete the interview.

PROCEDURE FOR THE DEVELOPMENT OF CONTENT FOR THE TDFQ

For this study the implementation behaviour of interest was guideline implementation. Two existing quantitative questionnaires which assessed constructs of the TDF (but had been previously developed for healthcare settings) were adapted for this study. Both of the existing TDF questionnaires were reported to have good construct validity and internal consistency (17, 19) and utilised the 14 domain structure, with domains being: 1) Knowledge; 2) Skills; 3) Social/professional role and identity; 4) Beliefs about capabilities; 5) Optimism; 6) Beliefs about consequences; 7) Reinforcement; 8) Intentions; 9) Goals; 10) Memory, attention and decision processes; 11) Environmental context and resources; 12) Social influences; 13) Emotion; and 14) Behavioural regulation (14). Definitions of the constructs these domains capture can be seen in Table 3.1.

Table 3.1 Definition of TDF constructs by domain, and as applied to the childcare setting and the implementation of menu dietary guidelines.

Domain	Definition of constructs (14)	Application to the childcare setting
1. Knowledge	Knowledge (including knowledge of condition /scientific rationale), Procedural knowledge, Knowledge of task environment	The service cooks awareness and familiarity with implementing the menu dietary guidelines
2. Skills	Skills, Skills development, Competence, Ability, Interpersonal skills, Practice, Skill assessment, Coping strategies	Training, skills and practice in implementing the menu dietary guidelines
3. Professional role and identity	Professional identity, Professional role, Social identity, Professional boundaries,	The extent that implementation of menu dietary guidelines is

	Professional confidence, Group identity, Leadership, Organisational commitment	perceived as part of the service cook's role
4. Beliefs about capabilities	Self-confidence, Perceived competence, Self-efficacy, Perceived behavioural control, Beliefs, Self-esteem, Empowerment, Professional confidence	The service cooks confidence in implementing the menu dietary guidelines
5. Optimism	Optimism, Pessimism, Unrealistic optimism, Identity	The service cooks confidence that the implementation of the menu dietary guidelines will be attained
6. Beliefs about consequences	Beliefs, Outcome expectancies, Characteristics of outcome expectancies, Anticipated regret, Consequents	The service cooks belief about benefits/disadvantages of implementing the menu dietary guidelines
7. Reinforcement	Rewards (proximal / distal, valued / not valued, probable / improbable), Incentives, Punishment, Consequents, Reinforcement, Contingencies, Sanctions	The extent of recognition and reward the service cooks expect to receive when implementing the menu dietary guidelines
8. Intentions	Stability of intentions, Stages of change model, Trans-theoretical model and stages of change	The service cooks intention to implement the menu dietary guidelines
9. Goals	Goals (distal / proximal), Goal priority, Goal / target setting, Goals (autonomous /controlled), Action planning (with relation to their intention to implement	The relative importance to service cooks of implementing the menu dietary guidelines
10. Memory, attention and decision processes	Memory, Attention, Attention control, Decision making, Cognitive overload / tiredness	The extent to which implementing the menu dietary guidelines is part of regular practice
11. Environmental context and resources	Environmental stressors, Resources / material resources, Organisational culture /climate, Salient events / critical incidents, Person x environment interaction, Barriers and facilitators	The environmental context/situation that may encourage/discourage implementation of the menu dietary guidelines
12. Social influences	Social pressure, Social norms, Group conformity, Social comparisons, Group norms, Social support, Power, Intergroup conflict, Alienation, Group identity, Modelling	The interpersonal relationships/process that may influence implementation of the menu dietary guidelines
13. Emotions	Fear, Anxiety, Affect, Stress, Depression, Positive / negative affect, Burn-out	The service cooks emotions when implementing the menu dietary guidelines
14. Behavioural regulation	Self-monitoring, Breaking habit, Action planning (with relation to monitoring their habits)	The service cooks ability to self-monitor and action plan to implement the menu dietary guidelines

Modification of the questionnaire items to be relevant to the LDC setting was overseen by the research team, which included: experienced health promotion practitioners;

implementation scientists; psychologists; dietitians; psychometricians; and behavioural scientists. Modification was based on feedback from stakeholders and expert opinion. Changes to the questionnaire took into consideration individual factors and other inner setting implementation constructs, such as structural characteristics, networks and communication, and culture, which could impact on implementation behaviour in the setting (20). An example of how items were modified can be seen in Table 3.2.

Table 3.2 Example of a modified item

Original item	If I *[action]* in *[context, time]* with *[target population]* it will benefit public health
Modified item	I believe *[action related to program, intervention, innovation or guidelines]* according to the *[name of recommendations, protocol, guidelines]*, will lead to benefits for the *[participants, clients, patients, individuals, children]*

All items were modified in a generic format (see appendix 3.1), allowing for adaptation of the items to different programs, guidelines, interventions or initiatives that may be undertaken in other community settings. Context specific prompts were included, with six of the questionnaire items to ensure they were interpreted in relation to the LDC setting. Consistent with previous questionnaires, the final items required respondents to answer using a 7-point Likert scale (strongly agree to strongly disagree).

The survey was piloted with two LDC service cooks who were not included in the final sample. Piloting indicated that completion of the survey took 25 minutes; it was well understood and was positively received by the respondents. No amendments were made to the survey following the pilot.

DATA COLLECTION PROCEDURE

Quality assurances

The final questionnaire was administered to LDC service cooks via a computer assisted telephone interview (CATI) over a three-month period. The telephone interview was scripted to ensure standardised delivery. All CATI interviewers were experienced in using standardised telephone interviewing protocols in the conduct of telephone-based health surveys. All interviewers received one-day training and each interviewer conducted one

mock interview with a member of the research team prior to administering the questionnaire to respondents.

Characteristics of service cooks

The CATI interview included items to capture the demographic and professional characteristics' of the service cooks (age, gender, education level, years employed as a service cook, weekly hours worked) and the current processes that related to the planning of menus in their service and the provision of healthy foods (how often they review or plan a service menu, whether they received support to plan the service menu, the cycle length of the menu).

DATA ANALYSES

Reliability (prior to CFA)

The reliability (internal consistency) of the newly developed 14-domain TDFQ was assessed using Cronbach's alpha (α), with an alpha between 0.70 and 0.95 considered acceptable (21).

Confirmatory factor analysis (CFA)

To assess construct validity of the questionnaire, CFA was undertaken using the CALIS procedure of SAS statistical software. The measurement model hypothesised the relationship between the latent domains and manifest variables that measure these domains. For the CFA, based on previous publications a prior hypothesis was made that each item (n=75) loaded on only one domain and that a number of domains were potentially correlated (i.e. knowledge and skills; social/professional role and skills) (17). No directional paths between latent domains were hypothesised. All loadings were standardized (domain means and variances fixed at 0 and 1 respectively). The model was estimated using the full information maximum likelihood method, which used all available data. Questionnaire items worded negatively (n=3) were reverse-coded for analysis.

The model was assessed for goodness of fit and iteratively revised in an attempt to derive a theoretically meaningful and statistically acceptable model. Items were dropped for the following conditions: 1) the item had a non-significant loading on its factor (p-value > 0.05); 2) the item appeared more than once in the ten highest Lagrange multiplier (LM)

estimates on different factors (a high LM estimate indicates a complex item which should be removed); 3) the item had a loading <0.4 on its factor domain (22, 23).

As per recommendations, an attempt was made to include three items per domain to ensure minimum coverage of each construct's theoretical domain.

The sensitivity of the model was assessed by restricting the number of domain co-variances to the following pre-specified domains which the TDF literature suggests are correlated: 1) Domain 1 (Knowledge) and Domain 2 (Skills); 2) Domain 3 (Social/professional role) and Domain 2 (Skills) (17).

When co-variances between the remaining domains were fixed to zero, the model fit was worse, suggesting that estimating all co-variances between the domains produced a better model.

Goodness of fit

As the chi-square test statistic is generally regarded as being too stringent, particularly when data is not multivariate normal, a chi-square to degrees of freedom ratio was reported, where a ratio of less than two was considered ideal (24). Consistent with best practice recommendations, three goodness-of-fit measures were also reported: one absolute measure (Standardized Root Mean Square Residual (SRMR)), one parsimony index (Root Mean Square Error of Approximation (RMSEA)), and one incremental index (Comparative Fit Index (CFI)) (25). An SRMR value less than 0.055 is considered ideal (25). An RMSEA value <0.05 indicates a close approximate fit, while values between 0.05 and 0.08 suggest an acceptable fit and values >0.10 suggest a poor fit (26, 27). A CFI value exceeding 0.9 indicates good fit (27).

Reliability (following CFA)

The reliability (internal consistency) of the revised TDFQ was assessed using Cronbach's alpha (α), with an alpha between 0.7 and 0.95 considered acceptable (21).

Discriminant Validity

Discriminant validity was assessed following the method proposed by Anderson and Girbing (28). The estimated correlation parameter for two estimated constructs was constrained between them to 1.0 and a chi-square difference-test was performed on the values obtained for the constrained and unconstrained models. The test was performed

with one pair of factors at a time, as a non-significant test for one pair of factors can be made unclear by being tested with several pairs that have significant values (28). A further assessment of discriminant validity was undertaken which was to determine whether the confidence interval (+/- two standard errors) around the correlation estimate between the two factors included 1.0 (the confidence interval test). Intervals that did not include 1.0 were considered supportive of factor discriminant validity.

RESULTS

CHARACTERISTICS OF SERVICE COOKS

Of the 342 eligible services, 202 (59%) service cooks completed the full CATI which included demographic items and the 75 item TDFQ. One-hundred and forty (46%) service cooks did not complete all 75 items of the TDFQ as they were unaware of certain aspects of the sector specific menu dietary guidelines. There were significant differences in the characteristics of respondent and non-respondent service cooks for three variables; those who had completed a registered training organisation course; >5 years in current position and; <5 hours taken to plan a new service menu (table 3.3).

Of the 202 service cooks who completed the full CATI, 93% were female, 56% had >5 years' experience working as a service cook and 42% had been in their current position for >5 years. The most common menu cycle length was six weeks (53% of respondents). Services typically planned a new service menu every six months (42% of respondents) and 63% of respondents reported it took <5 hours to plan a new service menu.

Table 3.3 Demographics of non-respondent service cooks

	Respondents n=202	Non-respondents* n=140	
Demographic variable	**N (%)**	**N (%)**	**p-value****
Female	188 (93.07)	127 (90)	0.43
Qualification			
University Qualification	4 (1.98)	2 (1.43)	0.70
Tafe Course	88 (43.56)	56 (40.00)	0.58
Registered Training Organisation Course	88 (43.56)	78 (55.71)	0.03
'On the job' Training	44 (21.78)	27 (19.29)	0.59
≥40 years of age	130 (64.68)	88 (62.86)	0.73
>5 years as a service cook in childcare services	109 (56.19)	66 (47.83)	0.15
>5 years in current position	83 (41.92)	40 (28.99)	0.02
Hours worked per week			

20-29 hours	82 (40.59)	60 (43.17)	0.89
Works ≥30 hours per week	93 (46.04)	61 (43.88)	
Menu planning practices			
Menu cycle Length			
Six week menu cycle	31(15.35)	12 (8.57)	
Four week menu cycle	108 (53.47)	78 (55.71)	0.42
Two week menu cycle	14 (9.41)	11 (7.86)	
Frequency service plans a menu			
Every 6 months	84 (41.58)	63 (45.00)	0.92
Every 3 months	60 (29.70)	38 (27.14)	
Hours taken to plan a service menu			
<5 hours	127 (62.87)	96 (68.57)	0.04
≥5 hours	66 (32.67)	31 (22.14)	

**Non-respondents are those eligible service cooks who did not complete all 75 TDFQ items and whose data is not included in the analysis.*
***p-value <0.05 is considered significant*

PSYCHOMETRIC PROPERTIES OF THE QUESTIONNAIRE

Content validity

Following content validation the TDFQ consisted of 75 items. Each domain had a minimum of three items as per recommendations (29). The domains and items were: Knowledge (5 items); Skills (3 items); Social/professional role and identity (3 items); Beliefs about capabilities (6 items); Optimism (3 items); Beliefs about consequences (8 items); Reinforcement (4 items); Intentions (3 items); Goals (4 items); Memory, attention, and decision processes (4 items); Environmental context and resources (8 items); Social influences (5 items); Emotion (6 items); Behavioural regulation (8 items).

Reliability (prior to CFA)

The Cronbach's Alphas for the 14 domains prior to CFA ranged between 0.56 and 0.90 and are reported in Table 3.4.

Confirmatory factor analysis (CFA)

Five iterative processes of adjustment were undertaken for the CFA. Across the five iterations one item was removed for non-significant loading on a construct, six items were removed for a high LM on different factors and seven items were removed for small loadings of <0.4.

One item (item 8) had high LM estimates on different factors but was not removed, as its removal would have resulted in a 2-item factor.

In total, 14 TDFQ items were removed, leaving 61 items (See additional file 1). No questionnaire items moved between domains across the 5 iterations and none of the 14 domains were removed from the measure. Each domain resulted in having 3 to 6 items as identified by the CFA.

Goodness of fit

The Chi-Square goodness of fit statistic was 3447.19 (with 1678 degrees of freedom), providing a p-value of <0.0001. The Chi-Square statistic divided by the degrees of freedom was 2.5 (a ratio of less than 2 is considered ideal) leading to rejection of the null hypothesis (that the model fits the data).

The SRMR obtained for the final model was 0.070 suggesting the model was not ideal. The RMSEA and 90% confidence interval for this model was 0.072 (0.069, 0.076) suggesting that the model has reasonable fit on this criteria. The CFI had a value of 0.78, suggesting that the model did not fit the data well.

Reliability (following CFA)

For the final 61 items, Cronbach's alphas ranged from 0.61 (skills) to 0.90 (intentions). Nine of the 14 domains demonstrated reliability (internal consistency) with alphas between 0.70 and 0.90. The remaining four domains had Cronbach's alphas below 0.70 (Skills α=0.61; Optimism α=0.67; Goals α=0.67; Social influences α=0.68) (table 3.4).

Table 3.4 Number of domain items and Cronbach Alpha's for original and revised TDFQ

	Original TDFQ (75 items)		Revised TDFQ (61 items)	
Domain	**# of items**	**α**	**# of items**	**α**
Knowledge	5	0.85	5	0.85
Skills	3	0.61	3	0.61
Professional role and identity	3	0.88	3	0.89
Beliefs about capabilities	6	0.80	6	0.80
Optimism	3	0.67	3	0.67
Beliefs about consequences	8	0.71	4	0.89
Reinforcement	4	0.73	4	0.73
Intentions	4	0.90	4	0.90
Goals	4	0.68	4	0.67
Memory, attention and decision processes	4	0.56	3	0.64

Environmental context and resources	9	0.77	7	0.79
Social influences	6	0.64	4	0.68
Emotion	7	0.89	5	0.88
Behavioural regulation	9	0.76	6	0.80

Discriminant validity

The confidence interval test showed that there were no correlations between factors that had 95% confidence intervals including 1.0, therefore supporting the discriminant validity of the model.

DISCUSSION

This is the first empirical validation of a TDFQ measure in the non-health care setting. The final 14-domain, 61-item measure demonstrated satisfactory fit on one of the three goodness-of-fit-tests, has internally consistent items, and overcomes some of the previous limitations of existing tools in the field. The questionnaire displayed good discriminant content validity, indicating that the domains measure theoretically different constructs. This result is congruent with previous TDF measures which also demonstrated good discriminant content validity (17, 19).

The two previous TDF measures developed by Taylor et al, based on the original 12 domain framework have demonstrated satisfactory fit, with one measure meeting both of the goodness of fit measures and the other meeting one of the two goodness of fit measures (15, 16). Both 12 domain measures displayed a chi-square to degrees of freedom ratio less than 2.0 and an RMSEA score greater than 0.05 (15, 16). When assessing the reliability of the TDFQ, the domain 'Social influences' performed poorly, however this aligns with previous research reported by Taylor et al, whom employed the same acceptable alpha cut-off point of 0.7 (16).

The final TDFQ measure is a potentially useful tool to support application and measurement of theory in future implementation studies in non-health care settings. As recommended, the final 14-domain TDFQ includes at least three items per domain and the generic format structure of the questionnaire items also allows for adaptation for different programs and guidelines specific to interventions or initiatives in the non-healthcare setting.

CONSIDERATIONS FOR FUTURE DEVELOPMENT OF THE TDFQ

Response scale

A large number of items had only two response options selected by participants (strongly agree and agree), suggesting a high ceiling effect. While we included a seven point response scale (recommended for improving validity) it is possible that the response options did not allow for sufficient diversity in respondent preferences (30). The administration of the questionnaire via telephone interview, rather than paper and pencil, may have also impacted on the way in which participants responded to the questionnaire items. Further pilot testing of response scales should be conducted prior to administering the TDFQ.

Feasibility and acceptability

The feasibility (how long it takes to administer and score) and acceptability (ease of completion) of the TDFQ should be considered in future research to reduce the risks of the tool not being used. Further factor analysis should be performed to determine whether there is potential to reduce the number of items in this setting and other community-based settings.

Sample size

Given there were some minor revisions to the original hypothesised model, it is recommended that the fit of this measure be assessed with a larger sample of service cooks in the childcare setting, as well as with other staff providing menu services in similar community settings (schools, sporting clubs). When validating this measure, researchers should undertake a power calculation and aim to reach the appropriate sample size to allow for increased confidence in results. Thorough psychometric testing and reporting (reliability and validity) should be undertaken to increase the empirical evidence available for the use of a TDF measure for intervention development and evaluation of implementation strategies (31).

LIMITATIONS

There are a few limitations to the current study. First, the majority of the respondents were female (93%). While this reflects the demographic for our population of interest (service cooks in childcare settings), this may affect the generalisability of the results to other community settings. Second, a significant proportion of service cooks who were telephoned and invited to participate had not heard of the sector-specific menu dietary

guidelines (46%) and were not eligible to participate in this study. The findings of the current study only apply to service cooks who were already aware of the guidelines, and as such may have higher intentions of applying such guidelines.

Third, the acceptability of the questionnaire was not specifically measured. However, the average time to complete the telephone interview was 25-40 minutes, which may represent a significant burden for respondents. This highlights the difficulties in developing a comprehensive questionnaire that satisfactorily measures the 14 TDF domains, while being of reasonable length (19). Fourth, only a small sample size was available for the analysis, as only data for respondents who completed all 75 items of the TDFQ were included. The final sample size of 202 may have been inadequate to psychometrically validate the 75 item TDFQ as the ratio of "five participants per item" was not achieved (i.e. 375 participants were needed to meet this recommendation) (26).

CONCLUSION

To our knowledge this is the first quantitative measure of the TDF developed for application in a non-health care setting, specifically the childcare setting. While only one of the three indices support goodness of fit of the measurement model tested, with some minor revisions we arrived at a 61-item model with good discriminant validity, with internally consistent items. Future research should aim to assess the psychometric properties of the developed TDFQ in the childcare setting and other community settings.

DECLARATIONS

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical approval to conduct the study was obtained from the Hunter New England Human Research Ethics Committee (reference 12/08/15/5.01) and the University of Newcastle Human Research Ethics Committee (reference H-2012-0321).

CONSENT FOR PUBLICATION

Not applicable

AVAILABILITY OF DATA AND MATERIALS

The datasets during and/or analysed during the current study available from the corresponding author on reasonable request.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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AUTHORS' CONTRIBUTIONS

First author KS led the development of this manuscript. KS, SY, LW and MF conceived the intervention concept. KS, SY, LW, MF, TCM, JW and JP contributed to the research design and trial methodology. CO completed the analysis of the data. All authors contributed to and approved the final version of this manuscript.

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CHAPTER 4

A multi-strategy childcare-based intervention to improve compliance with nutrition guidelines versus usual care in long day services: a study protocol for a randomised controlled trial.

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ABSTRACT

INTRODUCTION

Interventions to improve child diet are recommended as dietary patterns developed in childhood track into adulthood and influence the risk of chronic disease. For child health, childcare services are required to provide foods to children consistent with nutrition guidelines. Research suggests that foods and beverages provided by services to children are often inconsistent with nutrition guidelines. The primary aim of this study is to assess, relative to a usual care control group, the effectiveness of a multi-strategy childcare-based intervention in improving compliance with nutrition guidelines in long day care services.

METHODS AND ANALYSIS

The study will employ a parallel group randomised controlled trial design. A sample of fifty-eight long day care services that provide all meals (typically includes one main and two mid meals) to children while they are in care, in the Hunter New England region of New South Wales, Australia will be randomly allocated to a 6-month intervention to support implementation of nutrition guidelines or a usual care control group in a 1:1 ratio. The intervention was designed to overcome barriers to the implementation of nutrition guidelines assessed utilising the theoretical domains framework. Intervention strategies will include the provision of staff training and resources, audit and feedback, ongoing support and securing executive support. The primary outcome of the trial will be the change in the proportion of long day care services that have a two-week menu compliant with childcare nutrition guidelines, measured by comprehensive menu assessments. As a secondary outcome, child dietary intake while in care will also be assessed. To assess the effectiveness of the intervention, the measures will be undertaken at baseline and approximately 6 months post baseline.

ETHICS AND DISSEMINATION

The study was approved by the Hunter New England Human Research Ethics Committee (Appendix 4.1). Study findings will be disseminated widely through peer-reviewed publications.

TRIAL REGISTRATION

Australian New Zealand Clinical Trials Registry ACTRN12615001032549 (Appendix 4.2).

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The study incorporates random allocation of long day care services and blinding of the dietitian assessing compliance to nutrition guidelines.
- The intervention is based on a theory informed systematic process to target barriers and enablers identified by the childcare setting.
- The intervention is conducted in the Hunter New England region of New South Wales and findings may not generalise nationally.
- Multiple observation periods may improve the validity of the assessment on usual child food intake.

INTRODUCTION

Internationally, dietary risk factors are a primary cause of death and disability. In 2010, the Global Burden of Disease study reported that over 11 million deaths worldwide were due to dietary risk factors alone (1). Of these deaths, 4.9 million were linked to low fruit intake, 1.7 million to low vegetable intake and 3.1 million to a high sodium intake (1). In Australia, approximately 23% of total mortality and 11% of disability adjusted life years during 2010 were attributable to dietary risk factors (1).

Dietary patterns and food preferences developed in childhood track into adulthood and influence the risk of future chronic disease (2). Developing healthy eating patterns in childhood is therefore recommended by the World Health Organisation and governments internationally as a key chronic disease prevention strategy (3). Childcare services represent an opportune setting to improve the dietary intake of children as they provide access to a large number of children for prolonged periods of time at a critical stage of development (4). Further, systematic review evidence suggests that improving the childcare nutrition environment can improve dietary and health outcomes for children (4).

It is recommended that childcare services provide foods to children consistent with dietary guidelines (5,6). International research, however, suggests that foods and beverages provided by services to children are often inconsistent with guideline recommendations. A study conducted in the United Kingdom audited 118 nursery menus and found that none adhered to nutrition guidelines (7). Similarly in Australia, 46 long day care service menus were reviewed and none provided adequate serves of vegetables consistent with the guidelines (8). Childcare services report a number of barriers to complying with nutrition guidelines, including limited professional development opportunities, lack of practical resources, lack of time and inadequate support from management and colleagues (9,10).

Childcare services in Australia do not receive a subsidy from the Government for the provision of meals that comply with the nutrition guidelines. For childcare services in New South Wales (NSW), Australia, the current nutrition recommendations are outlined in the Caring for Children resource which has been publically available online since October 2014 (11). The resource was developed by the NSW Ministry of Health to assist childcare services to provide food that is consistent with the sector-specific nutrition guidelines. The content is based on experience in the field and consultation with childcare

service representatives and outlines best practice guidelines on healthy eating and nutrition for the childcare setting. The resource provides guidance on menu planning and the number of serves of foods that need to be provided on a service menu to be compliant with guidelines. In NSW assessment and compliance officers, who regulate service accreditation, utilise the Caring for Children resource as a benchmark for determining if services meet accreditation standards in relation to the provision of healthy food and drinks to children while in care.

If the health benefits of nutrition guidelines for the childcare sector are to be realised, interventions to support services to overcome barriers to routine implementation are required. The few trials that have been conducted to assess how to best support the implementation of nutrition guidelines into childcare services report mixed results on implementation outcomes, providing a limited evidence base for efforts to improve implementation of nutrition guidelines and practices in this setting (12-20). In addition, the majority of these trials do not explicitly report applying an implementation framework to guide intervention development and strategy selection (13,19,20). Nonetheless, existing findings from these trials suggests that strategies such as resource provision, performance monitoring and feedback, ongoing support and professional development opportunities for service cooks and service managers may be effective in changing food provision in line with nutrition guidelines (12,15-21). Furthermore, it is suggested that strategies to increase childcare staff awareness of the nutrition guidelines may also be effective in improving compliance to nutrition guidelines in the setting (22).

While a number of non-randomised trials have assessed the impact of changing food provision in line with nutrition guidelines on child dietary intake, to our knowledge no randomised trials of such interventions have been undertaken (14,16-18). Such trials are required to better to assess the health impact of such implementation strategies on child health.

METHODS AND ANALYSIS

STUDY AIM

Given the limitations of the existing evidence base, the primary aim of the study is to assess, relative to ususal care, the effectiveness of a multi-strategy childcare-based intervention in improving the compliance with nutrition guidelines in long day care

serices. As a secondary aim, the impact on child dietary intake during the hours attending care will also be assessed.

STUDY DESIGN

The study will employ a randomised controlled trial design. Fifty-eight long day care services will be allocated to receive either the multi-component intervention to support nutrition guideline implementation or a usual care control group. Service compliance with nutrition guidelines regarding food provision will be assessed by menu assessments undertaken by a dietitian blind to group allocation at baseline and approximately six months following baseline data collection. Child dietary intake will be assessed by aggregate plate waste measures and educator completed child food intake questionnaires.

SETTING

The study will take place across one local health district of New South Wales, Australia (Hunter New England). The Australian Statistical Geography Standard describes the region as encompassing non-metropolitan 'major-cities' and 'inner regional' areas (23). Over 840, 000 people reside in the area, of which approximately 33, 300 are aged 3 to 5 years (24). There are currently 368 childcare services in the study region, of which 107 are long day care services which prepare and provide food onsite to children while in care. A subsample of 58 services will be invited to participate in this trial.

SAMPLE

To be eligible to participate in the trial, long day care services must prepare and provide one main meal and two mid-meals to children while they are in care, and be open for at least 8 hours per day. Services that do not prepare and provide meals to children onsite or do not have a cook with some responsibility for menu planning will be excluded from the study. Further, services catering exclusively for children requiring specialist care will be excluded, as will mobile preschools and family day care centres given the different operational characteristics, and therefore intervention requirements of these services relative to permanent childcare services.

RECRUITMENT PROCEDURES

A list of all long day care services in the study region will be supplied by the New South Wales Ministry of Health and serve as the sampling frame. Service managers will be

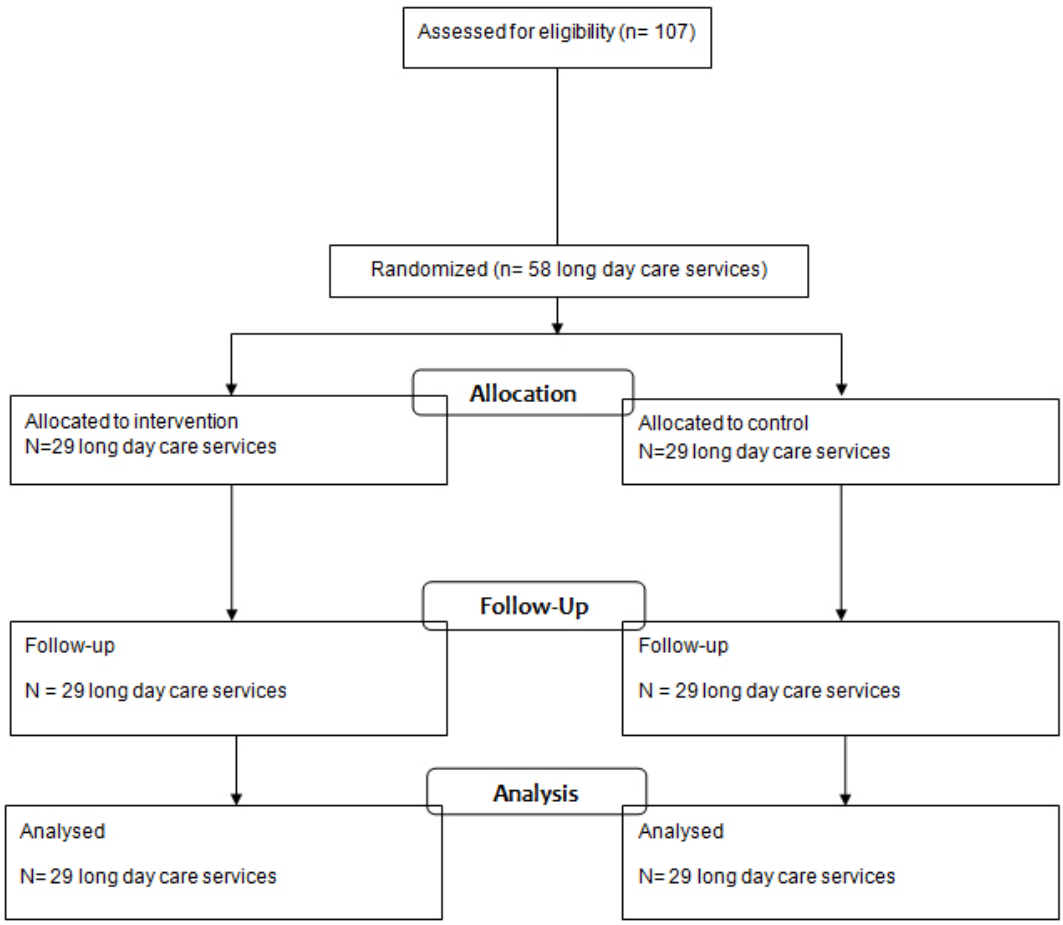
mailed recruitment letters approximately one week prior to recruitment, informing them of the study and inviting participation (Appendix 4.3, 4.4). A research assistant will contact services to confirm eligibility and invite participation. The order at which services will be approached to participate in the study will be randomised using a random number function in Microsoft Excel. Consent will be obtained through the service manager via the return of the service's current two-week menu. Study recruitment will continue until the required sample is achieved. To assess secondary outcome measures, a nested evaluation will be undertaken in a randomly selected subsample of 34 participating services located in the Hunter region. For such services, Managers will also be asked if they consent to participate in a site visit to assess child dietary intake via plate waste. Services will be asked to return consent forms if they choose to participate in the site visits. To maximise study participation, a dedicated recruitment coordinator will make multiple attempts to contact services at times convenient to the centre (17,25,26). The research team have extensive experience in the childcare setting and achieving consent rates of greater than 80% in previous trials undertaken (17,27).

To assess selective non-participation bias, the coordinator will also monitor participation rates and document characteristics of consenting and non-consenting services (28).

RANDOM ALLOCATION OF CHILDCARE SERVICES

Consenting childcare services will be randomly allocated to an intervention or control group in a 1:1 ratio via block randomisation using a random number function in SAS statistical software (see figure 4.1). Block size will range between 2 and 6. Allocation of services will be undertaken by an experienced research assistant. Outcome data collectors will be blinded, however long day care service staff will be aware of their group allocation.

Figure 4.1 CONSORT diagram estimating the progress of long day care services through the trial



INTERVENTION

Implementation intervention

The multi-component intervention was designed by an expert advisory group of health promotion practitioners, implementation scientists, dietitians and behavioural scientists in consultation with childcare service cooks and service managers. The intervention strategy selection is based on a theoretical framework and previous research evidence in the childcare setting (26,28-30).

Application of a theoretical framework

The theoretical domains framework was the basis for intervention development (31,32).

The theoretical domains framework is an integrative theoretical framework developed for behavioural research and incorporates 33 theories of behaviour change. The framework includes the following health behaviour change domains: knowledge; skills; social/professional role and identity; beliefs about capabilities; optimism; beliefs about consequences; reinforcement; intentions; goals; memory, attention and decision processes; environmental context and resources; social influences; behavioural regulation (33). The framework has previously been used to design effective interventions to improve guideline implementation in clinical settings (29,33,34). Further information about the domain definitions and constructs is reported by Cane, O'Connor and Michie (33). The theoretical domains framework was chosen by the research team as it has been empirically validated, successfully applied in numerous healthcare settings and covers approximately 95% of constructs targeting behaviour change (34-38).

The theoretical domains framework was used to assess the potential behavioural determinants of the implementation of nutrition guidelines in childcare services, and inform selection of intervention strategies to influence these (32). Specifically, literature reviews of previous implementation interventions targeting food provision in childcare and semi-structured interviews with service cooks (n=7) using a modified theoretical domains framework questionnaire were undertaken, to identify the relevant domains in the framework that may influence (enable or impede) guideline implementation (29,39). The findings of the interviews were supplemented with on-site observations of food service practices and menu planning processes. Based on findings of the literature review, the interviews and the observations, a matrix developed by Michie et al was applied to map potential behaviour change techniques (implementation strategies) to the relevant theoretical domains (See Table 1 for more detail) (31). The implementation strategies to include in the intervention were selected on the basis of the mapping process and evidence of effect in changing behaviours; with consideration of contextual factors, program resources and following further consultation with health promotion practitioners, childcare service managers and service cooks (31).

Intervention strategies

Based on the above process, a six-month intervention to facilitate childcare service implementation of nutrition guidelines will be delivered to long day care centres. The intervention will target childcare service managers and service cooks given their primary

role in the menu planning and food preparation process. Specifically, the intervention will consist of the strategies listed below. Further detail about the content of each strategy and how each strategy addresses the identified domains is detailed in Table 4.1.

a) Provision of staff training

A one-day face-to-face menu planning workshop will be provided to service managers and cooks to improve staff knowledge and skills in the application of nutrition guidelines to childcare food service. The workshop will incorporate both didactic and interactive components including small group discussions, case studies, facilitator feedback and opportunities to practice new skills (40-43) (Appendix 4.5, 4.6, 4.7). Experienced implementation support staff and dietitians will facilitate the workshop.

b) Provision of resources

All intervention services will receive a resource pack to support the implementation of nutrition guidelines which includes the Caring for Children resource, menu planning checklists, recipe ideas and budgeting fact sheets (Appendix 4.8, 4.9, 4.10, 4.11). Resources to support guideline implementation were selected on the sector barriers as identified in literature reviews and expressed by service cooks during the semi-structured theoretical domains framework interviews (9,10,44).

c) Audit and feedback

Intervention service menus will be audited by a dietitian and feedback provided at two time points. The first menu audit and feedback will use baseline data and be provided at the commencement of the intervention and the second will be mid-intervention (Appendix 4.12). Intervention service cooks and managers will receive written (email) and verbal (service visit) feedback following each menu assessment via their implementation support officer (45).

d) Ongoing support

Intervention services will be allocated an implementation support officer to provide expert advice and assistance to facilitate guideline implementation. Each intervention service will receive two face-to-face contacts, following the menu planning workshop. Support contacts will be provided to service managers and cooks. Two newsletters will also be distributed to intervention services during the intervention period (46,47) (Appendix 4.13)

e) Securing executive support

The implementation support officer, the service manager and cook will sign a memorandum of understanding (MOU) outlining each party's responsibilities in working to improve food service (Appendix 4.14). Service managers will be asked to communicate support and endorsement of adhering to nutrition guidelines to other staff and update the service nutrition policy accordingly (if required) (48).

Table 4.1 Identified domains from quantitative and qualitative interviews, intervention content and delivery of intervention strategies

IDENTIFIED DOMAIN	INTERVENTION CONTENT	STRATEGY
Knowledge	The menu planning workshop will attempt to address the service managers and cooks awareness of the sector specific nutrition guidelines, the Australian Guide to Healthy Eating (AGHE) food groups and the daily recommended serves per child to be provided while in care (5).	The menu planning workshop
	The menu planning workshop will Introduce the Caring for Children resource, which outlines the sector specific nutrition guidelines. Participating services will also be provided with menu planning tools and checklists, recipe ideas, budgeting factsheets and serve size posters during the workshop.	Printed or electronic resources
	Post attending the menu planning workshop services will receive two face-to-face service visits (duration 1-2 hours) with a support officer at their service on site, which will also target specific knowledge gaps regarding application of the guidelines and provide clarification about any information about the sector specific nutrition guidelines that the service cook or manager were uncertain about.	Service visits
Skills	During the menu planning workshop the service cook and service manager will be taught step by step how to plan a service menu that is compliant with the nutrition guidelines using the menu planning checklist within the Caring for Children resource. Each service will be asked to bring their current service menu to the training and as part of the workshop will review the menu items for one full day of their menu. Activities such as serve size calculations and recipe modification exercises will assist to develop the individual menu planning skills of the service cooks and managers. In addition, small group discussions during the workshop will provide opportunities for services to share ideas, problem solve and practice menu planning processes together.	Menu planning workshop
	The follow up support contacts will provide additional opportunities for the service cook and manager to practice menu planning skills with their allocated support officer and receive immediate feedback and guidance to ensure menu compliance.	Follow up support contacts
Environmental context and resources	Services will be encouraged to adapt the service environment to be more supportive of the implementation of the nutrition guidelines. Services will be asked to display the nutrition guidelines and serve size posters in highly visible areas in the kitchen and to store provided resources at easily accessible areas.	Follow-up support contacts Printed resources

Action Planning	At the menu planning workshop the service cook and service manager will set joint goals and action plans, using a goal setting template, to work towards menu compliance based on their completed review of one full day of the service menu. Services will be encouraged to begin developing SMART (specific, measurable, achievable, realistic, appropriate timeframe) goals and indicate who is responsible to achieve each goal. A copy of the developed goals and action plans will be collected at the end of the workshop by each service's allocated support officer.	Menu planning workshop
	During the follow up contacts support officers will review the goals and actions plans of each service and utilise quality improvement principles encouraging service managers and cooks to identify problems, set new goals and implement action plans to facilitate services progression towards having a two week menu that is compliant with nutrition guidelines.	Follow-up contact
Professional Identity	The service cooks and service managers to determine clear roles and responsibilities for the implementation of nutrition guidelines, as part of their goals and action plans, during the menu planning workshop.	Menu planning workshop
	The MOU signed by the service cook and service manager during the initial follow up service visit will recommend that the service manager be supportive of the implementation of the nutrition guidelines and communicate feedback directly to the service cook.	Follow up support
	Service managers will be encouraged to update the service nutrition policy and the service cook position description to reflect the defined roles.	Securing executive support
Beliefs about consequences (reinforcement)	The intervention will attempt to strengthen the relationship and communication between the service cook and service manager([49]). The service manager will be encouraged to provide feedback to the cook throughout the intervention, as detailed in the signed MOU. Both the service manager and service cook will attend the support officer service visits, where they will together discuss the services progress towards compliance with the nutrition guidelines.	Follow up support
	A communication tool developed for the intervention will be provided to the services by their allocated support officer during the first follow up contact. The communication tool is designed for the service cook and service manager to provide clear feedback about the service menu between each another and as a monitoring tool to document the steps undertaken by the respective parties.	Printed resources
Social Influences	The newsletters distributed throughout the study period will relay key messages, provide further meal and snack ideas for inclusion on the menu and highlight case studies from services that have made significant improvements to their service menu. Highlighting	Printed materials

	achievements of other intervention services can act as an external influencer to progress services towards having a two week menu that is compliant with nutrition guidelines.

Intervention quality assurance and monitoring

The delivery of the intervention will be managed by an experienced health promotion manager, who will provide the implementation support staff and dietitians with one-day training to ensure they are equipped with the skills and knowledge required to deliver the intervention. The training will cover communication skills, role-plays, case study discussions and data collection and documentation processes.

The intervention support staff will participate in fortnightly group meetings, facilitated by the health promotion manager, to ensure standardised intervention delivery, facilitate staff learning, identify intervention delivery problems, problem solve and agree on standard responses to problems or service queries. Intervention delivery records will be maintained by implementation support staff. These records will be monitored to ensure the intervention is delivered as per protocol. Deviations in protocol will be documented and addressed by the health promotion manager.

CONTROL GROUP

Services randomised to the control group will receive usual care and be posted a hard copy of the Caring for Children resource. The control services will not receive any other intervention support from the research team.

MEASURES

Service cook demographics and menu planning practices

Service cooks will be asked to complete a mailed pen and paper questionnaire at baseline and follow-up. The questionnaire will collect service cook demographic data (including education level, years employed as a service cook, age, weekly hours worked) as well as information about the current processes that relate to the planning of menus in their service and the provision of healthy foods. Items to assess how frequently the service menu is reviewed, how feedback is incorporated during a menu review and the hours typically taken to plan a service menu were adapted from items previously used in a state-based survey of childcare service providers conducted by the research team.

Childcare service operational characteristics, nutrition environment, and menu planning practices

Childcare service operational characteristics and nutrition environment will be collected by a mailed pen and paper questionnaire completed by the service manager at baseline and follow-up (Appendix 4.15). Childcare service operational characteristics will include the hours of operation and the total number of children who are enrolled at the service, the number that attend each day and total number of staff (Appendix 4.16). The items used to assess service characteristics have been used in other Australian surveys of childcare services conducted by the research team (50). The nutrition environment of services will be assessed using items validated in a previous sample of 42 Australian childcare services and included in the service manager questionnaire (27,51). The nutrition environment items include assessment of a nutrition policy, role modelling behaviour of staff, and staff positive comments and prompts to children during meal times.

OUTCOMES

PRIMARY OUTCOMES

Compliance with nutrition guidelines

The primary outcome of the trial is the change in proportion of services with a two-week menu that is compliant with the nutrition guidelines. Compliance will be assessed via a comprehensive menu assessment undertaken by a dietitian in accordance with best practice protocols for menu assessment undertaken at both baseline and follow up (52) (Appendix 4.17). Consistent with guideline recommendations, a compliant menu will be defined as one that provides 50% of the recommended daily serves of each of the Australian Dietary Guidelines five food groups (i) vegetables and legumes/beans; ii) fruit; iii) wholegrain cereal foods and breads; iv) lean meat and poultry, fish, eggs, tofu, seeds and legumes; v) milk, yoghurt, cheese and alternatives) for children aged 2 to 5 years whom attend each day (11). A comparison of plate waste measures and menu audits (unpublished) conducted by the research team, found a 96% agreement in number of food groups provided among eighty-four meals, supporting the utility of menu assessments to assess overall guideline compliance. The recommended serve sizes are outlined in the Caring for Children resource and are based on the Australian Guide to Healthy Eating (AGHE) recommendations. Table 4.2 shows the recommended number of

serves to be provided on a childcare service menu consistent with childcare nutrition guidelines.

Table 4.2 Recommended daily serves of food groups to be provided to children aged 2-5 years who attend care for 8 or more hours (11).

Food group	Recommended daily serves to provide for 8 or more hours of care (2-5 year olds)
Vegetables and legumes/beans	2
Fruit	1
Wholegrain cereal foods and breads	2
Lean meat and poultry, fish, eggs, tofu, seeds and legumes	0.75
Milk, yoghurt, cheese and alternatives	1

Services will be asked to provide a copy of their current two week menu to the research team. An independent dietitian, blind to group allocation, will review menus and calculate serves of food groups provided per child per day, based on the AGHE food groups. For menu assessment, the food items on the menu will be classified into their appropriate food group and the total of each food group summed to generate number of serves for each food group. If insufficient information is provided to enable food group classification, the dietitian will contact service cooks for additional information via telephone or face to face visit. The dietitian will determine compliance with the nutrition guidelines based on the calculations of serves of each food group provided per child per day.

Compliance with nutrition guidelines for individual AGHE food groups

The change in proportion of services which comply with the nutrition guidelines for the individual food groups (i) vegetables and legumes/beans; ii) fruit; iii) wholegrain cereal foods and breads; iv) lean meat and poultry, fish, eggs, tofu, seeds and legumes; v) milk, yoghurt, cheese and alternatives) and 'discretionary' foods will also be compared between intervention and control group. 'Discretionary' foods are defined as those which are high in kilojoules, saturated fat, added sugars and added salt (11). Examples include cakes, sweet biscuits, chocolate, confectionary, crisps, pastries, commercially fried foods and high salt savoury biscuits (11). Discretionary foods are not recommended for provision in childcare services as outlined in the Caring for Children resource (11).

SECONDARY OUTCOMES

Theoretical domains framework constructs

Post intervention between group differences in the theoretical domains framework constructs targeted by the intervention will be assessed as a process measures part of the cook's pen and paper questionnaire.

Food group consumption

Child food group consumption is measured on two levels – service level via aggregate plate waste measures and an individual level via educator completed usual food intake questionnaires.

Service level child food group serves consumption

The secondary trial outcome will be the grams of food consumed at the service per day for each of the core food groups and the 'discretionary' foods. The data will be collected in a sub-sample of 34 services. Plate waste methods will be used to obtain aggregate serves of food groups consumed by children while in care. Aggregated plate waste has been reported to be a valid method of assessing food intake at the group level and has been previously used in studies assessing the food intake of children in the school setting (53). Plate waste will be collected for two mid and one main meals on one day of data collection at baseline and follow-up. Two trained research assistants will undertake the plate waste measurements for each service. Data collection and assessment procedures will be based on those previously reported in the literature and will include the following:

1. Research assistants will collect the written menu and additional information including recipes from the service cook, for the day of data collection.

2. Once the food is prepared and cooked, prior to being served, the food items will be separated into their respective food groups based on the AGHE and the total mass of each food group will be weighed, to the nearest 0.1 gram, using a digital scale (Nuweigh JAC838). Any liquids will be measured to the nearest millilitre. Mixed meals (those which include a combination of food groups) will be weighed as a total mass and the proportion of each food group contributing to the total mass will be determined from the recipe information collected from the service cook.

3. To measure waste, a number of tubs, dependent on the services menu items, will be provided to collect leftover food items. The tubs will be labelled with the AGHE food groups or mixed meals items included on the service menu. Tubs will also be provided and labelled for any liquids; each liquid type will be poured into a separate waste tub. Leftover food items (including any food items found on the floor) will be similarly separated into food groups, placed in labelled waste tubs and weighed to determine the leftover mass. Mixed meals will again be weighed as a total mass. The research assistants will be responsible for grouping the leftover food items. When food items become mixed through the process of serving and/or eating and the food items are unable to be weighed separately post serving then they will be treated as a mixed food and serving sizes attributed based on the combined food groups, determined from the recipe provided by the service cook.

4. The research team will subtract the leftover weight of each food group from the initial weights, providing the total weight of each food group consumed by the children.

5. The steps outlined above will be repeated for each meal within the eight hours of care (typically two mid meals and one main meal).

The research assistants will be trained in safe food handling practices and wear gloves at all times to address occupational health and safety concerns. The data collection service visits will be scheduled at a time convenient for the service cook and the measurements will be conducted to cause minimal disruption to the service cooks daily practices.

Individual child usual food group serve consumption

A further secondary outcome measure will be the usual serves of food, from each food group (as well as 'discretionary' foods) consumed by individual children attending each service. This will be measured in the same sub-sample of 34 services by childcare service educator completed questionnaires at baseline and follow-up. The food intake questionnaire was developed specifically for this intervention and was adapted from a reliable and validated dietary intake survey for children (54) (Appendix 4.18). The tool has been developed in recognition of the resource burden required to capture 'usual intake' using gold standard or objective data collection methodologies such as direct observations of children and/or multiple day plate waste assessments (55,56).

The food intake questionnaire requires staff to record the number of serves of each of the Australian Dietary guideline food groups plus 'extra' foods that the child usually consumes across the day, whilst in care. Research assistants will provide service educators with brief training and a supporting resource, explaining how to accurately complete the child food intake questionnaire. The child food intake questionnaires will be provided to educators during the full day data collection service visit. The questionnaire will only be completed for 2-5 year old children attending care on the day of data collection. To maximise the number of returned questionnaires, the research team will place a data collection box at the service, which will be collected one week post the full day data collection service visit. One member of the research team will be responsible for monitoring and following up the return of the child food intake questionnaires.

Intervention acceptability

As part of the follow-up pen and paper questionnaires (Appendix 4.19, 4.20), services allocated to the intervention group will answer items related to the use, appropriateness, and satisfaction with the resources, training and ongoing support provided by the implementation team. Both the service cook and service manager will answer these acceptability items. The items are not validated and will be similar to those used by the research team to evaluate previous health promotion programmes in childcare services (57). The items will be answered on a 4 point Likert scale (strongly disagree, disagree, agree, strongly agree).

Contamination and co-intervention

Intervention contamination and receipt of other interventions provided separate to the trial will be assessed via pen and paper questionnaires completed by service cooks and service managers in both intervention and control groups at follow-up. The questionnaire items will assess if the control services were exposed to any intervention materials or support during the study period. If they received any additional support to improve menu planning or food preparation during the study period, participants will be asked to describe such support.

Context

A systematic search will be conducted to aid the assessment of the external validity of the trial findings and to describe the context in which the trial was conducted. The search will

include national and state education websites, local newspaper archives and accreditation and national healthy eating recommendations and guidelines to identify any changes in government policy, standards, sector accreditation requirements and nutrition guidelines that may impact on the healthy eating environment and the provision of healthy foods within the childcare setting. The date of events and release of promotional materials related to the dissemination of the Caring for Children resource will also be documented. The search will include the 12 months prior to and the six months during intervention delivery.

Delivery of intervention strategies

Project records maintained by implementation support staff will be used to monitor and assess the delivery and uptake of each of the intervention strategies.

Provision of tools and resources: The type of tools/resources provided to each intervention service will be monitored and recorded, along with the date they were distributed.

Provision of staff training: The name of the service manager and service cook who attended the one day menu planning workshop will be recorded by implementation support officers. In addition the date and location of the workshop each intervention service attended will be documented.

Executive support: A copy of the goals developed by intervention service cooks and service managers will be collected by implementation support officers at the completion of the one day menu planning workshop (Appendix 4.21).

Audit and feedback: The date each menu assessment is completed and feedback report provided to intervention services will be recorded by implementation support officers.

Ongoing support (newsletters, follow up service visits/calls): The date and frequency of support contacts by implementation support officers to each service will be recorded.

MINIMISING ATTRITION

Evidence based strategies will be employed to minimise study attrition (58). Specifically, strategies include allocating one research assistant to monitor follow-up data collection, using multiple modes of contact (including phone, face-to-face and email) to collect data

and sending reminder letters and emails to services that have not provided follow-up data (58). To minimise burden to services, the data collection site visits will be scheduled at a convenient time for the services and the pen and paper questionnaires will be an appropriate length to complete.

DATA ENTRY

Hard copies of data will be stored in lockable filing cabinets, at the Hunter New England Population Health facility, of which only the study team will have access to. Electronic data will be stored on password protected computers and within a secure electronic database. The pen and paper questionnaire will be coded by a trained research assistant; then checked by the chief investigator and one other investigator. This same coding process will be undertaken for the educator completed usual food intake questionnaires. To ensure data quality, double data entry will be conducted for 10% of all data for each measure.

SAMPLE SIZE AND POWER CALCULATIONS

SERVICES IMPLEMENTATION OF NUTRITION GUIDELINES (COMPLIANT/NON-COMPLIANT)

Allowing for a 13% compliance rate in the control group, the recruitment of 29 services in the intervention and 29 services in the control will enable the detection of an absolute difference of 32% in primary outcome at follow up, with 80% power, using a two-sided alpha of 0.05 (17).

STATISTICAL ANALYSIS

The primary trial outcome will be assessed by comparing group differences in proportion of services having 2-week menus which are compliant with nutrition guidelines (provide 50% of recommended serves of the AGHE food groups per child per day). The software utilised for all statistical analysis will be SAS (version 9.3 or later). The primary trial outcome will be analysed under an intention-to-treat framework, with services being analysed based on the groups to which they were allocated, regardless of the treatment type or exposure received (59). All statistical tests will be 2-tailed with an alpha value of 0.05. A logistic regression model, adjusted for baseline values of the primary trial outcome will be used to determine intervention effectiveness. All available data will be

used for the analysis. Sensitivity analyses, using multiple imputations for missing data will also be performed to assess the robustness of the findings of the primary analyses.

DISCUSSION

The limited available evidence regarding the implementation of nutrition guidelines in menu based childcare services highlights the need for further intervention studies to support childcare service's to implement these guidelines. The strengths of this trial include its randomised design, the use of the theoretical domains framework to guide intervention strategy selection to target barriers and facilitators to the implementation of the childcare nutrition guidelines and rigorous assessment of primary and secondary outcome measures. This trial will provide strong evidence to advance implementation research in this setting and allow assessment of the impact on child diet. This randomised controlled trial is the first in the childcare setting to assess the impact of improving guideline implementation on child dietary intake.

CONCLUSION

This paper describes the design; delivery and evaluation of a randomised trial to support childcare services implement nutrition guidelines. The proposed trial addresses a gap in literature by applying implementation theory to inform the design and development of an intervention to improve childcare services implementation of nutrition guidelines. The trial will be the first national randomised trial of its type and is likely to represent a substantial contribution to the literature in this field.

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COMPETING INTERESTS

The authors declare that they have no competing interests.

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ETHICS AND DISSEMINATION

Ethical approval to conduct the study has been obtained from the Hunter New England Human Research Ethics Committee (reference: 06/07/26/4.04). Evaluation data and process data collected as part of the study may be presented at scientific conferences, be published within scientific journals, form part of student theses. Participant's confidentiality will be maintained and it will not be possible to identify individuals or services from any publication or presentation arising from the research.

AUTHORS CONTRIBUTIONS

First author KS led the development of this manuscript. KS, SY, MF and LW conceived the intervention concept. KS, SY, MF, JJ, LW contributed to the research design and trial methodology. All authors contributed to and approved the final version of this manuscript.

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CHAPTER 5

Improving the implementation of nutrition guidelines in childcare centres improves child dietary intake: Findings of a randomised trial of an implementation intervention

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ABSTRACT

INTRODUCTION

Evidence suggests that improvements to the childcare nutrition environment can have a positive impact on child dietary intake. The primary aim of the study is to assess, relative to usual care, the effectiveness of a multi-strategy implementation intervention in improving childcare compliance with nutrition guidelines. As a secondary aim, the impact on child dietary intake was assessed.

METHODS

Parallel group, randomised controlled trial design with forty-five childcare services in the Hunter New England region, New South Wales, Australia. The six month intervention was designed to overcome barriers to the implementation of the nutrition guidelines that had been identified by applying the theoretical domains framework. Intervention strategies included the provision of staff training and resources, audit and feedback, ongoing support and securing executive support. The primary outcome of the trial was the change in the proportion of long day care services that had a two-week menu compliant with the childcare menu dietary guidelines, measured by comprehensive menu assessments. As a secondary outcome, child dietary intake while in care as also assessed via aggregate plate waste measures.

RESULTS

There were no differences between groups in the proportion of services providing food servings (per child) compliant with nutrition guideline recommendations for ALL five (5/5) food groups at follow-up (i.e. full compliance). Relative to control services, intervention services were more likely to be compliant with guidelines in provision of fruit (OR=10.84;95%CI:1.19,551.20;p0.0024); meat and meat alternatives (OR=8.83;95%CI:1.55,-;p0.023); dairy (OR=8.41;95%CI:1.60,63.62;p0.006)) and discretionary foods (OR=17.83;95%CI:2.15,853.73;p0.002). Children in intervention services consumed greater serves of fruit (adjusted difference=0.41;95%CI:0.09,0.73; p0.014) and vegetables (adjusted difference=0.70;95%CI:0.33,1.08;p<0.001).

CONCLUSION

Findings indicate that service level changes to menus in line with dietary guidelines can result in improvements to children's dietary intake. This study provides evidence to advance implementation research in the setting as a means of enhancing child public health nutrition.

KEY WORDS

Childcare; nutrition; children; diet; implementation, guidelines.

INTRODUCTION

Dietary risk factors, such as low fruit and vegetable intake and high sodium intake, are a primary cause of death and disability. In 2010, the Global Burden of Disease study reported that over 11 million deaths worldwide were due to dietary risk factors alone (1). Dietary patterns and food preferences developed in childhood are known to track into adulthood and influence the risk of future chronic disease (2). Therefore, developing healthy eating patterns in childhood is recommended by the World Health Organisation as a key chronic disease prevention strategy (3).

Childcare services are an important setting for public health interventions. Systematic review evidence suggests that improvements to the childcare nutrition environment can have a positive impact on child dietary intake (4). Australian childcare services are required to comply with licensing and accreditation standards as outlined in the National Quality Framework. There are seven National Quality Standards (NQS's) which provide a national benchmark for services allowing for assessment of the quality of each childcare service. Of particular relevance to this study is NQS 2 'children's health and safety' which states that childcare services implement policies and practices to support children's health and wellbeing and makes specific reference to the provision of healthy foods (5). Childcare services also provide access to a large number of children for prolonged periods of time at a critical stage of development[(4)]. In Australia, 52% of children aged up to 6 years, attend formal care at a pre-school or long day care centre (LDC) (6) for on average 18 hours per week and can consume a large proportion (50% - 67%) of their daily dietary requirements during attendance (7, 8).

Many countries, including Australia, Canada and England, recommend that childcare services provide foods to children consistent with their national dietary guidelines (9, 10). International and Australian research, however, suggests that foods and beverages provided by services often do not meet dietary guideline recommendations. Assessment of menus from 118 nurseries in England, found that all childcare services menus failed to comply with sector nutrition guidelines (11). Furthermore, an analysis of lunch menus from 83 childcare services in Oklahoma USA concluded that the menus did not provide sufficient carbohydrates, dietary fibre, iron, vitamin D and vitamin E; and provided excessive sodium. Similarly, in Australia, a menu audit of 46 long day care service menus found that no service provided food that was compliant with all sector nutrition guideline recommendations (12).

Without implementation childcare dietary guidelines cannot yield improvements in child health. Few trials however, have been conducted to assess how to best support the implementation of nutrition guidelines in this setting. A recent Cochrane review (2017) found only two randomised trials of interventions targeting the implementation of dietary guidelines (13, 14). While both studies demonstrate that implementation strategies such as staff professional development and ongoing support may be effective at improving food provision, neither study measured the impact of improving food provision on child dietary intake.

Given the limited research available in this field, the primary aim of the study is to assess, relative to usual care, the effectiveness of a multi-strategy implementation intervention in improving child care services compliance with nutrition guidelines. As a secondary aim, the impact on service level child dietary intake was also assessed.

METHODS

Ethical approval to conduct the study was obtained from the Hunter New England Human Research Ethics Committee (reference: 06/07/26/4.04) and the University of Newcastle Human Research Ethics Committee (reference H-2012-0321). Trial registration ID: ACTRN12615001032549.

DESIGN AND SETTING

A detailed protocol has been published elsewhere (15). A randomised controlled trial was conducted with childcare services, specifically long day care services in a single Local Health District in the state of New South Wales, Australia. There are currently 368 childcare services in the study region, of which the 106 LDC services which prepare and provide food onsite to children while in care served as the sampling frame.

Participants

Eligible childcare services were those that prepared and provided one main meal and two mid-meals to children while in care, and that were open for at least eight hours per day. Services that did not prepare and provide meals to children onsite or that did not have a cook with some responsibility for menu planning were excluded. Services catering exclusively for children requiring specialist care, mobile preschools and family day care

centres were also excluded, given the different operational characteristics of these services compared to centre-based LDC services.

Recruitment procedures

Service managers were mailed information about the study approximately one week prior to recruitment. A random number function in Microsoft Excel was used to determine the order at which services were approached to participate in the study. Services were phoned and consent was obtained through the service manager agreeing to provide the service's current two-week menu for baseline assessment.

Randomisation and allocation

As consent was obtained via phone, consenting childcare services were immediately randomly allocated to an intervention or control group in a 1:1 ratio via block randomisation using a random number function in SAS statistical software. Block size ranged between two and six. All trial outcome data collectors were blinded; however childcare service staff were aware of their group allocation.

IMPLEMENTATION INTERVENTION

The implementation intervention was delivered to participating childcare services over a 6 month period. Given their primary role in menu planning and the food preparation process in such services, long day care service managers and service cooks were the service personnel targeted by the intervention.

The multi-strategy implementation intervention was developed by an experienced team of health promotion practitioners, implementation scientists, dietitians and behavioural scientists in consultation with childcare service cooks and service managers (16). The intervention aimed to increase the implementation of the sector nutrition guidelines by addressing barriers and enablers to the implementation of such guidelines and was developed based on the *Caring for Children* resource (which outlines the nutrition guidelines for child care services in the state of New South Wales included in Table 1)(17), the Theoretical Domains Framework (TDF) and previous research conducted in the childcare setting (18-21).

Application of the tdf

The TDF is an integrative theoretical framework of factors considered to influence behaviour change and incorporates 33 theories of behaviour change (21-24). The framework includes 14 health behaviour change domains thought to play a role in successful implementation of best practice guidelines and policies and has been empirically validated in the childcare as well as healthcare settings (18, 21, 25-30). The TDF was used to develop a semi-structured interview, completed with a convenience sample of seven childcare service cooks to identify factors (barriers and enablers) that influenced childcare services implementation of nutrition guidelines. The factors identified in these interviews informed the selection and design of the implementation intervention strategies.

Intervention strategies

The implementation intervention consisted of the following strategies:

a) *Securing executive support (31)*

A memorandum of understanding (MOU) outlining each party's responsibilities to implement the nutrition guidelines was signed by the implementation support officer, the service manager and the service cook. Service managers were also asked to communicate support and endorsement of adhering to nutrition guidelines to other staff and update the service nutrition policy accordingly (if required).

b) *Provision of staff training (32-35)*

A one-day face-to-face menu-planning workshop was provided to service managers and cooks aiming to improve their knowledge and skills in the application of nutrition guidelines to childcare food service. The workshop incorporated both didactic and interactive components including small group discussions, case studies, facilitator feedback and opportunities to practice new skills. Experienced implementation support staff and dietitians facilitated the workshop.

c) *Provision of resources (17)*

All intervention services received a resource pack to support the implementation of the nutrition guidelines which included the Caring for Children resource, menu planning checklists, recipe ideas and budgeting fact sheets.

d) *Audit and feedback (36)*

Intervention services had a dietitian complete an audit of their two week menus at two time points (baseline and mid-intervention), with written and verbal menu feedback provided at each time point.

e) *Implementation support (37, 38)*

Intervention services were each allocated an implementation support officer to provide expert advice and assistance to facilitate nutrition guideline implementation. Each implementation support officer offered two face-to-face contacts with the service following the menu planning workshop. In addition to the support visits, two newsletters were also distributed to intervention services during the intervention period.

Control group

Services randomised to the control group were posted a hard copy of the *Caring for Children* resource and received usual care from the local health district health promotion staff. The control services did not receive any other implementation support from the research team.

DATA COLLECTION PROCEDURES AND MEASURES

Service cook demographics and menu planning practices

Service cooks were asked to complete a mailed pen and paper questionnaire at baseline and follow-up. The questionnaire captured data about the service cook characteristics (education level, years employed as a service cook, age, weekly hours worked) and information about their menu planning processes and the provision of healthy foods (such as how frequently the service plans a menu) in their service. Questionnaire items were adapted from items previously used in a state-based survey of childcare service providers conducted by the research team (39).

Childcare service operational characteristics, nutrition environment and menu planning practices

Service managers were also asked to complete a pen and paper questionnaire mailed to them at baseline and follow-up. The questionnaire captured childcare service operational characteristics (including the hours of operation; the total number of children who are

enrolled at the service; and the number of children whom attend each day) and the service nutrition environment (including presence of a nutrition policy; role modelling behaviour of staff; and staff provision of positive comments and prompts to children during meal times). The items used in the questionnaire have been used in previous Australian surveys of childcare service managers conducted by the research team (39, 40).

Primary outcomes: compliance with nutrition guidelines

Services provided a copy of their current two-week menu to the research team. An independent dietitian, blinded to group allocation assessed the menu and calculated serves of food groups per child based on the Australian Guide to Healthy Eating (AGHE) food groups. Menu compliance with nutrition guidelines was assessed via a comprehensive menu assessment undertaken by a dietitian in accordance with best practice protocols at baseline and follow-up (15, 41). Compliance with the nutrition guidelines was determined based on the calculations of serves of each food group provided per child each day. The calculated serves of each food group were rounded to the nearest 0.25 of a serve.

Two primary trial outcomes were assessed:

i) *Full compliance with nutrition guidelines.* Guidelines for the sector indicate menus must provide 50% of the recommended daily serves of the five food groups specified in the Australian Guide to Healthy Eating (AGHE) across a 2 week menu cycle (10 days). Specifically, to be fully compliant services must list on their menu each day for two weeks: i) 2 serves of vegetables and legumes/beans; AND ii) 1 serve of fruit; AND iii) 2 serves of wholegrain cereal foods and breads; AND iv) 0.75 serves of lean meat and poultry, fish, eggs, tofu, seeds and legumes; AND v) 1 serve of milk, yoghurt, cheese and alternatives (See Table 5.1). Full compliance was defined as the proportion of services providing food servings (per child) compliant with nutrition guideline recommendations for ALL five food groups across all 10 days of a two week menu.

ii) *Compliance with nutrition guidelines for individual AGHE food groups*. Six measures were used to assess compliance with nutrition individual guideline recommendations for each five food groups specified above and discretionary

foods. Discretionary foods are those which are high in kilojoules, saturated fat, added sugars and added salt, and are not recommended for provision in childcare services. Specifically for this outcome we assessed the proportion of services providing across every day of a two week menu, the recommended serves of each food group listed in Table 5.1, as well as discretionary foods (17).

Table 5.1 Recommended daily serves of food groups to be provided to children aged 2-5 years who attend care for 8 or more hours.

Food group	Recommended daily serves to provide for 8 or more hours of care (2-5 year olds)
Vegetables and legumes/beans	2
Fruit	1
Wholegrain cereal foods and breads	2
Lean meat and poultry, fish, eggs, tofu, seeds and legumes	0.75
Milk, yoghurt, cheese and alternatives	1

Secondary trial outcomes

Two secondary outcomes were also included to provide greater description of any changes occurring in the primary measures of menu compliance. These measures were not prospectively registered:

i) *Menu compliance score (Mean number of compliant food groups)*. A score for menu compliance was generated by summing the number of food groups and discretionary foods provided in sufficient quantity to meet guideline recommendations for each service. Mean score could range between zero and six, with a score of one allocated for each of the food groups of (i) vegetables and legumes/beans; ii) fruit; iii) wholegrain cereal foods and breads; iv) lean meat and poultry, fish, eggs, tofu, seeds and legumes; v) milk, yoghurt, cheese and alternatives) as well as for 'discretionary' foods.

ii) *Mean number of serves of each food group provided.* The mean number of serves of each food group and discretionary foods listed on menus was also assessed.

Theoretical domains framework constructs

At post intervention, theoretical domains framework (TDF) constructs (knowledge, skills, professional role and identity, optimism, reinforcement, Goals, Environmental context and resources, social influences) targeted by the intervention were assessed via an online survey completed by service cooks for both intervention and control groups. The survey included 61-items covering the 14 TDF domains and was previously validated with long day care service cooks in Australia (29). Service cooks were asked to rate their barriers and enablers to implementing the sector nutrition guideline on a seven-point Likert scale from "Strongly disagree" to "Strongly agree". The study only measured the post intervention difference of the TDF domains as awareness of the sector nutrition guidelines at baseline was low.

Service level child food group consumption

Child consumption was assessed in a sub sample of 28 randomly selected (intervention n=15; control n=13) services. The aggregate serves of each of the core food groups and 'discretionary' foods consumed by children, for two mid-meals and one main-meal, while in care was assessed at a service level at baseline and follow-up. Plate waste data was collected by two trained research assistants during a full day data collection site visit at each time point. On the day of data collection, the research assistants collected the services menu and the pre and post serving weights of two mid meals (morning and afternoon tea) and one main meal (lunch). The process for collecting plate waste measures was based on procedures previously reported in the literature (42) and is detailed in the published protocol paper (15).

Contamination, co-intervention and context

Intervention contamination and receipt of other interventions that may have influenced menu planning and food preparation was assessed in both intervention and control groups at follow-up via pen and paper questionnaires completed by service cooks and service managers.

A systematic search to identify any changes in government policy, standards, sector accreditation requirements and nutrition guidelines that may impact on the healthy eating environment and the provision of healthy foods within the childcare setting was conducted to aid the assessment of the external validity of the trial findings and to

describe the context in which the trial was conducted. The search was based on procedures applied in previous implementation trials in this setting (19) and involved reviewing local news archives, websites of national and New South Wales health and education departments, accreditation standards and national healthy eating guidelines to identify the existence of or changes in government policy and standards, funded programs, or guidelines that may influence the healthy eating environments of childcare services. The search included the 12 months prior to and during the 6-month intervention.

Adverse effects

Information on adverse effects was assessed via items included in the cook's pen and paper questionnaire completed at baseline and follow-up. Measures included: Receipt of negative feedback about the service menu in the last month (received from educators, children and or parents) and the estimated average percentage of each meal not consumed by the children, classified as waste (morning tea, lunch, afternoon tea).

Intervention delivery

Project records maintained by implementation support staff were used to monitor the delivery of the intervention strategies.

SAMPLE SIZE AND POWER CALCULATIONS

Compliance with nutrition guidelines

Based on results of a preliminary study undertaken by the research team, the recruitment of 29 services in the intervention group and 29 services in the control group will enable the detection of an absolute difference of 32% between groups in the primary outcome at follow up, allowing for a 13% overall compliance rate in the control group, with 80% power, with a two-sided alpha of 0.05. If the intervention were made available to all services within NSW, approximately 1118 childcare services (~30%) in the state would be compliant with the state guidelines, impacting on the diet of thousands of children whom attend these services.

STATISTICAL ANALYSES

SAS (version 9.3 or later) software was utilised for all statistical analysis. Socioeconomic characteristics were determined using service postcodes, which were classified as being

in the top or bottom 50 % of New South Wales according to the Socio-economic Indices for Areas (43). All statistical tests were two-tailed with an alpha value of 0.05 and all available data was used for the analysis. All trial outcomes were analysed under an intention-to-treat framework using all available data with services analysed based on the groups to which they were allocated, regardless of the treatment type or exposure received. Logistic regression models, adjusted for baseline values of the outcome were used to determine effectiveness of the intervention in improving full compliance with nutrition guidelines; and compliance with nutrition guidelines for individual AGHE food groups. Linear regression models, adjusted for baseline values of all outcomes were used to determine effectiveness of the intervention on modifying the mean number of compliant food groups, mean number of serves of each food group planned on the service menu and the mean number of serves consumed for each AGHE food group and 'discretionary' foods. Analyses using multiple imputations for missing data were also performed.

Similar to previous studies, average scores for each TDF construct were calculated by summing all scores for all items within the domain ("Strongly disagree"=1 to "Strongly Agree"=7) and dividing by the total number of responses within the domain. T-tests were used to assess between group differences on theoretical domains framework constructs at follow-up.

RESULTS

Of the 106 eligible long day care services in the study region, 90 (85%) nominated supervisors were eligible, 79 (87%) consented for their service to participate in the study and 54 were randomised into the study (intervention n=26; control n=28). The remaining 25 services were allocated to receive an alternate intervention consisting of training only due to service team resource availability (Figure 5.1). Of the 54 services in this study, nine services (intervention n=1; control n=8) withdrew consent prior to baseline data collection and without knowledge of group allocation. Only one service did not complete follow up data collection. The baseline characteristics of the long day care services are described in table 5.2. There was a significant difference in service cooks qualifications between the intervention and control service (52% intervention; 90% control (p=<0.05).

Figure 5.1 Retention of childcare services throughout study

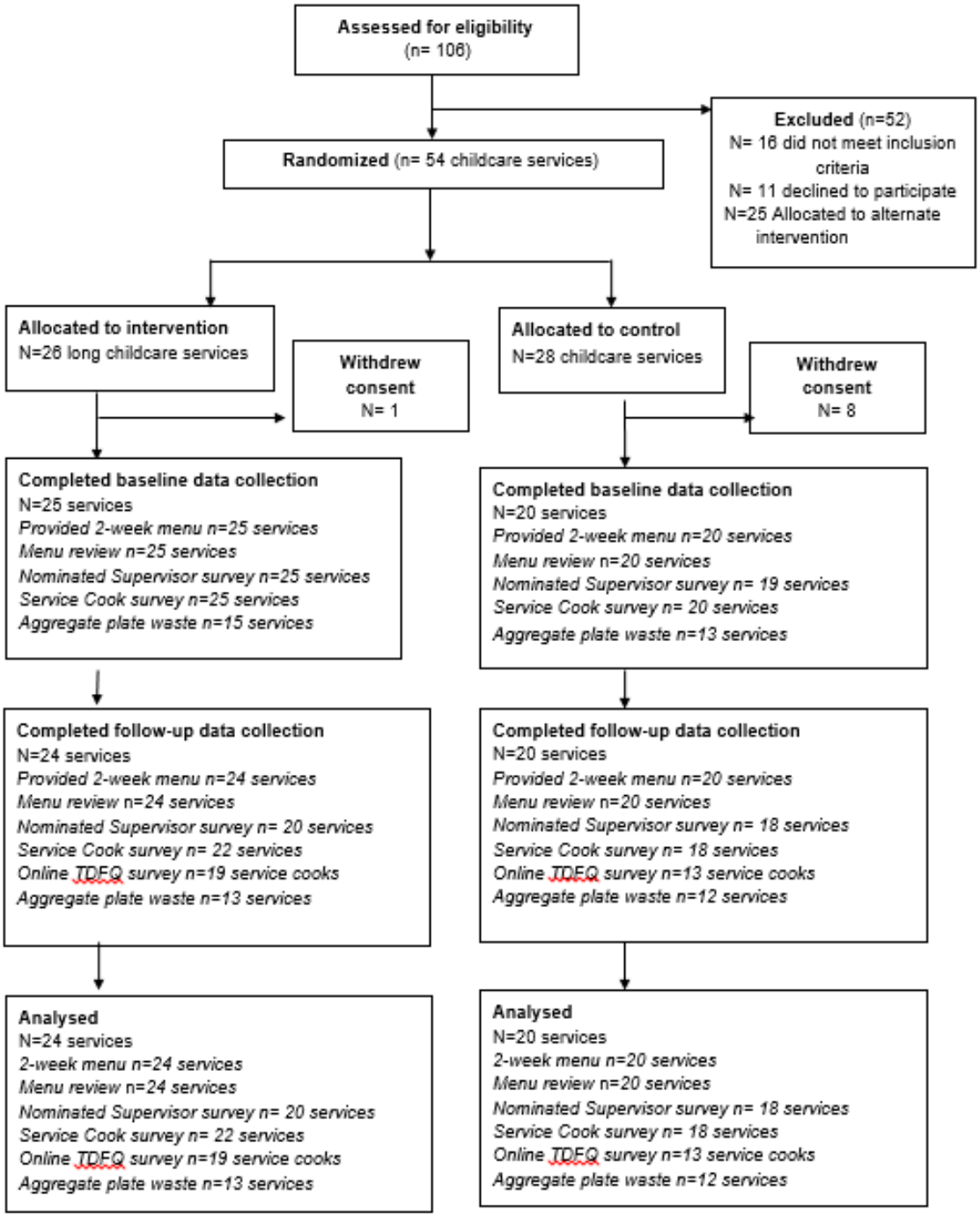

Table 5.2 Baseline characteristics of childcare services and service cooks

	Intervention (n=25) n(%)	Control (n=20) n(%)
Operational characteristics		
Total no. of children enrolled *(mean(SD))*	129 (33.6)	114 (66.9)
No. Aboriginal and Torres Strait Islander children enrolled *(Mean(SD))*	5 (6.5)	8 (17.5)
Daily budget allocated for food provision per child^ *(Mean(SD))*	$2.05 ($0.45)	$2.21 ($0.90)
% Services in high socioeconomic area	14 (56)	8 (40)
Services located (SEIFA):		
Major city + inner regional	23 (92)	17(85)
Outer regional/remote Australia	2 (8)	2 (10)
Service cook demographic variable		
University or Tafe qualification	13 (52)	18 (90)
<40 years of age	7 (29)*	5 (26)**
>5 years as a service cook in childcare services	9 (38)*	7 (35)**
Works ≤20 hours per week	2 (8)	5 (25)
Nutrition environment		
Service has a nutrition policy	25 (100)	19 (100)**
Menu is displayed in service for families to view	25 (100)	19 (100)**
Menu planning practices		
Service plans a menu every month or more frequently	10 (40)	6 (32)**

*n=24 intervention services completed survey item,
**n=19 control services completed survey item
^n=11 intervention services, n=11 control services completed survey items

PRIMARY TRIAL OUTCOMES

I) Full compliance with nutrition guidelines

At follow-up one intervention service (4%) and zero control services were fully compliant with the sector nutrition guidelines (all 5/5 food groups) (See table 5.3). Statistical analyses were not able to be performed given zero values across multiple cells.

II) Compliance with nutrition guidelines for individual AGHE food groups

Relative to control, significantly greater compliance among services allocated to the intervention group was reported for four of the six food groups (fruit (OR = 10.84; 95%CI:1.19,551.20; p0.0024); meat and meat alternatives (OR = 8.83; 95%CI:1.55,-; p0.023); dairy (OR = 8.41; 95%CI:1.60,63.62; p0.006); and discretionary foods (OR = 17.83; 95%CI:2.15,853.73; p0.002)) (Table 5.3)

Table 5.3 Baseline and follow up results for the outcomes: Compliance with nutrition guidelines; compliance with individual AGHE food groups; and mean number of serves of each food group planned on the service menu.

	Intervention		Control		Analysis using all available data (controlled for baseline)		Analysis using multiple imputation (controlled for baseline)	
	Baseline n=25	Follow-up n=24	Baseline n=20	Follow-up n=20	OR (95% CI)	Exact p-value	OR (95% CI)	Exact p-value
Primary Outcome: *Compliance with nutrition guidelines (n (%))*								
Full compliance	0 (0)	1 (4)	0 (0)	0 (0)	-	-	-	-
Primary Outcome: *Compliance with nutrition guidelines for individual AGHE food groups (n (%))*								
Vegetables	0 (0)	3 (12.50)	0 (0)	0 (0)	3.43 (0.50, -)	0.239	3.28 (0.48, -)	0.242
Fruit	4 (16)	9 (37.50)	5 (25)	2 (10)	10.84 (1.19, 551.20)	0.024	9.21 (0.95, 488.40)	0.049
Breads and Cereals	3 (12)	3 (12.5)	2 (10)	2 (10)	1.19 (0.11, 16.30)	1.000	1.15 (0.11, 15.79)	1.000
Meat and Alternatives	1 (4)	7 (29.17)	0(0)	0 (0)	8.83 (1.55, -)	0.023	8.37 (1.48, -)	0.025
Dairy	10 (40)	15 (62.50)	5 (25)	3 (15)	8.41 (1.60, 63.62)	0.006	6.26 (1.26, 43.40)	0.020
Discretionary	0 (0)	12 (50)	0 (0)	1 (5)	17.83 (2.15, 853.73)	0.002	16.54 (2.00, 788.10)	0.002
Secondary Outcome: *Mean number of serves of each food group planned on the service menu (mean (SD))*								
					Estimate (95% CI)	**p-value**	**Estimate (95% CI)**	**p-value**

Vegetables	1.18 (0.50)	2.16 (0.55)	1.05 (0.57)	1.10 (0.49)	1.01 (0.70, 1.31)	<0.001	0.96 (0.65, 1.27)	<0.001
Fruit	0.83 (0.51)	1.10 (0.35)	0.91 (0.45)	0.78 (0.40)	0.35 (0.15, 0.55)	<0.001	0.34 (0.14, 0.54)	0.002
Breads and Cereals	2.00 (0.65)	2.34 (0.57)	2.13 (0.72)	2.09 (0.61)	0.31 (0.01, 0.63)	0.044	0.31 (0.01, 0.61)	0.045
Meat and Alternatives	0.55 (0.23)	0.77 (0.15)	0.50 (0.18)	0.58 (0.20)	0.16 (0.08, 0.25)	<0.001	0.15 (0.06, 0.24)	0.002
Dairy	1.19 (0.43)	1.40 (0.42)	1.13 (0.54)	1.04 (0.50)	0.35 (0.07, 0.63)	0.016	0.33 (0.06, 0.61)	0.019
Discretionary	0.63 (0.44)	0.08 (0.19)	0.65 (0.35)	0.58 (0.41)	-0.47 (-0.66, -0.29)	<0.001	-0.42 (-0.62, -0.21)	<0.001

SECONDARY TRIAL OUTCOMES

i) Menu Compliance score (Mean number of compliant food groups)

There was a significant difference between groups at follow-up in the mean number of food groups compliant (mean difference 1.57; 95%CI: 0.82, 2.33; p=<0.001) favouring the intervention.

ii) *Mean number of serves of each food group provided*

There were significant differences (Table 5.3) between groups at follow-up in the mean number of serves of each food group planned on the menu for all six of the food groups.

Theoretical domains framework constructs

At follow-up there was no significant difference between the intervention and control group in the TDF domain scores (knowledge (p=0.45); skills (p=0.21); social/professional role and identity (p=0.12); reinforcement (p=0.99); goals (p=0.37); environmental context and resources (p=0.77); social influences (p=0.75)) for the domains that were targeted by the intervention.

Service-level child food group serves consumption

Significant improvements in consumption, relative to control, were found for two out of the six food groups (Vegetables 0.70; 95%CI:0.33,1.08; p <0.001); Fruit 0.41; 95%CI: 0.09,0.73; p= 0.014) (Table 5.4).

Table 5.4 Service level child food group serve consumption at baseline and follow-up

	Intervention		Control		Analysis using all available data (controlled for baseline)		Analysis using multiple imputation (controlled for baseline)	
	Baseline n=15, Mean (SD) serves	Follow-up n= 13, Mean (SD) serves	Baseline n=13, Mean (SD) serves	Follow-up n= 12, Mean (SD) serves	Estimate (95% CI)	p-value	Estimate (95% CI)	p-value
Vegetables	0.58 (0.45)	1.33 (0.60)	0.51 (0.37)	0.56 (0.27)	0.70 (0.33, 1.08)	<0.001	0.56 (0.19, 0.94)	0.005
Fruit	0.39 (0.36)	0.87 (0.44)	0.42 (0.29)	0.46 (0.30)	0.41 (0.09, 0.73)	0.014	0.32 (0.01, 0.63)	0.042
Breads and cereals	1.19 (0.78)	1.85 (0.74)	1.45 (0.48)	1.66 (1.44)	0.26 (-0.67, 1.21)	0.560	0.18 (-0.67, 1.04)	0.661
Meat and Alternatives	0.47 (0.38)	0.66 (0.27)	0.38 (0.37)	0.53 (0.31)	0.13 (-0.12, 0.38)	0.296	0.03 (-0.21, 0.27)	0.816
Dairy	0.55 (0.23)	1.03 (0.57)	0.56 (0.26)	1.01 (0.62)	-0.02 (-0.48, 0.43)	0.902	-0.05 (-0.46, 0.37)	0.822
Discretionary	0.53 (0.52)	0.08 (0.28)	0.62 (0.65)	0.58 (1.00)	-0.54 (-1.14, 0.05)	0.073	-0.42 (-0.98, 0.14)	0.136

Contamination, co-intervention and context

At follow-up, no intervention and no control service cooks or service managers reported receiving any additional intervention or support beyond the prescribed intervention.
The systematic search undertaken did not identify any changes in childcare government policy, standards, sector accreditation requirements and nutrition guidelines related to healthy eating environment and the provision of healthy foods within the childcare setting. However the trial was conducted concurrently with a state-wide childhood obesity prevention initiative, where by services were eligible to receive training or support regarding healthy eating and physical activity, which may have included support or training to improve food provision (44). Internal service records identified 10 services (five intervention and five control) that had completed the state-wide training between the specified period (12 months prior to intervention delivery and during the 6-month intervention). For all except one service (intervention), the training was completed by service educators.

Adverse events

At follow-up, after adjusting for baseline values, there was no significant difference observed between groups for service cooks reporting negative feedback received about the service menu in the past month from educators (intervention 32% (n=7/22) vs control 25% (n=4/16); p=0.62), children (intervention 32% (n=7/22) vs control 6% (n=1/16); p=0.07) or parents (intervention 9% (n=2/22) vs control 0% (n=0/16); p=0.95).

At follow-up, after adjusting for baseline values, there was also no significant difference observed between groups for the estimated average percent of food classified as waste for each meal (morning tea -0.41 (-2.35,1.52) p=0.66; lunch 3.31 (-2.64, 9.27) p=0.26; afternoon tea -1.24 (-3.77, 1.28) p=0.31).

Delivery of intervention strategies

All services were offered and accepted six months of implementation support via telephone contact from an implementation support staff member. Over 90% of intervention services signed the MOU, received all of the intervention resources and newsletters, participated in two service visits and completed the mid-point menu review and were provided with a feedback report. Eighty-eight percent of nominated

supervisors and ninety-two percent of service cooks attended the one-day menu-planning workshop.

DISCUSSION

This study is one of the few randomised control trials measuring the effectiveness of a multi-component implementation intervention on childcare service compliance with nutrition guidelines. The study found that the intervention improved compliance with individual core food groups (fruit; meat and meat alternatives; dairy; and discretionary foods) and, that child intake of some core foods (vegetables and fruit) increased as a consequence. In addition the intervention had no adverse effects on food wastage or the service receiving negative feedback about the menu. Such findings provide one approach for policymakers and service delivery organisations to enhance childcare service guideline compliance and children's intake of healthy food while in care.

The intervention, however did not improve full compliance with nutrition guidelines. This finding suggests that achieving a fully compliant two-week menu represents a considerable challenge for childcare services, even with comprehensive implementation support. The findings also support reviews of implementation practice guidelines which suggest that achieving perfect compliance with guideline recommendations is rarely achieved (45). In retrospect, the primary trial outcome selected for this trial may have been unrealistic, given the complexity of menu planning processes and the complexity of the operating environments of childcare services. While the Caring for Children resource represents an attempt to develop guidelines that are acceptable and suitable for the childcare setting, the complexity with planning meals and beverages so that they meet the recommended servings for all core food groups are likely to represent a significant challenge for service cooks who do not typically have any formal training in nutrition. Future updates to the guidelines should consider that full compliance is unlikely to be achievable in this context. Generally, this is a key finding for the formation and measurement of nutrition guideline compliance in the setting.

Nonetheless, improvements in food provision were achieved. The magnitude of improvements in implementation of menus compliant with four of six individual food groups (fruit, meat and alternatives, dairy, discretionary) achieved by intervention services (21.5% for fruit; 25.17% for meat and alternatives; 22.5% for dairy; 50% for discretionary) were somewhat similar yet slightly lower to those reported among trials

using similar implementation strategies in childcare services to improve menus (40-68%) (13, 14, 46, 47). The effect sizes were also similar to that reported in trials of implementation strategies in schools to improve the availability of healthy foods (25-42%) (46, 48). The findings of this study, therefore, reinforce the capacity to improve food provision in line with menu dietary guidelines in education settings as a potentially effective public health nutrition strategy.

Despite significant improvements among intervention services in the mean serves planned on the menu for all six food groups, changes in service level child consumption significantly improved for vegetables (0.70 serves) and fruit (0.41 serves) only. The findings indicate that improvements in food availability do not uniformly translate to improvements in child intake. Statistical significance aside, smaller improvements in consumption of foods relative to improvements reported in menu availability were also reported across other food groups. Additional strategies beyond targeting foods provided such as the use of positive statements during meal times and educator's role modelling of healthy eating behaviours, and addressing other known determinants of child food intake may be required to improve the effectiveness of the intervention on child diet.

Interestingly, the implementation strategy did not change the TDF constructs that it targeted. The findings may suggest that the intervention exerts its effects in improving menu planning and food provision through other pathways. Future research to identify such pathways is warranted. Alternatively, the findings may reflect challenges in measurement of implementation constructs. While validated, and used in previous randomised trials, TDFQ scores for a number of constructs were high and skewed. Such ceiling effects may hinder the capacity of the measure to detect meaningful changes in hypothesised implementation mediators. Work to improve the TDFQ tool in the childcare setting and the measurement of implementation constructs more broadly would be valuable for future research in the field.

Strengths of the study include the randomised controlled trial design, the application of theory for intervention design and blinding of outcome assessors. However, the study findings should be considered in the context of its limitations. Previous studies have identified that time is a key determinant of implementation (49, 50). The short intervention period of six months, may have not have provided sufficient time for the intervention services to reach full compliance, particularly considering the complexity of

the menu planning process. Secondly with such a short intervention period, we do not know if the changes will be sustained long term. Future research is warranted to assess the sustainability of such interventions. Finally, the research was conducted in a region in which childcare services have been exposed to obesity prevention intervention and implementation support for more than a decade (19, 40, 46, 51). The effects of the implementation strategies on services operating under different contexts are unknown.

CONCLUSION

This study is one of the few randomised control trials measuring the effectiveness of a multi-component support intervention on the implementation of menu dietary guidelines in the childcare setting. The findings indicate that service level changes to menus in line with dietary guidelines can result in improvements to children's dietary intake. Despite the lack of effect on TDF constructs/outcomes, the chosen implementation strategies were effective in supporting practice change, despite a short intervention period. As such they should be considered for future programs/interventions targeting dietary guideline implementation in the setting.

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CHAPTER 6

The impact of a childcare food service intervention on child dietary intake in care: an exploratory cluster randomised controlled trial

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ABSTRACT

INTRODUCTION

To assess the efficacy of a food service implementation intervention designed to increase provision of foods consistent with nutrition guidelines on child consumption of fruit, vegetables, breads/cereals, meat/alternatives, dairy, and diet quality in care.

METHODS

Exploratory cluster randomised controlled trial involving 395 children aged 2-5 years attending 25 childcare centres in New South Wales, Australia. Centres were randomised to the intervention or control group. Intervention development was guided by the Theoretical Domains Framework and included securing executive support, provision of group training, resources, audit and feedback and one-on-one support. The intervention was delivered across 6 months and the study was conducted between March and December 2016. Child diet was assessed by educators using a validated questionnaire modified for completion in childcare centre. Data was analysed in SAS using generalised linear mixed models, adjusted for clustering.

RESULTS

Children in the intervention group consumed significantly higher number of serves of vegetables (0.4 serves; $p<0.001$); wholegrain cereals (0.7 serves; $p=0.02$); and meat/alternatives (0.5 serves; $p<0.001$) and had higher diet quality scores (10.3; $p<0.001$).

CONCLUSIONS

A food service intervention targeting the provision of food significantly improved child dietary intake in care. Such findings are relevant to health promotion practitioners responsible for supporting improvements in child diet.

KEYWORDS

Childcare, diet, health promotion, nutrition, obesity

INTRODUCTION

Dietary risk factors are one of the biggest contributors to premature death internationally. Amongst high income countries, low fruit and vegetable consumption and high sodium diets account for approximately 21% of deaths from ischaemic heart disease and 11% of stroke (1). Improving child dietary intake is recommended to reduce the burden associated with poor diet as child dietary pattern tracks into later life (2-4).

Childcare centres are a recommended setting to deliver public health nutrition interventions to improve child diets as they provide access to the majority of young children. In Australia, 52% of children aged up to 6 years attend formal care at a pre-school or long day care centre for an average of 18 hours per week (5, 6). Approximately 30% of childcare centres in Australia provide food onsite (7), where children can consume up to 67% of their daily dietary requirements (5). For centres where food is provided onsite, menu planning and preparation of food and beverages are typically undertaken by an onsite cook (8). Systematic reviews of trials undertaken in education and care settings including childcare centres and schools have found that modification to the food environment to increase availability of healthier food and beverages is associated with improvements to children's dietary intake (9, 10). Such findings are consistent with the socioecological framework which posits that the broader social and physical settings within the community can facilitate or promote healthy eating (11).

As such, in Australia, nutrition guidelines exist for childcare services and require that centres provide foods consistent with Australian dietary guidelines (12). Despite this, cooks report a number of barriers to meeting these guidelines. Reported barriers include inadequate exposure to guidelines, concerns about child food preferences as well as challenges with modifying recipes to meet guidelines (13-16). Childcare cooks report that help with menu planning, providing appropriate recipes and making gradual changes to the menu would enable them to provide healthier food and beverages (17).

Given the potential benefits of improving provision of food in childcare, interventions that target cooks barriers to planning and preparing healthier meals, represents a promising strategy for improving child diet. A previous non-randomised trial in six childcare centres which included training workshops and monthly site visits to support cooks with preparing healthier foods reported that the intervention had a positive impact on consumption of saturated fat (18). A recent systematic review of nutrition

interventions in childcare centres identified no randomised controlled trials that have examined food service based implementation interventions (9). Further, the impact of such an intervention on child dietary intake or quality has also not been explored in a randomised controlled trial (RCT) design (9).

PURPOSE

We aimed to assess the efficacy of a theory-based multi-strategy implementation intervention, targeting the food service of childcare centres, to improve child dietary intake and diet quality in care, compared to usual care.

METHODS

DESIGN

The study employed a repeat cross-sectional exploratory cluster RCT and reports results from a subsample of 25 centres participating in a larger trial to improve implementation of nutrition guidelines. Nested studies represent an efficient way of assessing the impact of implementation of setting-based guidelines within complex interventions (19, 20). Repeat cross-sectional rather than cohort assessments were chosen as they are recommended to assess the impact of population level or settings-based interventions where the effect of the intervention is expected at the cluster level (in this study, child diet among children attending a childcare centre exposed to the intervention) and where high attrition is expected (in this case, change of childcare rooms/centres) (21, 22). Intervention and data collection procedures of the main trial are reported in detail in a published study protocol (23). The primary outcome of the main trial was centre menu compliance to nutrition guidelines for the sector and is reported in a separate publication (24). Briefly, the main study found that services in the intervention were significantly more likely to have menus that provided serves of foods consistent with guidelines for fruit (OR: 10.8, p=0.0024), meat (OR: 8.3, p=0.023), dairy foods (OR:8.4 p=0.006) and discretionary foods (OR: 17.8, p=0.002)(24). Ethical approval was provided by the Hunter New England Human Research Ethics Committee (HREC) (reference: 06/07/26/4.04) and the University of Newcastle HREC (reference H-2012-0321). The reporting of this study adheres to the Consolidated Standards of Reporting Trials (CONSORT) guidelines for cluster trials.

SAMPLE

In Australia, early childhood and education care consists of centre based (including long day care centres and preschools) and family based care. Long day care centres usually operate more than 10 hours a day, while preschools have shorter operating hours (usually ranging from 9am – 3pm) (25). The study was undertaken with long day care centres (henceforth known as centres) located in the Hunter New England local health district, New South Wales (NSW), Australia. Centres were eligible to participate in the trial if they had an onsite cook that prepared and provided at least one main meal and two mid meals to children attending the centre; were open eight or more hours each day; and the individual centre played a role in planning their own menu. Centres that did not prepare meals onsite or those catering exclusively for children requiring specialist care, mobile preschools and family day care centres were excluded. Eligible centres were randomised to: i) a multi-strategy intervention, ii) a minimum intervention (not included in analyses for the current study); or iii) a usual care control group. Only centres in the multi-strategy intervention and usual care control group participated in data collection for this study due to resource restriction. Child's diet was assessed if they were aged between 2-5 years old, were in care at a participating centre and present on the day of data collection.

RANDOMISATION AND BLINDING

Overall, 54 childcare centres were recruited to the main trial. The randomisation schedule for the main trial was prepared a priori by a statistician independent to conduct of the trial. Centres were randomised to the intervention or control group via block randomisation (block size ranged between 2-6), using a central conceal random allocation process. Of these, 25 centres were approached in random order using a random number list generated in Microsoft Excel and invited to participate in the nested study. An information statement and consent form was mailed to centres approximately one week prior to a telephone invitation to participate in the trial. Centres consented to a one-day site visit and completion of pen and paper questionnaires by the nominated supervisors and cooks at baseline and follow-up. Centres participating in the nested evaluation also consented to completing child questionnaires reporting on child dietary intake and diet quality. The study was conducted as an open trial as it was not possible to blind the childcare centre staff receiving the intervention. Outcome assessors were

centre educators and not blinded to intervention allocation. The study statistician undertaking the primary analyses was blinded to group allocation.

INTERVENTION

Centres in the intervention group were offered a six month multi-strategy implementation intervention to improve menu compliance with the NSW nutrition guidelines. These guidelines are outlined in the Caring for Children resource and requires childcare centres provide at least 50% of the recommended serves of the Australian Guide to Healthy Eating (AGHE) core food groups and no "discretionary" food to children each day (26). Selection of trial strategies was informed by the Theoretical Domains Framework (TDF) (27) and based on extensive interviews with centre cooks and managers regarding the barriers and facilitators to providing foods in line with guidelines.

Specifically, implementation of the framework involved the following steps: i) literature reviews; ii) interview using a validated TDF survey with childcare centre staff and iii) observations of menu planning and food preparation processes (23). Utilising this information, the identified barriers were mapped to TDF constructs, and implementation strategies recommended to address identified barriers were then selected. To be included, implementation strategies needed to be empirically supported as effective by systematic review evidence in childcare and other settings, and judged as feasible and acceptable to centres.

The selected strategies included: securing executive support at the commencement of the intervention via a face to face meeting with service managers and cooks, provision of group training, provision of resources, audit and feedback and one-on-one implementation support provided by an experienced implementation support officer. The intervention was delivered in a staggered manner to all intervention centres from February 2016 to August 2016. An overview of the intervention content and delivery is provided in Table 6.1 and described in detail in the study protocol (23).

Table 6.1 Summary of the Theoretical Domains Framework (TDF) targeted domains, intervention strategy and detail.

Theoretical Domains targeted/ action target	Implementation strategy and definition[a]	Detail
Professional identity	Securing executive support/ Obtain formal commitments(41) Definition: Obtain written commitments from key individuals that state what they will do to implement the innovation	Actor: Implementation support officer Action: Establishes a memorandum of understanding outlining centre cook and supervisor's responsibilities to implement the nutrition guidelines. Also supports the supervisors to communicate support of the guidelines more broadly to service staff and parents, as well as update the service nutrition policy accordingly, where required. Targets: Supervisors, cooks, educators Temporality: First meeting Dose: One-off
Knowledge; Skills; Action planning; Professional identity	Conduct educational meeting(42, 45) Definition: Hold meetings targeted toward different stakeholder groups to teach them about how to implement the nutrition guidelines	Actor: Implementation support officers, public health dietitians Action: A one-day group training workshop was provided to support the application of nutrition guidelines to childcare menu. The workshop ran for approximately six hours and included small group discussions with other centre staff, setting of clear and concrete goals, case studies, opportunities to practice new skills discussed in the training and facilitator feedback. Where centre staff could not attend the group training, one-on-one training at service site was provided by a support officer. Target: Supervisors, cooks Temporality: Approximately 1 -2 months after first face to face meeting Dose: One-off
Environmental context and resources; Knowledge	Distribute educational resources(46) Definition: Distribute educational materials (including guidelines, manuals, and toolkits) in person, by mail, and/or electronically	Actor: Implementation support officers Action: All intervention centres received a resource pack to support implementation of the nutrition guidelines which included the Caring for Children resource, menu planning checklists, recipe ideas and budgeting fact sheets. Two newsletters were also distributed to the intervention centres outlining the serves required for targeted core food groups, as well as recipes which included these food groups, sandwich ideas, key messages for educators about the nutrition guidelines and their role to support the cook in implementing the guidelines, and case studies from service cooks involved in the intervention. Target: Cooks, supervisors, educators Temporality: At training, 3 and 6 months post training Dose: Three times in 6 months

Skills; Self-monitoring	Audit and provide feedback (47) Definition: Collect and summarise performance over a specified period of time, and provide to centres in written and verbal form.	Actor: Public health dietitian Action: A dietitian undertook an audit of intervention service menus at baseline and mid intervention). The audit was undertaken on two randomly selected weeks of their current menu. Written and verbal feedback with recommendations to support changes to meet food group recommendations was provided to centre cooks. Target: Cooks and supervisors Temporality: Baseline and approximately 3-4 months post baseline Dose: Two times in six months
Belief about consequences	One on one implementation support/conduct educational outreach visits (48, 49) Definition: A trained person (implementation officer) meet with childcare providers in their practice settings with the intent of changing their behaviour to adopt the guideline	Actor: Implementation support officers Action: Centres received up to two face to face support visits. The face to face support included the support officer, supervisor and service cook reviewing service menu feedback reports, developing action plans to meet nutrition guidelines, and planning up to three days of the service menu together in order to practice new skills of implementing guidelines to menu planning Target: cooks and supervisors Temporality: 1-2 months and 4-5 months post training Dose: Two face-to-face support visits

[a]. Definitions were adapted from the Expert Recommendations for Implementing Change criteria

CONTROL

Centres allocated to the control group were mailed the Caring for Children resource which outlines the nutrition guidelines and received usual care from their local health district. Where support was requested, a feedback report outlining general menu compliance was provided to these centres.

DATA COLLECTION PROCEDURES

Baseline data was collected following randomisation (March 2016), with follow up data collection undertaken approximately 6-8 months post baseline (October –December 2016). Centre supervisor and cooks completed a brief pen and paper questionnaire at baseline and follow up. Educators from the room with the majority of children aged 2-5 years, present on the day of the site visit, completed written questionnaires reporting on child age and sex and the usual dietary intake of the child attending care, over the past month. Educators were provided with 30 questionnaires per room and any educator

present could complete these for children aged 2 - 5 years in the room on the agreed day of data collection. Previous trials undertaken by the research team have identified that approximately 23 children aged 2-5 years are present in a centre room. As part of the data collection process, research assistants provided all participating educators with brief training on how to estimate serve sizes and complete the questionnaire and a supporting laminated pictorial resource outlining example serve sizes to help with estimating child food intake. Educators were asked to refer to the resource and also service menus to facilitate recall when completing the questionnaires. Educators were asked to return the questionnaires to research assistants present on the day or where not possible return the questionnaires to an allocated data collection box, via reply paid envelopes, or to a member of the research team at the end of the data collection period.

OUTCOMES

The outcomes for this nested study were the: 1) usual serves of Australian Guide to Healthy Eating (AGHE) core food groups consumed by children which includes: i) vegetables and legumes/beans; ii) fruit; iii) wholegrain cereal and breads; iv) lean meat and poultry, fish, eggs, tofu, seeds and legumes; v) milk, yoghurt, cheese and alternatives, and 2) child diet quality, whilst in care.

All outcomes were assessed using a questionnaire developed for the purpose of this study. The questionnaire was adapted from a 38-item short food survey previously validated in a sample of Australian preschool aged children (28). This original measure was identified in a recent systematic review of short dietary measures as a valid and reliable tool for assessing young children's dietary intake (29). The research team consulted with the developers of the original tool and minor modifications were made to support completion by childcare educators, increase clarity and to address previous limitations. Reporting of child dietary intake by educators has previously been undertaken in a number of studies (30, 31). The modified tool consists of 47 items asking centre educators to record the frequency and portion sizes of each AGHE food group, number of discretionary foods, the variety of foods and the quality of foods (i.e. wholemeal/wholegrain cereals, lean meats) consumed by an individual child during the duration of care. A post-validation study of the modified food frequency questionnaire compared to direct observations by two to three dietitians per service across two randomly selected days (gold standard for the setting) found between 53% (fruit)- 93%

(vegetables) agreement for consumption of AGHE food groups in line with guidelines for the setting (manuscript in preparation).

Consumption of AGHE core food groups

Usual serves of AGHE core food groups were assessed using 28-items items from the questionnaire assessing frequency (times per day/week or doesn't eat), and portion size (1/2 portion, 1 portion, 2 portion or doesn't eat) consumed of each core food group. Food intake data were converted to usual servings of food groups per day consumed in care.

Diet quality

Diet quality was assessed using all 47-items in the questionnaire and comprised of the following nine components: usual serves of each of the five AGHE core food groups, number of extra/discretionary foods, healthy fats/oils, beverages, and diet variety. Similar to the original tool each component, except for extra/discretionary, was allocated 10 points, where a maximum score of 10 indicates optimal intake and a score of 0 indicates no intake of a particular food group. The extra/discretionary component was allocated 20 points with inverse scoring, where no serves of such foods represented optimal intake (20 points) and 0 represented excessive intake. Total diet quality was calculated by summing the scores from each component with a total score of 100, where a higher score represented better diet quality.

Other data

Service and cook characteristics

Childcare service supervisors reported on their centre operational characteristics including the total number of children enrolled; postcode; whether children of Aboriginal or Torres Strait Islander background are enrolled; and hours of operation. Childcare service cooks reported on their gender, age, years working in current position, years employed in the childcare setting, number of hours worked per week, and qualifications. Questionnaire items have been used in previous Australian surveys of centre managers conducted by the research team (32, 33).

SAMPLE SIZE

Retrospective sample size calculations were undertaken and estimated that a sample of

12 centres per group, with approximately 20 children per cluster, allowing for 15% of centres loss to follow up would provide 80% power to detect a difference of at least 50% of a standard deviation difference between the groups for all outcomes, with a two-sided alpha of 0.025 allowing for multiple outcomes and assuming an ICC of 0.1 (7). This would equate to between 0.2 to 0.6 serves of each of the core AGHE food groups; and a four point difference in total diet quality score. Such effect size are similar to that identified in other intervention targeting pre-school aged children (34).

ANALYSIS

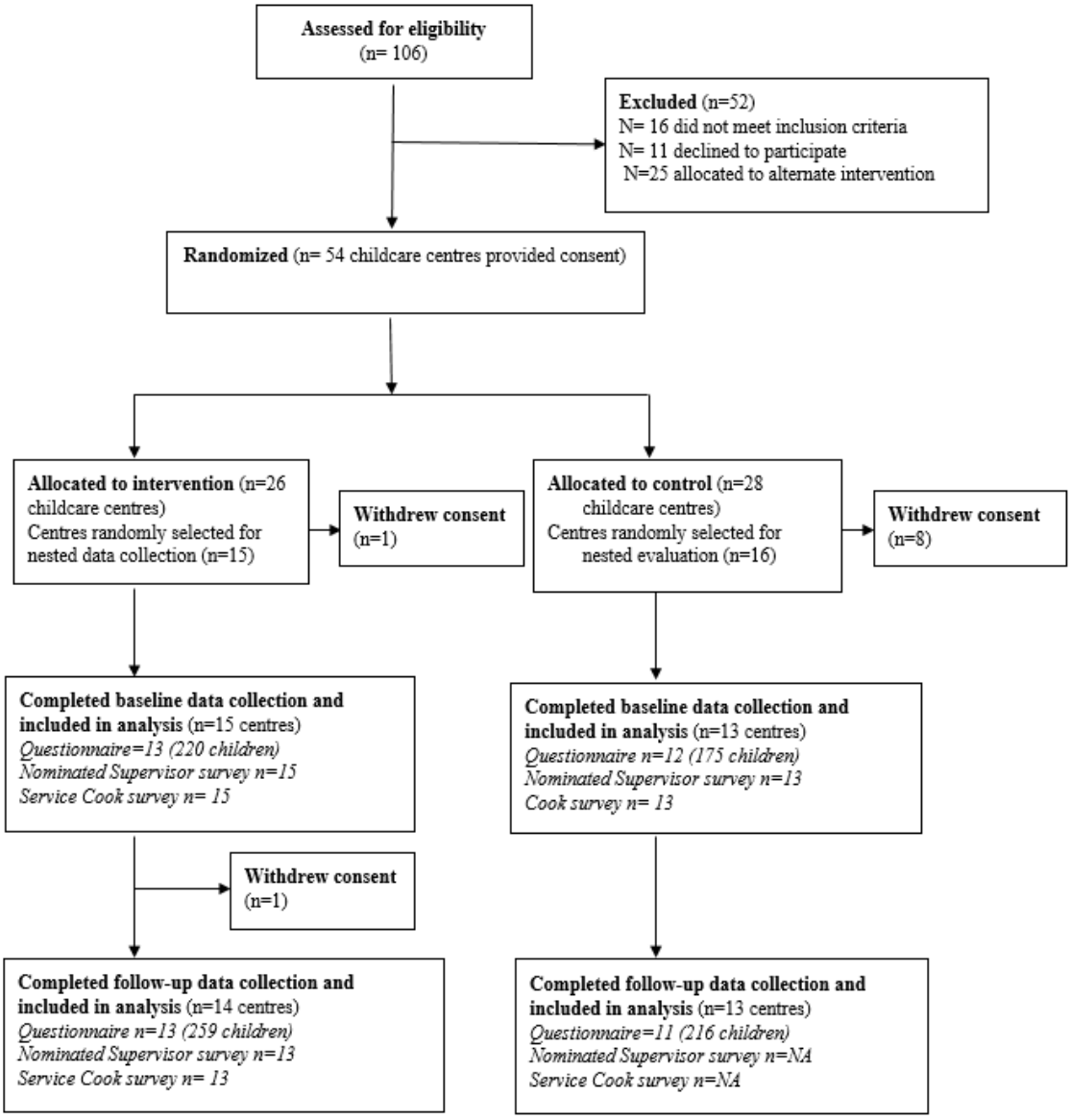
Statistical analyses was undertaken by a statistician independent to the project team (author CL) using SAS V9·3 (SAS Institute, Cary, North Carolina, USA) in August 2017. Centre postcodes ranked in the bottom 50% of NSW according to Socioeconomic Indices for Areas (SEIFA) were classified as being least advantaged. Only children who attended for two or more days a week (n= 870, (90%)) were included in the analysis as the outcome related to usual consumption in care. For the main outcomes of the current paper (child dietary intake as reported via educator completed questionnaire), a complete case analyses was performed using all available data (without imputation). An intention to treat analysis using multiple imputation for missing data at baseline and follow-up was also undertaken using the MI procedure in SAS. Group differences for all outcome data were assessed through a group by time interaction using generalised linear mixed models, adjusting for clustering within centres. Statistical significance was defined as p-values less than 0·025 to account for multiplicity.

RESULTS

Fifty-four centres (60% of eligible) were randomised into the larger study. Of these, 28 centres were randomly selected to participate in assessment of child diet (15 intervention, 13 control). At baseline, 13 intervention and 12 control centres (89% retention rate) completed questionnaires, resulting in 220 children in the intervention group and 175 children in the control group (see Figure 6.1). At follow-up, 13 intervention and 11 control centres completed questionnaires, which included 259 children in the intervention and 216 in the control group. A significant difference in child age was found among those children excluded from analysis compared to those included (t (932) = -2.35; p=0.02), however there were no differences in child sex (χ^2(919) =0.04; p=0.81). Comparison of children with and without at least one item missing on the

questionnaire found no significant differences in child age (t (847) = 1.32; p=0.19) or sex (χ^2(832) =0.006; p=0.94).

Figure 6.1 Participant flow through the trial and analysed for the primary outcome. Data were analysed using separate linear mixed models, adjusted for baseline values and clustering at the childcare level. Main findings are reported using intention to treat with multiple imputation analysis.



The operational characteristics of participating childcare centres, cooks and children at baseline are specified in Table 6.2.

Table 6.2 Demographic characteristics of childcare centres, cooks and children at baseline (data collected Jan –Feb 2016)

	Intervention N=15 n (%) or mean (SD)	Control N=13 n (%) or mean (SD)
SERVICE CHARACTERISTICS		
Number of enrolments	124.2 (39.8)	121.6 (49.8)
Socioeconomic status[a,b]		
Least advantaged	3 (23.1)	6 (50)
Most advantaged	10 (76.9)	7 (53.9)
Remoteness		
Inner regional	5 (33.3)	4 (33.3)
Major city	10 (66.7)	9 (69.2)
Children of Aboriginal or Torres Strait Islander background enrolled in service	10 (66.7)	8 (61.5)
Service hours per day	10.8 (0.6)	11 (0.6)
Service cook gender		
Female	15 (100)	12 (92.3)
Service cook age	43 (10.2)	45.2 (11.7)
Years working as in current position	4 (2.3)	3.8 (3.4)
Years employed in childcare setting	7.4 (7.7)	5.2 (4.9)
Hours worked per week	25.3 (5.5)	23.9 (7.3)
Service cook qualifications		
University	0 (0)	1 (7.7)
TAFE	10 (66.7)	11 (84.6)
Registered training organisation	3 (20)	4 (30.8)
Commercial cookery qualification	6 (40)	3 (23.1)
On the job training	3 (20)	5 (38.5)
CHILD CHARACTERISTICS	**220=participants**	**175=participants**
Sex n (%)[c]		
Female	102 (47.7)	79 (47.6)
Male	112 (52.3)	87 (52.4)
Mean (sd) age[d]	3.5 (1.0)	3.6 (1.0)

[a.] Classified using *Socio-Economic Indexes for Areas* (*SEIFA*) based on childcare postcode
[b.] 2 intervention centres missing
[c.] 6 intervention and 9 control children missing
[d.] 6 intervention and 4 control children missing.

CONSUMPTION OF AGHE FOOD GROUPS

Children in intervention centres had significantly higher consumption of vegetables (mean difference: 0.4 [95% CI 0.2, 0.6]; p<0.001) wholegrain cereals (mean difference: 0.7 [95% CI 0.1, 1.3]; p=0.02); and meat/meat alternatives (mean difference: 0.5 [95% CI 0.3, 0.7]; p<0.001) while in care (see Table 6.3). There were no significant differences in serves of dairy and fruit items consumed.

DIET QUALITY SCORES

Table 6.3 Impact of intervention on all outcomes in intervention and control groups at follow-up, controlling for clustering within childcare centres (baseline data collection: Jan –Feb 2016, follow up data collection (Sept- Nov 2016)[a]

	Baseline Mean (SD)		Follow-up Mean (SD)		Complete Case Analysis[b] Intervention v Control at Follow-up		Multiple Imputation Analysis[c] Intervention v Control at Follow-up	
Variable	**Intervention** (N=220)	**Control** (N=175)	**Intervention** (N=259)	**Control** (N=216)	**Difference [95% CI]**	**P-value**	**Difference [95% CI]**	**P-value**
Usual serves of Australian Guide to Healthy eating core food groups								
Fruit	0.7 (0.4)	0.8 (0.5)	0.9 (0.5)	0.8 (0.6)	0.2 [0.02, 0.3]	0.03	0.1 [-0.01, 0.2]	0.08
Vegetables	0.9 (0.8)	0.8 (0.7)	1.3 (0.9)	0.8 (0.6)	0.4 [0.2, 0.6]	<0.001**	0.3 [0.2, 0.5]	<0.001**
Whole grain cereals	3.4 (2.0)	3.3 (2.4)	3.9 (2.1)	3.1 (2.1)	0.7 [0.1, 1.3]	0.02*	0.7 [0.1, 1.2]	0.01*
Dairy/dairy alternative	1.4 (0.9)	1.5 (0.8)	1.5 (0.8)	1.4 (0.8)	0.1 [-0.08, 0.4]	0.2	0.2 [-0.04, 0.4]	0.12
Meat/Meat alternatives	0.9 (0.6)	0.9 (0.7)	1.3 (1.1)	0.8 (0.5)	0.5 [0.3, 0.7]	<0.001**	0.4 [0.2, 0.6]	<0.001**
Diet quality score								
Overall score (/100)	73.7 (11.0)	70.3 (12.3)	82.5 (9.9)	71.0 (13.6)	10.3 [6.7, 14.0]	<0.001**	6.9 [4.1, 9.8]	<0.001**
Fruit (/10)	6.3 (3.1)	7.0 (3.4)	7.2 (3.0)	6.7 (3.3)	1.4 [0.5, 2.3]	0.005**	1.1 [0.3, 1.8]	0.008**
Vegetables (/10)	4.2 (2.8)	3.9 (2.9)	5.8 (3.0)	4.1 (2.7)	1.6 [0.8, 2.4]	<0.001**	1.2 [0.5, 1.9]	<0.001**

Breads and Cereals (/10)	9.6 (1.2)	8.9 (1.6)	9.7 (0.9)	8.7 (1.9)	0.4 [0.02, 0.8]	0.04	0.3 [-0.2, 0.6	0.14
Meat/Meat alternatives (/10)	7.8 (3.1)	7.7 (3.2)	8.6 (2.6)	7.8 (2.7)	0.7 [-0.1, 1.6]	0.08	0.6 [-0.09, 1.4	0.09
Dairy (/10)	7.7 (3.0)	7.6 (2.8)	7.8 (2.8)	7.3 (3.0)	0.2 [-0.6, 0.8]	0.66	0.5 [-0.2, 1.2]	0.17
Water (/10)	10.0 (0.2)	10.0 (0.1)	10.0 (0.0)	10.0 (0.1)	0.02 [-0.02, 0.05]	0.32	0.00 [-0.03, 0.03]	0.91
Discretionary (/20)	12.3 (5.7)	8.4 (7.8)	14.9 (7.0)	9.4 (7.3)	2.1 [0.4, 3.8]	0.02*	2.8 [1.3, 4.3]	<0.001**
Variety (/10)	8.2 (1.78	7.8 (1.6)	8.2 (1.8)	8.3 (1.5)	-0.2 [-0.7, 0.3]	0.35	-0.1 [-0.5, 0.3]	0.6
Healthy fats (/10)	8.2 (2.4)	8.8 (2.0)	8.9 (2.2)	8.6 (2.2)	0.9 [0.3, 1.6]	0.006**	0.6 [0.1, 1.2]	0.02*

There was also a significant difference between groups in terms of total diet quality scores (mean difference: 10.3 [95% CI: 6.7, 14.0]; p<0.001) which could be attributed to improvement in scores for the following components: fruit (mean difference: 1.4 [95% CI: 0.5, 2.3]; p=0.005), vegetables (mean difference: 1.6 [95% CI: 0.8, 2.4]; p<0.001), discretionary foods (mean difference: 2.1 [95% CI: 0.4, 3.8]; p<0.02), and healthy fats (mean difference: 0.9 [95% CI: 0.3, 1.6]; p=0.006) (see Table 6.3). There were no significant differences for the other domains. No changes in statistical significance were observed in the multiple imputation analysis.

DISCUSSION

This study found that a theory-based multi-strategy implementation intervention targeting the food service of childcare centres to improve nutrition guideline compliance resulted in significant improvements to child usual consumption of vegetables, cereals and meat/meat alternatives in care at six-months follow up. Child diet quality was also significantly higher in the intervention group at follow-up. Findings from this trial suggest that interventions to support centre provision of food in line with nutrition guidelines can improve child diet in care.

The size of the intervention effect on child consumption of vegetables is larger than that previously reported in other effective childcare-based studies employing multi-strategy interventions (0.19 -0.25 serves) (35, 36). The intervention also had a positive impact on improving consumption of meat/meat alternatives and wholegrain cereals, providing a way of addressing previously reported deficits in preschool-aged children children's dietary intake that include low consumption of vegetables and meat/meat alternatives (37), as well as low levels of dietary fibre (38). The intervention also had a positive impact on child diet quality (10 point difference in scores between groups) an outcome which has not previously been explored in this setting. While we are unable to compare findings from this study with other studies, improvement in diet quality scores suggests that intervention also had a positive impact on variety and quality (unprocessed, wholegrains, healthy fats) of foods consumed. A systematic review of diet quality scores in children reported some association between overall diet quality and overweight and obesity and cardiovascular markers including blood pressure (39). Findings from our main trial identified significant improvements in childcare centre's provision of foods in line with dietary guidelines (24). Such findings together with that identified in the current study suggests that food-service based interventions to improve implementation of dietary

guidelines in childcare centres could significantly improve the public health nutrition of children.

Findings from this study also support government investments in training and supporting food service staff to provide food in line with setting nutrition guidelines. While the intervention strategy employed in this study provides one potentially effective model of support, it was heavily reliant on face to face training of cooks and centre managers and required ongoing in-person and telephone support contact to do so. While effective, the provision of such support across an entire population of centres, including those in rural or remote locations could be cost prohibitive. Future studies utilising such multi-strategy interventions should incorporate systematic methods to collect process data surrounding feasibility and uptake to better understand the potential contribution of individual components to outcome. Future interventions to investigate more scalable or lower resource means of improving provision of food, as well as investigations of cost effectiveness of such intervention are also warranted. For example a web-based training and decision support tool may provide a useful adjunct or alternative to face to face implementation support (40). While providing evidence to support initial improvements in child dietary intake, future research investigating the longer term impact of this intervention is recommended given potential attenuation of long term effects of interventions relying primarily on training and face to face support.

STUDY LIMITATIONS

These findings should be interpreted in light of a number of limitations. Firstly, the outcome assessors were centre educators and not blinded to group allocation. While educators were not specifically targeted by the intervention, this could have resulted in detection bias where centres were more likely to report favourable outcomes due to receipt of the intervention. Second, this trial was undertaken in one jurisdiction in NSW, Australia, as such the generalisability of findings may be limited. Third, there was a significant amount of missing data for the questionnaire with approximately 21% of children at baseline or follow-up, missing at least one item on the record. However, no significant differences in child age or gender were found among children with and without missing data and multiple imputation and intention to treat analysis did not result in any change in statistical significance of trial outcomes. Fourth, outcomes related to diet quality were not prospectively registered which could have resulted in some selective outcome reporting. Fifth, the measures were developed and validated for

children attending care in NSW childcare centres, and as such is unlikely to be generalisable to other settings. Additionally, the self-reported dietary measure required childcare educators to recall child diet over the past month and as such is subject to recall bias. Further, initial findings from our validation study found lower level of agreements for food groups including fruit and dairy, and as such findings related to those food groups need to be interpreted with caution. Lastly, this study did not assess intervention uptake among childcare centres, limiting the ability to explore between-centre variability, usefulness and impact of the various components on outcomes.

CONCLUSIONS

The study provides initial evidence to support the efficacy of a multi-strategy implementation intervention targeting the childcare food service in improving child dietary intake. These findings suggest that greater investment to support childcare centres with improving food provided on their menu may be a promising strategy to improve child public health nutrition.

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COMPETING INTERESTS

The authors declare that there is no conflict of interest.

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CHAPTER 7

A summary of thesis findings and implications for future research, policy and practice.

This thesis sought to address identified gaps in evidence regarding the implementation of menu dietary guidelines in centre based childcare services. The aims of this thesis were to:

1) Describe the childcare sector menu dietary guidelines, current implementation of such guidelines and previous interventions to improve the implementation of the guidelines by childcare services (Chapter 1);
2) Systematically review and synthesise the current evidence reporting factors which influence the implementation of menu dietary guidelines in childcare services (Chapter 2);
3) Develop and psychometrically test a tool to assess the factors (barriers and enablers) which influence implementation of menu dietary guidelines in the childcare setting (Chapter 3);
4) Develop and evaluate the effectiveness of an intervention to improve the implementation of menu dietary guidelines in childcare services (Chapters 4, 5 & 6).

This Chapter provides an overview of the key findings of the studies undertaken to address these aims. The Chapter concludes with a consideration of the implications of study findings for future policy, practice and research.

THESIS FINDINGS

CHAPTER 1: THESIS INTRODUCTION

Chapter 1 provided an evidence-based rationale for the research described in this thesis. Firstly it outlined evidence demonstrating the disease and economic burden of dietary risk factors highlighting that although several risk factors contribute to NCDs dietary risk factors are a primary modifiable contributor to morbidity and mortality.

In order to reduce the health and economic burden of diet related disease it was identified that many countries have developed national dietary guidelines that encourage the consumption of core food groups and water, and discourage the consumption of discretionary energy-dense, nutrient-poor foods and sugar sweetened beverages (1-4). Despite such dietary guidelines, international and Australian population level evidence

was presented demonstrating that a high proportion of adults and children do not meet such national dietary guidelines (5-9).

The chapter identified that dietary behaviours and food preferences developed in childhood track through to adulthood highlighting the importance of developing healthy eating habits in childhood (10). The chapter discussed how increasing the availability of healthy foods in public institutions including schools and childcare services has been identified as key NCD prevention strategy (11) and outlined how to promoting healthy eating behaviours among children is consistent with childcare services infrastructure, accreditation requirements and service operations (12-18). The chapter then presented an overview of international sector menu dietary guidelines, aligned with national dietary guidelines that support the provision of healthy foods to children in childcare services. Furthermore the chapter presented evidence identifying that internationally implementation of such menu dietary guidelines is poor (19-21). Given such evidence, the chapter concluded that guidelines are currently limited in their potential to positively influence children's food intake and identified a need for further research in order to realise their public health benefits. Specifically, it was concluded that additional research is required to support comprehensive implementation of child care menu dietary guidelines via: gaining a better understanding of the factors which may influence (enable or impede) the implementation of the menu dietary guidelines in childcare services; the development of a comprehensive and valid tool to investigate such factors; and the effectiveness of strategies to improve the implementation of the menu dietary guidelines in the setting.

CHAPTER 2: SYSTEMATIC REVIEW – FACTORS THAT INFLUENCE THE IMPLEMENTATION OF MENU DIETARY GUIDELINES IN CENTRE BASED CHILDCARE SERVICES

Although children attending childcare services consume a significant portion of their daily dietary intake whilst in care (22) most services that serve food fail to provide meals that are consistent with the sector menu dietary guidelines (19-21). In order to inform strategies to improve childcare service adherence to such guidelines, a comprehensive understanding of factors that may impede or promote their implementation was considered to be required.

To this end a systematic review was conducted to identify factors (barriers and facilitators) that may influence the implementation of menu dietary guidelines in childcare services (23). Identified factors were synthesised according to the Theoretical Domains Framework (TDF) domains. Eligible studies were identified via searches of electronic databases, reviews of reference lists of included trials and via consultation with experts in the field of implementation science. Any non-experimental study utilising any research design which qualitatively and/or quantitatively examined barriers or facilitators to the implementation of menu dietary guidelines in childcare services was included. Two review authors, un-blinded to author and journal information, independently extracted information from the included studies.

Twelve studies were included in the review (six quantitative and six qualitative studies). Overall, the most common domains under which barriers and facilitators were classified included 'environmental context and resources' (e.g. insufficient menu planning tools and resources; insufficient time) and 'social influences' (e.g. staff perceptions of what foods children liked or disliked).

While the review identified important factors that may influence the implementation of menu dietary guidelines in childcare services, the need for further research to better understand the association of such factors with menu compliance was evident. The review also highlighted the limitations of current tools used to assess factors that influence the implementation of menu dietary guidelines in the child care setting, specifically, the lack of validated measures.

CHAPTER 3: MEASURING FACTORS (BARRIERS AND FACILITATORS) THAT INFLUENCE THE IMPLEMENTATION OF MENU DIETARY GUIDELINES IN THE CHILDCARE SETTING

As described in Chapter 1, the TDF provides a comprehensive theoretical basis for systematically assessing the determinants of implementation behaviour and can assist in providing an understanding of the potential mechanisms of behaviour change that may result from implementation interventions(24). However, to date, only a limited number of tools to comprehensively assess implementation are available. Furthermore, very few have had their psychometric properties evaluated and none have been developed to

assess factors influencing menu dietary guideline implementation in the childcare setting (25, 26).

Chapter 3 assessed the psychometric qualities of a new tool, based on the TDF, that measured factors that influence the implementation of menu dietary guidelines in the childcare setting (27). As previous measurement tools had been developed and validated for healthcare settings, there was a need for such tools to be adapted and psychometrically examined for use within the childcare setting (28, 29).

A 75 item 14-domain Theoretical Domains Framework Questionnaire (TDFQ) was developed and administered via telephone interview to 202 centre based childcare staff who had a role in planning the service menu. Confirmatory factor analysis (CFA) identified a final model consisting of 61 items across the 14 domains, with good discriminant validity and internally consistency.

The need for additional pilot testing of response scales prior to further administration of the TDFQ was recommended, as was assessment of approaches to reducing the response burden of completing the tool. Finally, it was recommended that the measure be further assessed with larger samples of service cooks in the childcare setting to assess its utility and generalisability.

CHAPTER 4: A MULTI-STRATEGY CENTRE BASED CHILDCARE INTERVENTION TO IMPROVE COMPLIANCE WITH MENU DIETARY GUIDELINES VERSUS USUAL CARE IN LONG DAY CARE SERVICES: A STUDY PROTOCOL FOR A RANDOMISED CONTROLLED TRIAL.

Chapter 4 described the development and the protocol for a multi-strategy intervention to increase the proportion of childcare services implementing menu dietary guidelines (30). The study also sought to determine the effect of the intervention on children's dietary intake while in care and to assess changes in TDF constructs targeted by the intervention.

A parallel group, randomised controlled trial was conducted in a sample of 45 centre based childcare services in the Hunter region of New South Wales, Australia. Services allocated to the intervention group were provided five implementation support

strategies over a six month period including: the provision of staff training; the provision of resources; menu audit and feedback; ongoing support; and securing executive support. Services randomised to the control group received usual care and were posted a hard copy of the Caring for Children resource which outlined the sector menu dietary guidelines. The primary outcomes of the trial were:

1) *The change in the proportion of services with a two-week menu that was fully compliant with the menu dietary guidelines, and*
2) *The change in the proportion of services compliant with the menu dietary guidelines for individual food groups.*

Both primary outcomes were assessed by comprehensive menu reviews completed by dietitians at baseline and six months post baseline. The following secondary outcomes were also assessed:

1) *The menu compliance score (Mean number of compliant food groups)*
2) *The mean number of serves of each food group provided*,
3) *The between group difference in the TDF constructs targeted by the intervention (i.e. knowledge, skills, professional role and identity, optimism, reinforcement, goals, environmental context and resources, social influences).*
4) *Service-level and individual-level child food group consumption (assessed in a sub sample of 28 randomly selected services including 15 intervention and 13 control))*

At the time of submission this study was the only randomised control trial measuring the effectiveness of a multi-component intervention on the implementation of menu dietary guidelines and reporting the effect on child food intake in the childcare setting. It was also the only trial describing the use of a comprehensive implementation framework, the TDF, to inform intervention development, and the only trial to include an assessment of intervention impact on the targeted implementation constructs.

CHAPTERS 5 AND 6: THE FINDINGS OF A RANDOMISED CONTROLLED TRIAL OF AN IMPLEMENTATION INTERVENTION: IMPROVING THE IMPLEMENTATION OF MENU DIETARY GUIDELINES IN CENTRE BASED CHILDCARE SERVICES IMPROVES CHILD DIETARY INTAKE.

Chapters 5 and 6 described the effectiveness of the multi-component implementation intervention described in Chapter 4 in increasing the proportion of childcare services implementing menu dietary guidelines. Chapter 5 reported the effect of the intervention on guideline implementation by the childcare services, the effect on service-level child food intake and on the targeted TDF constructs (31). Chapter 6 described the effect of the multi-component intervention on individual child dietary intake while in care.

Chapter 5

At baseline, no services in either group were fully compliant with the sector menu dietary guidelines (i.e. for all five core food groups) and, at follow-up (immediately post-intervention) one intervention service (4%) and no control services (0%) were fully compliant. Furthermore, at follow-up, relative to the control group, significantly higher compliance was observed among intervention services for four of the six Australian Guide to Healthy Eating (AGHE) food groups (fruit; meat & meat alternatives; dairy; and discretionary foods).

In regard to the secondary outcomes, there was a significant difference between groups at follow-up favouring the intervention in the mean number of food groups that services were compliant with providing. There were also significant differences between groups at follow-up in the mean number of serves of each food group planned on the menu for all six of the food groups, again favouring the intervention services (vegetables; breads & cereals; meat & alternatives; dairy). Relative to control, there were significant improvements in service-level food group consumption for two out of the six food groups (vegetables and fruit).

The validated tool described in Chapter 3 was used to assess TDF domains within the randomised controlled trial. The study found no significant differences between the intervention and control groups with regard to the TDF domain scores (knowledge, skills,

social/professional role and identity, reinforcement, goals, environmental context and resources, social influences).

Chapter 6

Assessments of individual child food intake among 530 three to five year olds showed that children in the intervention group consumed a significantly higher number of serves for three of the six food groups (vegetables; breads & cereals; meat & meat alternatives). Despite the lack of effect on TDF constructs, the implementation intervention was effective in facilitating improved menu compliance with individual core food groups (fruit, meat and meat alternatives, dairy, and discretionary foods) and improving child intake of several core food groups (vegetables; breads & cereals; meat & meat alternatives). Further research is required to test the effectiveness of the intervention across a larger number of childcare services to ensure generalisability of the results. While future examination of cost-effectiveness of the intervention would be beneficial, the findings of the implementation intervention are broadly positive, and provide one model for policy makers and practitioners responsible for enhancing menu dietary guideline implementation in the childcare setting.

IMPLICATIONS FOR FUTURE RESEARCH, POLICY AND PRACTICE

THE CHALLENGE OF ACHIEVING FULL COMPLIANCE WITH MENU DIETARY GUIDELINES

The modest improvements in compliance with dietary guidelines following the implementation intervention described in Chapters 4, 5 and 6 underscores the considerable challenge of planning menus consistent with menu dietary guidelines. In centre-based childcare services – even with comprehensive implementation support. A recent Cochrane systematic review (32)(Appendix 1.2), for example, identified eight controlled trials that targeted the implementation of nutrition practices among childcare services. While the review identified two trials that aimed to improve the provision of healthy food within childcare services, only one trial specifically sought to improve the implementation of sector menu dietary guidelines(33). Similar to the findings of Chapter

5 the intervention reported variable positive improvements in some measures of guideline compliance, but not implementation of all guideline recommendations.

The findings of Chapters 4, 5 and 6 support these findings and are in alignment with research regarding compliance with nutrition guidelines from school settings and with guideline implementation research in the health and medical literature more broadly. Collectively this research consistently identifies challenges in achieving full compliance with best practice guidelines (34). For example, Durlak et al conducted a systematic review of 542 studies examining factors affecting the implementation of health and medical best practice guidelines (35). The review found that achieving guideline implementation levels of up to 60% was common, however, very few studies reported levels greater than 80% and no study reported 100% implementation (35). The review authors concluded that achieving 100% compliance with guideline recommendations is rare and expecting to achieve this may be unrealistic (35).

In light of this, it is perhaps unsurprising that internationally, population surveys of childcare service menus reveal that few are fully compliant with dietary guidelines. For example a 2010 study of menus from 118 nurseries in England found that all childcare services failed to fully comply with sector menu dietary guidelines(19). Similarly, a 2017 study assessed the nutritional adequacy of childcare menus in 61 randomly selected childcare services across two Canadian provinces, against the provincial sector nutrition guidelines (36). The study found that lunches served in childcare services did not comply with the provincial nutrition recommendations and were low in all core food groups, with the exception of 'grains'. Finally, a study undertaken in 2012 which audited the menus of 46 centre based childcare services in the Hunter New England region of NSW reported that no childcare service provided food that was compliant with all required food group recommendations outlined in sector menu dietary guidelines(21). In particular, compliance with vegetables was poor with no childcare services in the study providing children with the recommended serves of vegetables (21).

Such evidence underscores the complexity of the menu planning process, and reinforces the significance of the barriers, identified in Chapter 3, experienced by childcare service staff in planning menus consistent with menu dietary guidelines. The findings suggest that future efforts to improve food served to children in childcare should focus on improvement, rather than emphasising full compliance with dietary guidelines. Such an

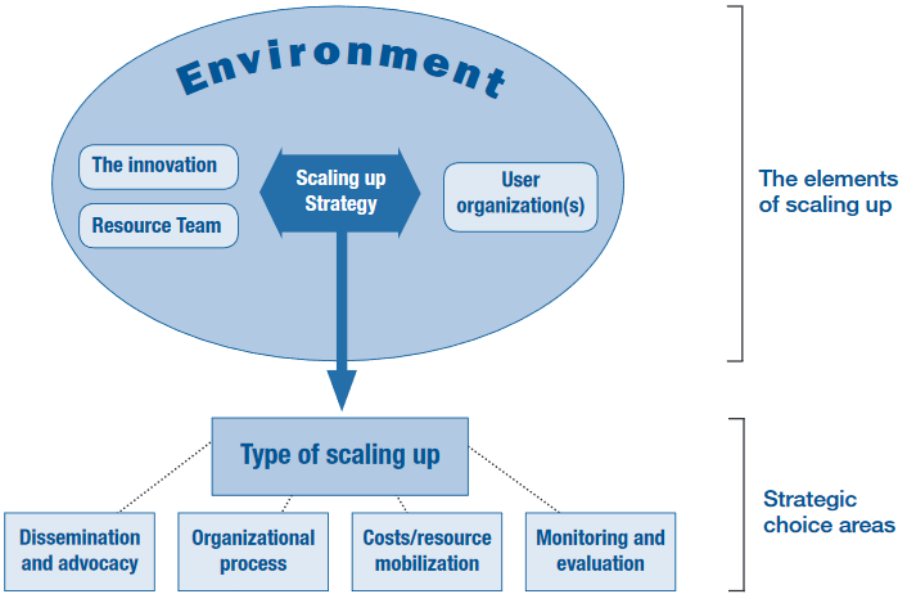
approach may reduce the likelihood of demoralization on the part of childcare services unable to achieve compliance despite significant investment and effort. Setting and achieving more modest goals is also associated with greater sustainment of behaviour change (37). As even small changes in food service provision can have important public health nutrition benefits for children in early childhood, testing strategies that re-frame the goals of future implementation strategies in this setting is warranted.

SCALABILITY OF EFFECTIVE IMPLEMENTATION STRATEGIES TO IMPROVE COMPLIANCE WITH MENU DIETARY GUIDELINES IN THE CHILDCARE SETTING

Scaling-up of effective nutrition interventions has been identified as a global public health priority by the WHO (38). The WHO defines scaling up as "deliberate efforts to increase the impact of health service innovations successfully tested in pilot or experimental projects so as to benefit more people and to foster policy and program development on a lasting basis" (ref 39). In the context of scaling-up, the term 'successful' refers to innovations or interventions which have been shown to be relevant and realistic to carry out and have had a beneficial outcome on the desired target group (39). To facilitate decision making regarding the potential for scale-up of effective public health programs, including nutrition interventions, the WHO has developed 'The ExpandNet/WHO framework' (Figure 7.1) (39). The framework is specifically designed to support public health policy makers and practitioners to plan and manage the process of scaling up. Four key elements are suggested to influence the success of a scale-up strategy: i) the innovation; ii) the user organisation; iii) the environment; iv) the resource team or organisation.

While improvements in menu dietary guideline implementation were reported in Chapters 4, 5 and 6, the effects were modest despite an intensive implementation support strategy. Such findings suggest that current menu dietary guidelines may not be well suited for scale-up. In this section each element of the ExpandNet framework is considered to reflect on the potential to scale-up dietary guidelines in the childcare setting and to identify opportunities to improve on efforts to do so that were trialed in this thesis.

Figure 7.1 The ExpandNet/WHO framework for scaling up



The innovation

As a health 'innovation', childcare menu dietary guidelines appear to align with recommended characteristics of an 'innovation' suggested by the WHO ExpandNet framework to facilitate implementation at scale. Specifically, previous research with childcare service staff and parents suggests that that menu dietary guidelines are perceived as reliable (40), their implementation is observable and is compatible with service norms and values (12, 13). However, the application of dietary guidelines is complex, prescribing specific quantities of foods to be consumed across each food group. Furthermore, food served must cater for children with a variety of special dietary requirements, and food quantities vary according to the number of children who attend on each day. Planning menus that correctly balance food served to children, therefore, is a considerable challenge and this complexity has been attributed, in part, to current poor rates of dietary guideline compliance in the sector (19, 21, 33).

The environment

The broader childcare implementation 'environment', at least in Australia, appears supportive of improvements in food provision at childcare services. Nationally, efforts to improve diet in early childhood are being undertaken by government and non-government organisations. Specifically, in the state of New South Wales, the 'NSW Healthy Eating Active and Living Strategy 2013-2018' provided a whole government framework to reduce the development of NCDs by promoting and supporting healthy eating and

physical activity across the lifespan, including programs that target early childhood (41). Additionally, in NSW, since 2005, the state government has made a significant investment in supporting local health district services via the 'Healthy Children's Initiative' to implement evidence-based policies and practices for obesity prevention (42). Programs delivered as part of this initiative include 'Munch & Move' and 'Good for Kids, Good for Life' (33, 43). Other states including Victoria, South Australia and Western Australia have made similar investments targeting obesity prevention. For example, since 1999 the 'Start Right Eat Right' program received government funding to improve the implementation of healthy eating policies and practices, with a focus on improving service menus and food provision in childcare (44). Furthermore, in the past five years, new menu dietary guidelines for the sector have been released (45), and there has been significant investment in professional development for centre based childcare services across Australia, with menu compliance being identified as a priority by National childcare accreditation agencies (18). Such initiatives, as well as the high childcare service level response rates achieved in studies in chapters 3, 5 & 6 suggest a broader environment supportive of efforts to scale-up dietary guideline implementation in this setting.

The user organisation

Consideration of menu dietary guidelines in relation to the scale-up framework element "user organisation" suggests that such factors may be impediments to scale-up. Specifically, key attributes of 'the user organisation', relating to capacity of childcare services to implement menu dietary guidelines even with significant support (as demonstrated in Chapter 5) presents a significant challenge. For example, previous research suggests that food service staff within childcare services have limited nutrition knowledge (46) , do not understand the sector menu dietary guidelines (47), and lack the confidence and skills to plan menus which comply with menu dietary guidelines (13, 46). Furthermore, the childcare workforce is transient, and a formal nutrition qualification is not a requirement for cooks of childcare services in many Australian states and territories. This means that implementation support may need to be ongoing in order to sustain improvements in the capacity of childcare services to routinely implement guidelines. As most childcare services are independent community organisations (ref 43), the lack of an overarching across-service governance structure could also impede rapid adoption and integration of implementation interventions to improve compliance with dietary guidelines at scale. Greater attention to addressing some of these scale-up

impediments is therefore warranted to improve the population health impact of menu dietary guidelines in this setting.

Resource team

Childcare services are resource constrained. In Australia many (approximately 22%) of childcare services are community administered (48), and cost and resources are frequently cited barriers to the adoption of a range of health promotion initiatives including those that relate to child nutrition (13, 46, 49). In New South Wales, considerable investments have been made to help address some of these barriers and improve the provision of healthy food and beverages to children whilst in care. For example, since 2005 the NSW State Government has invested in building the capacity of childcare services (the user organisation) to implement state-wide evidence-based nutrition and physical activity policies and practices (43). This includes support to implement menu dietary guidelines via delivery of menu planning workshops for cooks, and provision of on-going implementation support from local health promotion practitioners. Despite such investment however, support provided to services is generally not as intensive as that trialled in Chapters 4,5 and 6. Therefore improvements in the nutritional quality of foods provided to children across NSW cannot be expected to be achieved at the level reported in Chapter 5 (31). While the adoption of the multi-strategy intervention described in Chapters 4, 5 and 6 may represent an improvement on current NSW approaches to modifying food provision in childcare, the implementation strategy (including provision of face-to-face training and ongoing face-to-face support to all services) would require similar infrastructure and resources to be delivered at scale, an investment that is well beyond current levels.

USING TECHNOLOGY TO IMPROVE 'SCALE-UP' OF GUIDELINE IMPLEMENTATION

Web-based support may overcome some of the challenges to implementation of menu dietary guidelines at scale. Support via web-based modalities offers several advantages over usual face-to-face strategies aiming to improve compliance with menu dietary guidelines by services. Web-based programs enable unrestricted accessibility and ongoing online support, can execute complex algorithms to plan menus compliant with dietary guidelines and can enable tailored support at a fraction of the costs of face to face methods. Such technology could therefore potentially overcome barriers related to the

knowledge and skills of childcare service staff when planning menus which comply with the menu dietary guidelines (46). Research in Australia also suggests that providing web-based support to services may be feasible and acceptable. Specifically, in a study of 214 childcare services in NSW, Australia, 100% of services reported having computer and internet access and 91% reported that a decision-support systems to help support staff with planning a healthy menu would be useful (50).

As such, web-based tools may be useful in aiding the scale-up of menu dietary guideline implementation in childcare and are already being used for this purpose in some jurisdictions in Australia. For example,'FoodChecker' is a web-based program developed by Nutrition Australia in Victoria (51), which allows service staff to enter one day or one week of their menu for assessment. The program provides instant feedback on the menu's compliance to the sector guidelines, as well as recommendations on how to become compliant. The Victorian state government encourages and recommends that childcare services use 'FoodChecker' to plan their childcare service menu. Similarly, the 'Feed Australia' program is a commonwealth funded initiative that allows childcare staff to enter their recipes, meals, snacks and beverages into a web-based menu-planning tool(52). Upon entering the information, the web-based tool automatically calculates the menu's compliance with the sector menu dietary guidelines (against the core food groups and the number of serves of each food group per child) and provides real-time feedback to the service cook. To the knowledge of the research team, in 2018, over 2,000 childcare services nationally were registered with the 'Feed Australia' program (53). While both programs appear to have overcome a number of the barriers to scale-up, their effectiveness in improving guideline compliance and child dietary intake has not yet been reported and warrants investigation.

LEVERAGING THE INFRASTRUCTURE AND EXPERTISE OF EXTERNAL CATERING SERVICES TO SCALE-UP GUIDELINE IMPLEMENTATION.

In the context of modest improvements resulting from current International approaches to support guideline implementation (32) (largely focussed on providing various intensities of implementation support) public health policy makers and practitioners may need to consider alternate approaches to scaling up . One possible model of food service provision for childcare services that may overcome some of the barriers to dietary guideline implementation identified in Chapter 2 (such as poor nutrition knowledge, lack

of time and a lack of up to date resources to plan menus) may be the use of external catering services. Childcare services procuring food from external catering companies is becoming increasingly common, as it is in other education settings such as primary schools. For example in 2018, 429 (27%) government owned primary schools leased their canteen to an external licensee for the procurement of food (54). Furthermore, in 2015 a survey of 405 childcare services in NSW, found 28% utilised external catering services (27). Professional food services often employ dietitians who are responsible for menu development and monitoring nutritional standards of the foods provided. Specifications regarding compliance of menus with dietary guidelines could be included in the specifications of food procurement contracts between food providers and childcare services.

While this strategy of procuring food from external companies may not be feasible for small community based, remote or non-networked childcare services it may be a simple means of ensuring menu dietary guideline compliance among larger provider childcare service operators. In fact syndicated food purchases may reduce the costs associated with food provision compared to the costs of preparing foods on-site, a common barrier to guideline adherence (13, 47, 49). In Australia during 2017, 15,787 children's education and care services (including long day care services (7540); preschools/kindergartens (3100); family day care (716); out of school hours care (4426); other (5) were registered, with 95% (15,071) of these being centre-based childcare services (48). A total of 7362 providers operated these services, with 17% (2684) of providers operating 2-24 individual services and 1% (157) of providers operating 25 or more individual services (48). Taking this data into consideration, the adoption of such a strategy could have a considerable and immediate impact on improving food served in childcare and positively impact dietary intake of large numbers of children each day.

SUPPORTING SCALE-UP OF GUIDELINE IMPLEMENTATION VIA THE MENU RESOURCES

Another possible policy response for governments or childcare accreditation and/or licencing organisations to support scale-up is to develop further resources to support the implementation of dietary guidelines, such as a set of compliant service menus for food service providers or childcare service cooks to utilise. This could enable a more standardised approach to food provision, addressing some of the barriers related to

service cooks' knowledge and skills required to calculate and plan a compliant menu for their service (13, 46, 47, 49, 55, 56). While standardised menu resources would need to cater for specific dietary needs of children (e.g. allergies or cultural requirements), and the differing availability of foods across a variety of geographic locations (as reported in Chapter 2) service cooks report that sample menus are acceptable and useful when planning a service menu (46, 49). While preliminary evidence is supportive of this concept, additional research to determine the acceptability, feasibility and potential effectiveness of such an approach is warranted.

COST EFFECTIVENESS OF IMPLEMENTATION INTERVENTIONS

Given Government resources are finite, health resources should be allocated based on maximizing the potential positive impact on public health. This necessitates information regarding both the effectiveness of potential public health interventions and the cost to deliver such interventions. Economic evaluation can provide this information for policy makers to help inform decisions regarding resource allocation (57). Economic evaluation is defined as "the systematic appraisal of costs and benefits of projects, normally undertaken to determine the relative economic efficiency of programs" (58).

While economic evaluations are considered useful and aid in decision-making, evidence shows that they are not routinely reported as part of implementation interventions. A recent Cochrane systematic review examined the effectiveness of strategies aimed at improving the implementation of healthy eating and physical activity policies, practices or programs by childcare services (32) and identified just ten studies, none of which reported any measure of the cost or cost-effectiveness analyses of the implementation strategies tested. More broadly, Vale and colleagues undertook a systematic review of economic evaluations and cost analyses of guideline implementation strategies in the field of health and medicine (59). Of the 235 studies identified, only 63 reported economic evaluations. Furthermore, the authors noted that the overall quality of the economic evaluations was poor and methodological limitations were common, including inappropriate analyses and unit analysis errors, and insufficient consideration of resource use and costs (59). Similar findings were also reported by Lau et al, who undertook a systematic review of reviews (including 91 reviews), to investigate the effectiveness of strategies for improving the implementation of complex interventions in the primary care setting (60).

The randomised controlled trial of the multi-strategy intervention reported in Chapters 4, 5 and 6 did not include an economic evaluation. Given the importance of this data, such an evaluation should be a priority for future work. To avoid the methodological shortcomings of previous economic evaluations of implementation strategies, such research should adhere to the WHO and the Australian National Health and Medical Research Council (NHMRC) protocols and recommendations for economic evaluations (61, 62). Ideally researchers should also adhere to the 2013 'Consolidated Health Economic Evaluation Reporting Standards (CHEERS) statement, produced by a task force supported by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) as these protocols provide a standardised approach to reporting economic evaluations (57).

A recent implementation study undertaken in NSW primary schools demonstrates how quality cost-effectiveness studies can assist policy makers in selecting appropriate and effective strategies to improve food provision. The study compared the cost-effectiveness of three implementation strategies, of varying intensities (high, medium and low), targeting the implementation of school canteen guidelines (63). Compared to usual support, the cost-effectiveness ratios for each of the three interventions were reported to be: A$2,982 (high intensity), A$2,627 (medium intensity) and A$4,730 (low intensity) per one percent increase in the proportion of schools reporting 'adherence' with the state-wide canteen nutrition guidelines. The study found that while there was no significant difference between cost-effectiveness ratios of 'high' and 'medium intensity' interventions, the absolute cost required to deliver the high intensity intervention was far greater. On this basis, a NSW Local Health District utilised the 'medium' intensity implementation strategy for population scale-up– delivering it to 168 schools in their service region (64).

To the best of the author's knowledge, there has been no such equivalent cost-effectiveness research undertaken in the childcare setting. This leaves policy makers and practitioners little empirical evidence with which to choose future strategies to support the implementation of menu dietary guidelines in the childcare setting.

CONCLUSIONS

The evidence presented in this thesis suggests that sector menu dietary guidelines have

the potential to have a positive impact on child health, however a significant proportion of childcare services fail to implement such guidelines. This thesis has identified a number of factors that influence childcare services implementation of such guidelines. Additionally, this thesis has demonstrated that a multi-strategy intervention can improve the implementation of menu dietary guidelines, resulting in improvements in children's food intake whilst in care. However, a greater understanding of the cost-effectiveness and scalability of such interventions is required. The work included in this thesis has contributed positively to the advancing implementation research and practice in the childcare setting.

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Appendix 1.1 Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services (Review)

Cochrane Library

Cochrane Database of Systematic Reviews

Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services (Review)

Wolfenden L, Jones J, Williams CM, Finch M, Wyse RJ, Kingsland M, Tzelepis F, Wiggers J, Williams AJ, Seward K, Small T, Welch V, Booth D, Yoong SL

Wolfenden L, Jones J, Williams CM, Finch M, Wyse RJ, Kingsland M, Tzelepis F, Wiggers J, Williams AJ, Seward K, Small T, Welch V, Booth D, Yoong SL.
Strategies to improve the implementation of healthy eating, physical activity and obesity prevention policies, practices or programmes within childcare services.
Cochrane Database of Systematic Reviews 2016, Issue 10. Art. No.: CD011779.
DOI: 10.1002/14651858.CD011779.pub2.

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Appendix 2.1 Systematic review search strategy

Database(s): MEDLINE 1946 to Present with Daily Update
Search Strategy:

#	Searches	Results
1	Child, Preschool/	814298
2	(pre-school* or preschool*).mp.	817193
3	Child Day Care Centers/	4616
4	childcare*.mp.	1366
5	(daycare* or day care*).mp.	13052
6	early child*.mp.	17937
7	(nursery or nurseries).mp.	10131
8	Kinder*.mp.	19724
9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	851481
10	nutrition*.mp.	286143
11	(health* adj2 eat*).mp.	4725
12	Child Nutrition Sciences/	1020
13	Fruit/ or fruit*.tw.	75125
14	Vegetables/ or vegetable*.tw.	44130
15	canteen*.mp.	412
16	Food Services/	5004
17	menu.mp.	3569
18	(calorie* or calories* or kilojoule*).mp.	19430
19	Energy Intake/	35388
20	Eating/	46219
21	Food Habits/	25543
22	Food/	28877
23	Menu Planning/	1351
24	feeding program*.mp.	710
25	food program*.mp.	421
26	10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25	474519
27	(recommend* or guideline* or protocol* or polic* or procedure* or best practice* or guidance* or strateg*).tw.	2277072
28	(barrier* or imped* or facilitat* or challenge* or adher* or factor* or hindrance* or hinder* or obstacle* or hurdle* or opportunit*).tw.	3345838
29	**9 and 26 and 27 and 28**	**2278**

Appendix 2.1 Systematic review search strategy con't

Database(s): Embase 1974 to 2016 Week 31

#	Searches	Results
1	preschool child/	526031
2	(pre-school* or preschool*).mp.	535605
3	day care/	10360
4	childcare*.mp.	1988
5	(daycare* or day care*).mp.	14583
6	early child*.mp.	26501
7	(nursery or nurseries).mp.	11774
8	Kinder*.mp.	27862
9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	594341
10	nutrition*.mp.	407754
11	(health* adj2 eat*).mp.	7274
12	Fruit/ or fruit*.tw.	103719
13	Vegetable/ or vegetable*.tw.	60467
14	canteen*.mp.	665
15	Food Services.mp. or catering service/	15249
16	menu.mp.	3667
17	(calorie* or calories* or kilojoule*).mp.	33908
18	caloric intake/	47205
19	eating/	27361
20	Food Habits.mp. or feeding behavior/	72285
21	food/	70686
22	feeding program*.mp.	847

Appendix 2.1 Systematic review search strategy con't

23	food program*.mp.	508
24	10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23	688198
25	(recommend* or guideline* or protocol* or polic* or procedure* or best practice* or guidance* or strateg*).tw.	3366539
26	(barrier* or imped* or facilitat* or challenge* or adher* or factor* or hindrance* or hinder* or obstacle* or hurdle* or opportunit*).tw.	4654123
27	**9 and 24 and 25 and 26**	**1976**

Appendix 2.1 Systematic review search strategy con't

Database(s): PsycINFO 1806 to July Week 4 2016
Search Strategy:

#	Searches	Results
1	preschool students/ or nursery school students/ or kindergarten students/	14033
2	(pre-school* or preschool*).mp.	44568
3	child day care/	2310
4	childcare*.mp.	3129
5	(daycare* or day care*).mp.	6295
6	early child*.mp.	27743
7	(nursery or nurseries).mp.	4743
8	Kinder*.mp.	22476
9	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8	91701
10	nutrition/ or nutrition*.tw.	21748
11	(health* adj2 eat*).mp.	2865
12	fruit*.mp.	14923
13	Vegetable*.mp.	4393
14	canteen*.mp.	96
15	menu.mp.	1466
16	(calorie* or calories* or kilojoule*).mp.	3691
17	exp Food Intake/ or Energy Intake.mp.	13992
18	Eating.mp. or exp Eating Behavior/	50109
19	exp FOOD/	11719
20	exp Food Preparation/	51
21	feeding program*.mp.	105
22	food program*.mp.	106
23	10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22	98341
24	(recommend* or guideline* or protocol* or polic* or procedure* or best practice* or guidance* or strateg*).tw.	726385
25	(barrier* or imped* or facilitat* or challenge* or adher* or factor* or hindrance* or hinder* or obstacle* or hurdle* or opportunit*).tw.	964406
26	**9 and 23 and 24 and 25**	**275**

Appendix 2.1 Systematic review search strategy con't

Database(s): MEDLINE In-Process & Other Non-Indexed Citations
Search Strategy:

#	Searches	Results
1	(pre-school* or preschool*).mp.	2171
2	childcare*.mp.	202
3	(daycare* or day care*).mp.	573
4	early child*.mp.	1945
5	(nursery or nurseries).mp.	585
6	Kinder*.mp.	704
7	1 or 2 or 3 or 4 or 5 or 6	5604
8	nutrition*.mp.	20715
9	(health* adj2 eat*).mp.	826
10	Child Nutrition Sciences/	0
11	fruit*.mp.	10591
12	vegetable*.mp.	4440
13	canteen*.mp.	44
14	menu.mp.	256
15	(calorie* or calories* or kilojoule*).mp.	1809
16	food.mp.	31322
17	eating.mp.	5982
18	energy intake.mp.	1372
19	feeding program*.mp.	70
20	food program*.mp.	32
21	8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20	63198
22	(recommend* or guideline* or protocol* or polic* or procedure* or best practice* or guidance* or strateg*).tw.	282839
23	(barrier* or imped* or facilitat* or challenge* or adher* or factor* or hindrance* or hinder* or obstacle* or hurdle* or opportunit*).tw.	385542
24	**7 and 21 and 22 and 23**	**103**

Appendix 2.1 Systematic review search strategy con't

CINAHL

#	Query	Results
S1	(MH "Child, Preschool")	150,112
S2	(pre-school* or preschool*)	151,988
S3	(MH "Child Care (Saba CCC)") OR (MH "Child Care Providers") OR (MH "Child Care")	3,054
S4	(childcare* or child care*)	30,256
S5	(daycare* or day care*)	10,142
S6	early child*	13,676
S7	(nursery or nurseries)	2,720
S8	"kinder*"	1,815
S9	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8	188,893
S10	"nutrition*"	102,885
S11	(health* n2 eat*)	3,695
S12	(MH "Child Nutrition")	5,982
S13	(MH "Fruit")	8,955
S14	(MH "Vegetables")	8,560
S15	fruit* or vegetable*	20,458
S16	"canteen*"	138
S17	(MH "Food Services")	5,652
S18	"menu"	1,915
S19	(calorie* or calories* or kilojoule*)	3,965
S20	(MH "Energy Intake")	12,990
S21	(MH "Eating") OR (MH "Eating Behavior") OR (MH "Food Habits")	21,755
S22	(MH "Food")	10,142
S23	(MH "Menu Planning")	1,028
S24	"feeding program*"	117
S25	food program*	1,052
S26	S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25	148,913
S27	TI ((recommend* or guideline* or protocol* or polic* or procedure* or best practice* or guidance* or strateg*)) OR AB ((recommend* or guideline* or protocol* or polic* or procedure* or best practice* or guidance* or strateg*))	494,695

Appendix 2.1 Systematic review search strategy con't

S28	TI ((barrier* or imped* or facilitat* or challenge* or adher* or factor* or hindrance* or hinder* or obstacle* or hurdle* or opportunit*)) OR AB ((barrier* or imped* or facilitat* or challenge* or adher* or factor* or hindrance* or hinder* or obstacle* or hurdle* or opportunit*))	538,958
S29	**S9 AND S26 AND S27 AND S28**	**700**

ERIC (searched in abstract, title, and keyword fields)

ab("Pre school*" or preschool* or "child care*" or childcare* or daycare* or day care* or "early child*" or nursery or nurseries or kinder*) AND ab(Nutrition* or (health* and eat*) or fruit* or vegetable* or canteen* or food or eating or menu or calorie or calories or kilojoule* or "energy intake" or "feeding program*") AND ab(recommend* or guideline* or protocol* or polic* or procedure* or best practice* or guidance* or strateg*) AND ab(barrier* or imped* or facilitat* or challenge* or adher* or factor* or hindrance* or hinder* or obstacle* or hurdle* or opportunit*)

Appendix 2.2 Full description of each included study

Brewer 2013

Methods	**Study design:** Cross sectional **Sample size:** Eight preschool employees **Sample method:** Purposive sampling **Data collection method:** Qualitative - Focus groups and semi-structured individual interviews **Method of analysis:** The researcher employed horizontalization of data to uncover significant statements, quotes, or key points that provided an understanding of how the preschool employees perceived the intervention program. After these significant statements were identified, the researcher used textural descriptions to write a general description of what the preschool employees' experienced during the eight-month intervention program.	
Participants	**Service type:** Preschool **Country:** United States **Region:** North eastern **Demographic/socioeconomic characteristics:** All Caucasian females between the ages of 19-58. Working at the preschool for at least two years **Inclusion/exclusion criteria:** Inclusion- Low-income preschools where 50% of children classified as obese. Exclusion – not listed **Mean age:** Age range 19-58 **Sex:** Female **Recruitment:** Not described	
Intervention	Grant-funded obesity prevention program was implemented. As part of the intervention program, substantial changes were made to the quality of foods that were served at the preschool. As part of the new menu, the preschool incorporated fruits and vegetables, lean proteins, dairy products, and high-fibre foods into the morning and afternoon snacks in order to reduce children's overall sugar intake and to provide them with sustained energy. Furthermore, staff were asked to refrain from giving children food as a reward.	
Outcomes	**Identified factor**	**Allocated TDF Domain (construct)**
Barriers	Food service workers reported that their kitchen supplies were insufficient	11. Environmental context and resources (Material resources)
	It was challenging to re-train the preschool staff who had preconceived notions of "what was healthy" and "what was a snack."	1. Knowledge (knowledge)
	Respondents felt that their previous menus were sufficient and that making changes to the menu would affect both their food budget and the amount of time needed to plan and prepare meals and snacks.	6. Beliefs about consequences (Outcome expectancies)
	Staff reported that the transition was not easy, and the menu adjustment was also difficult for the children. One food service worker specifically stated:	12. Social influences (social pressure)

	The children asked questions about the foods that they had not seen before and were skeptical about trying new foods. It seemed like the looks of things freaked them out more than the taste. Like, they kept asking why the bread was brown, but, I mean, they ate it and didn't complain about the taste.	
	Staff were reluctant to serve foods that were not "liked" the first time around. For example, one teaching assistant exclaimed: They really like the healthy mashed potatoes. I really liked the healthy mashed potatoes. I am even going to use that recipe at home....but not the mashed cauliflower. Nobody really ate the mashed cauliflower. I think most of them had never seen it before and they kept asking what it was. Even the smell of the mashed cauliflower; it didn't smell too good. I don't think many of the kids even tried the mashed cauliflower.	6. Beliefs about consequences (Outcome expectancies)
	Staff members were apprehensive about "wasting food" as they did not want to throw away expensive fruits and vegetables that children left on their plates. Therefore, if a food was not well-received the first time it was served, the preschool staff wanted to immediately remove it from the menu.	6. Beliefs about consequences (Outcome expectancies)
	Respondents felt that their previous menus were sufficient	1. Knowledge (knowledge)
	Respondents felt that making changes would affect their food budget	6. Beliefs about consequences (Outcome expectancies)
	Helping staff members regard a snack as a mini meal or a nutrient-dense food instead of a treat or dessert was difficult since a majority of the staff members were perceived high sugar treats as "snacks." One teaching assistant stated: "one day we give them a tasty cake, and the next day they get cheese cubes and a cherry tomato. I mean, what kid wants a cherry tomato for a snack?"	12. Social influences (social pressure)

	Because the preschool staff had previously served a lot of pre-packaged and processed foods such as instant mashed potatoes, chicken nuggets, and tater tots, when asked to prepare meals from scratch, they noticed that they needed better pairing knives, bowls, and baking pans.	11. Environmental context and resources (Material resources)
Facilitators	When the new menu was implemented, staff members were required to cut potatoes, grill chicken breasts, and create soups and casseroles from scratch. Therefore, they also needed more time to prepare the foods since home cooked meals take longer to prepare than opening a package or box. Therefore, staff also requested having a food service worker stay an hour later or come in an hour earlier to help with food preparation.	11. Environmental context and resources (Material resources)
	Staff suggested that making gradual changes to the menu was better than doing one, complete overhaul. "When we made small substitutions, like adding chopped pine- apple to pizza or swapping whole wheat pasta for white pasta, sometimes the kids didn't even notice	9. Goals (Goal setting)
Validity of measures used	Not described	

Appendix 2.2 Full description of each included study con't

Briley 1994

Methods	**Study design:** Cross sectional **Sample size:** 9 Childcare centres **Sample method:** A list of childcare centres that participate in the Child and adult food care program (CAFP) **Data collection method:** Qualitative - Formal interview with food program director and/or childcare centre director. **Method of analysis:** Grounded theory approach – three coding processes, open coding to develop categories, themes or concepts, axial coding to identify relationships among themes or concepts.	
Participants	**Service type:** Long day care services, offering full-day programs, prepared meals or snacks on site and served food to 20-60 children each day. **Country:** United States **Region:** Three communities representing different ethnic cultures in Texas **Demographic/socioeconomic characteristics:** African American, Hispanic, Anglo **Inclusion/exclusion criteria:** Inclusion - Services no more than half a day from Austin (Texas) or airports within commuting distance. Exclusion - Head start centres (as required to have a dietitian review menus) **Mean age:** Not listed **Sex:** Not listed **Recruitment:** The state NET Program Coordinator sent a letter to each of the centres to request their participation. The researchers telephoned the directors of the centres to make appointments and arrangements for the site visits.	
Outcomes	**Identified factor**	**Allocated TDF Domain (construct)**
Barriers	Food service staff lack confidence in their kitchen maths skills	4. Beliefs about capabilities (Perceived competence)
	Food service staff do not understand CACFP requirements	1. Knowledge (procedural knowledge)
	Food service staff have limited nutrition knowledge	1. Knowledge (knowledge)
	Food and nutrition not an integral or important part of the program	3. Professional role and identity (organisational commitment)
	Staffing: most centres cook is hired less than full time to save money	11. Environmental context and resources (resources)
	Services do not serve full portions, due to perception that children would not eat the whole amount – concerns regarding food waste	6. Beliefs about consequences (Outcome expectancies)
	Staff perceptions that children do not like fruit or vegetables.	12. Social influences (social pressure)
	Staff perceptions that children want food seasoned with margarine, lard or bacon.	12. Social influences (social pressure)
	Cook perception of their role is just to "fill the children up"	3. Professional role and identity (professional role)

	Kid culture or childcare culture for types of foods served	12. Social influences (Group norm)
	Convenience in relation to ordering, standard food	6. Beliefs about consequences (outcome expectancies)
Facilitators	Staff did not believe their knowledge limited their ability to meet children's needs	4. Beliefs about capabilities (Professional confidence)
Validity of measures used	Not described	

Appendix 2.2 Full description of each included study con't

Farmer 2015

Methods	**Study design:** multi-case, exploratory study design **Sample size:** 2 services, 10 key informants **Sample method:** Two urban child-care centres who were identified as 'early adopters' of the ANGCY (Alberta Nutrition Guidelines for Children and Youth). **Data collection method:** Data was collected by a researcher via direct observations; key informant interviews and field notes. **Method of analysis:** Thematic analysis and conceptual ordering of the data were conducted by researcher and reviewed by the research team. Due to the nature of data sources, both inductive and deductive coding strategies were used to analyze the content.	
Participants	**Service type:** Urban centre based childcare services **Country:** Canada **Region:** Edmonton, Alberta **Demographic/socioeconomic characteristics:** Case 1 - Publicly owned, non-profit child-care centre comprised of a Board of Directors that included community members and parents. The Board of Directors was responsible for decisions related to the administration and management of the centre and utilized a participatory approach to decision making. Case 2 - Privately owned, for-profit child-care centre, comprised of a Director-Owner at the helm of the organization who supervised the Assistant Director (AD) and staff (i.e. ECE, parent volunteers). **Inclusion/exclusion criteria:** Inclusion - child-care centres in identified as exemplary early adopter cases. Exclusion – not listed. **Mean age:** Not stated **Sex:** Not stated **Recruitment:** The research team contacted the six eligible urban childcare centres and two of them agreed to participate in the study. Directors and staff from each child-care centre consented to participate prior to the start-up of the study. To ensure a comprehensive perspective, the selection of key informants was based on key positions that staff held in the centre (i.e. directors, cooks) and their level of experience.	
Outcomes	**Identified factor**	**Allocated TDF Domain (construct)**
Barriers	None identified	
Facilitators	Given the organizational structure and availability of resources, such as having more highly trained and skilled staff	2. Skills (ability)
	Flexibility to dedicate time to other activities, Case 1 had greater capacity for being proactive and creative in implementing the nutrition guidelines.	11. Environmental context and resources (Resources)
	The staff in the present study reported that effective and strong leadership was essential or the successful adoption of an innovation, such as the nutrition guidelines. Staff feel there is a leader in the center and feel they have someone to turn to for	3. Professional role and identity (leadership)

	direction/ guidance when problems/issues arise Staff trust leadership to make the best decisions for the center Provide staff with informed solutions best for all involved	
	Staff feel comfortable to approach Directors with problems/issues as they arise. Staff feel supported by Directors both in practice and in raising issues/ideas	7. Reinforcement (Reinforcement)
	Regular feedback provided to staff both formally (performance evaluations annually) and informally (conversations/discussions) as issues arise	7. Reinforcement (Reinforcement)
	All staff members work together to achieve best practice Staff share knowledge, ideas, and collaborate with one another Staff trust and feel supported by one another	3. Professional role ad identity (Organisational commitment)
	Collaboration - All staff members work together to achieve best practice Staff share knowledge, ideas, and collaborate with one another	12. Social influences (Social support)
	Staff perceptions of being a valued staff member	11. Environmental context and resources (Organisational culture)
	Networking /information Sharing - Child-care staff in the present study acknowledged that having good communication and well-established social networks were crucial elements of a highly functioning organization and the ANGCY.	12. Social influences (Social support)
	Networking and knowledge brokering - Information seeking/sharing through social networks. Information sharing both formally (staff meetings) and informally (passing conversation/ discussions or informal meetings as issues arise). We meet and we share information so if we have issues about maybe how much we are budgeting for our food, where we are going to be buying our food, the kinds of menus we're developing… that kind of discussion goes on.'	3. Professional role and Identity (Organisational commitment)
	The ED played a critical role in knowledge brokering with center staff and they, in turn, relied on each other and especially on the ED for answers/solutions.	12. Social influences (Social support)

	The ED's and staff's commitment to healthy child development and the role of healthy eating were pivotal elements in the adoption of the guidelines	3. Professional role and Identity (Organisational commitment)
	The ED's and staff's understanding of healthy child development and the role of healthy eating were pivotal elements in the adoption of the guidelines	1. Knowledge (Knowledge)
	Supportive environment: enforcing nutrition policies, incorporating nutrition into the curriculum, promoting awareness of healthy nutrition practices through positive role modeling and the use of priming and prompting.	11. Environmental context and resources (Culture)
Validity of measures used	Not described	
Additional Notes	The present qualitative study was part of Phase 2 of an evaluation framework of The Alberta Nutrition Guidelines Outcomes (TANGO) study that evaluated the implementation of the ANGCY in schools, child-care and recreational facilities.	

Appendix 2.2 Full description of each included study con't

Froelich 2011

Methods	**Study design:** Cross-sectional **Sample size:** Seven childcare educators from six urban childcare centres. **Sample method:** Convenience: The directors were identified through their attendance at a board of directors meeting **Data collection method:** Qualitative – semi-structured interviews. The one-on-one interviews lasted about an hour and were carried out in a private room at the childcare centres. We made every effort to create a relaxed and open atmosphere for the interviews **Method of analysis:** The audio recorded interviews were transcribed verbatim. In order to confirm that we had accurately analysed their transcripts, we discussed the key factors that we had identified with the participants. No major changes were made to the transcripts, nor were new factors identified following the second meeting. We followed three steps to classify the barriers and facilitators identified by participants. First, the transcripts were read multiple times and meaning units such as words and phrases containing either a barrier or facilitator were identified; meaning units containing similar barriers and facilitators were then grouped together. Second, participants identified both personal (intrapersonal) and social environmental factors (interpersonal, institutional, community, and public policy) influencing their decisions; as such the researcher coded the barriers and facilitators as either personal or one of four social environmental factors. Third, some meaning units were reclassified and similar barriers and facilitators were grouped together to develop themes based on the participants' responses.
Participants	**Service type:** Centre based childcare services. All employed a service cook. **Country:** Canada **Region:** Urban Saskatchewan **Demographic/socioeconomic characteristics:** The research took place in six urban childcare centres. Five were located inside a community facility such as a school or physical activity complex and the sixth centre was located in a house that had been developed into a childcare centre. Some centres were licensed to care for 25 children, where as other care centres were licensed to care for up to 40 children, with the average child to educator ratio of 4:1. One centre cared for infants/children ages 6 weeks to 6 years of age; however the majority of centres did not accept babies younger than 6 months of age. They were all equipped with their own kitchen and thus each centre employed a full time cook. Two of the six care centres were located near the downtown of the urban centre; the four remaining centres were located in residential neighbourhoods. All contained both indoor and outdoor areas. **Inclusion/exclusion criteria:** Not listed **Mean age:** Not listed **Sex:** Female **Recruitment:** The directors were identified through their attendance at a board of directors meeting. A letter describing the study was distributed to the directors. If they were participating in the study, the directors were given an opportunity to leave their contact information with us. Following the meeting we contacted interested directors.

Outcomes	Identified factor	Allocated TDF Domain (construct)
Barriers	Additionally, child care centre workers often reported that children would not eat healthy foods such as vegetables and many dairy products because they were not introduced to these foods at home. Thus informants attributed parental behaviours and lack of knowledge as a barrier to the promotion of healthy eating practices in the child care centres	12. Social Influences (Social Pressure)
	All care centre workers felt their centres would benefit from a resource, such as a book or online website with easy to make recipes that consisted of affordable ingredients. Additionally the recipes would be assessed by a nutritionist.	11. Environmental context and resources (resources)
Facilitators	Participants suggested that cooks and directors should receive training to provide them with the knowledge of what is needed to prepare healthy meals for the children	2. Skills (skills)
	All care centre staff reported that provincial nutritional policies were closely followed at their centres and this facilitated early childhood educators in providing healthy foods for children in their care.	11. Environmental context and resources (organisational culture/climate)
Validity of measures used	The questions in the interview guide were developed around the ecological model; this is beneficial because it applies a systematic approach for data collection and analysis (Humbert et al., 2006).	
Notes Further comments from the review authors on aspects of the study that are not covered by the categories above.	The study was approved by the University of Saskatchewan Research Ethics Board.	

Appendix 2.2 Full description of each included study con't

Gabor 2010

Methods	**Study design:** Cross sectional **Sample size:** 83 individuals participated in 10 focus groups. Seven focus groups were conducted with childcare providers from a total of 32 child care centres and 27 child care homes across the state. Four of the seven childcare provider focus groups were held with providers from centres, and three with providers from child care homes. **Sample method:** Participants from six of the seven provider focus groups were recruited from child care centres participating in CACFP, and one group of participants was recruited from centres not participating in CACFP **Data collection method:** Qualitative**.** To obtain the perspective of providers and parents in these varying regions, three to four focus groups were conducted in each of the three counties. **Method of analysis:** Recorded focus group discussions were transcribed into Microsoft Word and imported into NVivo version 8 qualitative analysis software. After reviewing the transcripts, a coding structure was created and all transcripts were coded and analyzed in NVivo. From coded text, themes were identified and participants' quotes were selected for inclusion. Data were organized by site emerging themes and conceptual ordering. Content was analyzed using inductive and deductive coding strategies.	
Participants	**Service type:** Participants from six of the seven provider focus groups were recruited from childcare centres participating in CACFP, and one group of participants was recruited from centres not participating in CACFP. **Country:** Canada **Region:** Alberta **Demographic/socioeconomic characteristics:** The 10th focus group was conducted in New Castle County with licensed child care centre providers who did not participate in CACFP. This group of providers serves a population of families with somewhat higher incomes. **Inclusion/exclusion criteria:** Inclusion- Childcare centres or homes that participated in Delaware's CACFP. Exclusion – Not listed. **Mean age:** Not stated **Sex:** Not stated **Recruitment**: Mailing lists of licensed family child care homes were obtained from the state's three largest CACFP-sponsoring agencies that administer and monitor these homes in Delaware. A mailing list to recruit for the one group of non-CACFP providers was obtained from OCCL. Using these lists, providers serving child care centers and homes were mailed a recruitment letter signed by the state director of CACFP and the administrator of OCCL explaining the purpose of the needs assessment and encouraging their involvement in the focus groups. The letter instructed interested providers to contact Altarum via email or a toll-free number to sign up to participate**.**	
Outcomes	**Identified factor**	**Allocated TDF Domain (construct)**

Barriers	**Meal planning and food preparation** Difficulty developing menus, incorporating variety, cooking, modifying existing recipes to meet guidelines, and interpreting food labels.	2. Skills (ability)
	Difficulties in generating ideas for a variety of menu items - including providing a variety of snacks that meet the new guidelines was a challenge	2. Skills (ability)
	Challenges in preparing meals and snacks that are both appealing to children and in compliance with the limitations on fat and sugar content stipulated in the guidelines.	2. Skills (ability)
	Identifying suitable options for snacks was also mentioned often.	1. Knowledge (knowledge)
	Locating healthy, pre-packaged foods that meet the guidelines	2. Skills (skills)
	Additional time to prepare foods, time burden of developing new recipes	11. Environmental context and resources (resources)
	Lack of confidence in cooking skills, lack of interest	4. Belief about capabilities (self confidence)
	Insufficient recipes	11. Environmental context and resources (resources)
	Difficulties coming up with substitutions for recipes that are higher in fat or sugar than the guidelines permit that will also appeal to children.	1.Knowledge
	Adapting healthful recipes that they do find, which are typically for a small number of servings, to serve to the large number of children that they care for at their facility	2. Skills (Skills)
	Difficulties in calculating the amounts of sugar, fat, etc., in each child-size portion of homemade dishes with multiple ingredients	2. skills (ability)
	Difficulty finding foods from their traditional suppliers that comply with the guidelines.	11. Environmental context and resources (resources)
	Learning what products are available and where to purchase.	1. Knowledge (knowledge)
	Staff Engagement Staff resistance, staff will inadvertently project negative attitudes about the new foods that are being offered to meet the nutrition guidelines.	13. Emotion (Negative Effect)
	Food Costs Higher cost of healthy foods. Impact of rising food costs on their very limited budgets.	11. Environmental context and resources (resources)

	Parental Engagement Many providers in the focus groups reported that the parents of the children they care for have strong opinions about what their children should or should not eat. The providers reported that parents are concerned their children will not eat or drink enough and will come home hungry from child care. Family home providers in particular emphasized that parental resistance to the policy changes can also often encourage resistance from their children	12. Social Influences (Social pressure)
Facilitators	**Advanced Menu Planning** Planning menus much farther in advance.	9. Goals (Action planning)
	Using software that allows her to develop a set of menus in advance using prewritten recipes – one provider only	11. Environmental context and resources (resources)
	Advanced Meal Preparation Cook food ahead of time, such as the night before or by using a crock pot.	9. Goals (action planning)
	Transitioning to New Foods Gradually Gradually transitioning to healthier foods required in the new guidelines.	9. Goals (action planning)
	Provide More Opportunities for Providers and Cooks to Share Menus and Recipes. Obtaining recipes that other providers had used or tested to better ensure that the recipes would be kid friendly, but not too expensive.	11. Environmental context and resources (resources)
	Would be more likely to prepare a new recipe if they had tasted it or watched a demonstration on how to prepare it	2. Skills (skills)
	Develop User-Friendly Resources to Be Displayed at Child Care Facilities Providers suggested having large colourful charts or posters that they could display at the centre for the cook, teachers, and parents to use as a reference. posters or bulletin board displays would help convey the importance of the new guidelines to staff and parents.	11. Environmental context and resources (resources)
	Sample Menus With Specific Product and Shopping Information List of allowable foods or alternatives to popular but unallowable foods. However, they were careful to say that in order for these lists to be useful, they must be specific.	11. Environmental context and resources (resources)
	Strategies to Contain Food Costs	9. Goals (action planning)

	Staff Engagement Implementation of the guidelines hinges on the extent to which direct caregivers in child care homes and staff embrace them as fundamental to the well-being of the children in their care.	3. Professional role and identity (Organisational commitment)
	Involving staff in every facet of implementation.	12. Social Influences (Social support)
	Presenting the nutrition guidelines and their rationale in a fun and engaging way to help foster a positive attitude among staff, and motivate them to promote healthy habits for children.	3. Professional role and identity (Organisational commitment)
Validity of measures used	Validity not stated.	
Notes Further comments from the review authors on aspects of the study that are not covered by the categories above.	Focus group discussion guides with key discussion questions were developed with input from, and in coordination with OCCL, CACFP, and Nemours. Separate discussion guides were developed for the provider focus groups and parent focus groups. Focus group facilitators were trained to follow these guides in order to promote uniformity among the various lines of inquiry explored in the groups, follow-up questions (or probes),	

Appendix 2.2 Full description of each included study con't

Gerritsen 2016

Methods	**Study design:** Cross sectional **Sample size:** Invited n = 847, participated = 257 childcare centres managers/head teachers **Sample method:** Services listed in the Ministry of Education database of early education services (august 2013) within the three district health board areas of Auckland, Counties Manukau and Waikato. **Data collection method:** Quantitative 65 item online questionnaire adapted from the directors child care nutrition and physical activity assessment survey and the nutrition and physical activity self-assessment for childcare tool. **Method of analysis:** Descriptive analyses of the nutrition-related survey variables were performed for the total sample			
Participants	**Service type:** Early childhood education services (private day care, community day care, public kindergartens, and public play centres) **Country:** New Zealand **Region:** Three district health board areas of Auckland, Counties Manukau and Waikato. **Demographic/socioeconomic characteristics:** These regions collectively have an ethnically and socio-economically diverse population, containing one-third of New Zealand's children aged under 5 years **Inclusion/exclusion criteria:** inclusion - All licenced services with a valid email address were included. Exclusion- Infant and toddler services, home based services, play groups, unlicensed crèches and hospital based services. **Mean age:** Not listed **Sex:** Not listed **Recruitment:** All services which had a registered email address were sent an invitation to participate via email.			
Outcomes	**Identified factor**	**Prevalence (range of prevalence reported within studies)** Eg. 2-100% of participants/organisations identified this factor	**Strength (**Some measure of association with implementation outcome 'r' + correlation coefficient ODDS ratio)	**Allocated TDF Domain (construct)**
Barriers	**Reported at least one barrier to providing and/or promoting healthy food to children.**	**Two out of every 5 services (n=92, 39.5%)**		n/a
	Lack of support from parents and families	N=48, 20.6% of all services		12. Social Influences (Social pressure)

	Reported concerns about food intolerances or allergies as a barrier	N=24, 10.3% of all services		2. Skills (Skills)
	Lack of staff training on nutrition and education	N=16, 6.9% of all services		2. Skills (Skills)
	Lack of training for cooks (private and community day care centres)	N=10, 4.3% of all services		2. Skills (Skills)
	Insufficient funds	N=12, 5.2% of all services		11. Environmental context and resources (Resources)
Facilitators	None identified			
Validity of measures used	The sixty-five-item questionnaire for the survey was adapted from the Director's Child Care Nutrition and Physical Activity Assessment Survey(16) and the Nutrition and Physical Activity Self-Assessment for Child Care tool(17), both of which have been validated using direct observation, document review and structured interviews administered alongside the self-report questionnaire. Previous New Zealand surveys of child-care nutrition environments(12) were used to ensure appropriate response categories and the questionnaires from several other similar studies – one of which has been subsequently validated(18) – also informed item wording and response categories(19,20).			

Appendix 2.2 Full description of each included study con't

Hughes 2010

Methods	**Study design:** Cross-sectional **Sample size:** Surveys were completed by 1,583 programs (87%), 188 of which completed the survey. **Sample method:** All Head Start programs in the USA as part of the Study of Healthy Activity and Eating Practices and Environments in Head Start (SHAPES). Target respondents were service directors. **Data collection method:** Quantitative - targeted respondents were program directors, but the directors were encouraged to seek input from their program's specialists in health or nutrition, or both. For each of the three levels—program, staff, and parent—we asked two closed-ended questions, one about barriers to children's healthy eating and one about barriers to children's gross motor activity, for a total of six questions. For each of these six questions, the respondents were given a list of barriers and asked to mark all that applied. At the bottom of each list, a space labelled "other" was provided for the respondents to identify and mark an additional barrier if they wished. From the marked list, they were then asked to identify the single most important barrier.). Survey distributed via telephone. **Method of analysis:** For all six questions pertaining to perceived barriers, the authors report how frequently each barrier was chosen. For each question the authors also report the three barriers most frequently ranked as the most important barrier
Participants	**Service type:** Preschool, Head Start services **Country:** United States **Region:** n/a **Demographic/socioeconomic characteristics:** Not described **Inclusion/exclusion criteria:** Inclusion - All Head Start programs as part of the Study of Healthy Activity and Eating Practices and Environments in Head Start (SHAPES). Exclusion - eighty programs were excluded—fifty of which were in U.S. territories, twenty-seven of which did not provide direct services to children, and three of which provided all services outside of centers **Participants:** For 27 percent of the 1,583 programs, the program director completed the survey with no help from staff. Among the programs in which the task was shared, the primary respondent was the program director (41 percent), the health or nutrition specialist (47 percent), or an education specialist or other staff member (12 percent). Therefore, in two-thirds of programs the director was the only or the primary respondent. Of 1,583 programs, 250 directors (16 percent) used the open-ended question to describe further challenges to implementing obesity prevention efforts. **Mean age:** Not reported **Sex:** Not reported **Recruitment:** The survey instrument was mailed to 1,810 Head Start programs after eighty programs were excluded .We reached non responding programs by telephone and allowed them to complete the survey on the phone.

Outcomes	**Identified factor**	**Prevalence (range of prevalence reported within studies)** Eg. 2-100% of participants/organisations identified this factor	**Strength (**Some measure of association with implementation outcome 'r' + correlation coefficient ODDS ratio)	**Allocated TDF Domain (construct)**
Barriers	Not enough money to cover the cost of serving healthier meals and snacks	51%		11. Environmental Context and Resources (resources)
	Lack of control over the types of meals and snacks that are delivered to us by our food service provider	25%		11. Environmental Context and Resources (resources)
	Those preparing meals and snacks would lack the time to prepare healthier foods and beverages	22%		11. Environmental Context and Resources (resources)
	Children would not like the taste of healthier meals and snacks	12%		12. Social Influences (Social Pressure)
	Those preparing meals and snacks would lack the knowledge to prepare healthier foods and beverages	11%		1. Knowledge (knowledge)
	Staff do not have time to focus on children's health eating	7%		11. Environmental Context and Resources (resources)
	The program lacked money "to cover the cost of serving healthier meals and snacks."	56%		11. Environmental Context and Resources (resources)
	Lack of time as a barrier among those preparing meals and snacks	10%		11. Environmental Context and Resources (resources)

	Staff Do not like taste of healthier foods. Indicated that the most important barrier to encouraging children's healthy eating was that the staff did not like the taste of healthier food.	38%		12. Social Influences (Social Norm)
	Staff lack of knowledge about how to encourage healthy eating	24 %		1. Knowledge (knowledge)
	Staff identify/Cultural beliefs about food that are not always consistent with healthy eating	19 %		12. Social Influences (Social Norm)

	Programs lack resources to serve healthier foods: We lack funding. We spend a lot of our money on providing healthy meals and snacks,. The lack of adequate funding is the largest barrier we have when implementing any program changes. The reimbursement amount from CACFP cannot buy the needed food and pay for it to be prepared. The cost of leaner meats and proteins is rather prohibitive for a small program like ours that relies on USDA funding. School district food service often includes fried foods, but if we don't partner with them, staff (cooks) must be hired at more hours and would require health insurance due to increased hours. So, cost is a problem.			11. Environmental context and resources (resources)
	Parents would not support the idea of serving children healthier meals and snacks	4%		12. Social Influences (Social Pressure)
Facilitators	Our centers that have cooks on site are much healthier.			11. Environmental context and resources (resources)
Validity of measures used	Not stated			

Notes Further comments from the review authors on aspects of the study that are not covered by the categories above.	The survey instrument was developed and administered in partnership with HHS and the USDA.

Appendix 2.2 Full description of each included study con't

Jennings 2011

Methods	**Study design:** Cross sectional survey **Sample size:** n=55 managers of full-day-care pre-schools invited; 54 participated **Sample method:** List of all full-day-care services in the region **Data collection method:** Quantitative telephone questionnaire – over 150 items mix of open and closed questions. **Method of analysis:** Statistical analysis was performed using spss for Microsoft Windows, version 14.0 (SPSS Inc., Chicago, IL, USA). Descriptive data analysis was completed. The influence of nutritional training, the possession of the Guidelines and the existence of a written healthy eating policy on food provision and dietary practices were analyzed using chi-squared tests for independence (or Fisher's exact probability tests).			
Participants	**Service type:** Full-day-care pre-schools **Country:** Ireland **Region:** Dublin North West **Demographic/socioeconomic characteristics:** Dublin North West represented an area of diverse social class. Thereby providing information from pre-schools in both affluent and disadvantaged areas. **Inclusion/exclusion criteria:** Inclusion – Full-day-care pre-schools. Defined as a pre-school service offering a structured day-care service for pre-school children >5 hours daily but may also include a sessional pre-school service (ie. <3.5hours per day). Exclusion – not listed **Mean age:** Not listed **Sex:** Not listed **Recruitment:** List of all full-day-care services in the region. Services contacted via phone to participate. Recruitment not fully explained.			
Outcomes	**Identified factor**	**Prevalence (range of prevalence reported within studies)** Eg. 2-100% of participants/organisations identified this factor	**Strength (**Some measure of association with implementation outcome 'r' + correlation coefficient ODDS ratio)	**Allocated TDF Domain (construct)**
Barriers	The need for future nutritional training was recognised by almost all pre-school managers who specified the need for parental education (n=29), as well as practical ideas for food provision (n=27) and menu planning	53 of 54 (98.1%)		2. Skills (Skills development)

	(n=20) as training ideas.			
	The provision of appropriate pre-school nutrition resources, namely those pertaining to nutritional education and health promotion Topics: Resources on general healthy eating (n=11) Resources on weaning (n=6) Resources on specific dietary needs (n=6)	N=18 (33%)		11. Environmental context and resources (resources)
	Concerns that children wouldn't eat healthy foods	23 (42.5%)		12. Social Influences (Social pressure)
	Reported difficulty in the provision of a healthy diet within the pre-school setting, citing: Poor home diets and parental attitudes,	8 (14.8%)		12. Social Influences (Social norms)
	Negative peer modelling,	8 (14.8%)		12. Social Influences (Modelling)
	Lack of staff interest	8 (14.8%)		8. Intentions (stage of change)
	Cost as contributing factors	8 (14.8%)		11. Environmental context and resources (Resources)
	Nutritional issues related to menu planning: Menu variety (n=7) Balancing children dietary needs and preferences (n=5) Meeting the nutritional requirements of attending children (n=4) Catering for specific dietary needs (n=5) Fussy eaters (n=5)	N=18 (33%)		1. Knowledge (Knowledge)

Facilitators	Requested the provision of practical educational resources for menu planning	1/3 of managers (33%)		11. Environmental context and resources (Resources)
	Requested the provision of practical ideas for menu planning for meals and snacks	50% of managers		11. Environmental context and resources (Resources)
Validity of measures used	To develop the telephone questionnaire of pre-school managers, the researcher spent one full day observing the nutritional practices of a full-day-care pre-school. A pilot telephone questionnaire was subsequently designed in consultation with the senior community dietitians in the Health Promotion Unit of the Irish Health Service Executive (HSE) Dublin North East and the pre-school officer in the area in which the study was to be undertaken. A pilot study of seven full-day-care pre-schools in a Dublin area with a similar socioeconomic profile (Dublin North Central) resulted in minor amendments to the questionnaire to ensure optimum length, question sequence and removal of ambiguities.			
Notes Further comments from the review authors on aspects of the study that are not covered by the categories above.	The final questionnaire contained over 150 questions, both open-ended and closed, and took between 25 and 50 min to complete.			

Appendix 2.2 Full description of each included study con't

Kelly 2016

Methods	**Study design:** Cross sectional **Sample size:** 390 regulated childcare centres across Nova Scotia. 66 returned completed questionnaires (response rate of 17%). **Sample method:** All regulated child care centres in Nova Scotia. **Data collection method:** Quantitative - Nutrition and Physical Activity Questionnaire – circulated to all regulated child care settings in Nova Scotia **Method of analysis:** Not described			
Participants	**Service type:** Regulated child care centres **Region:** Forty-five percent (n=30) came from regulated childcare centres located in the Halifax Regional Municipality (HRM) while 41% (n=27) came from other areas of Nova Scotia. A total of 14% (n=9) could not be linked to a geographical area. **Demographic/socioeconomic characteristics:** Most respondents were facility directors or assistant directors and represented various licensing capacity levels. Almost all respondents (94%) described themselves as fairly to very familiar with the *Standards and Guidelines* and most of the settings they represented (75%) had food preparers who had substantial food preparation experience or formal food preparation training. **Inclusion/exclusion criteria:** inclusion: regulated child care centres. Exclusion: Not listed. **Mean age:** Not listed **Sex:** Not listed **Recruitment:** Questionnaire was circulated to all regulated child care centers in Nova Scotia.			
Outcomes	**Identified factor**	**Prevalence (range of prevalence reported within studies)** Eg. 2-100% of participants/organisations identified this factor	**Strength (**Some measure of association with implementation outcome 'r' + correlation coefficient ODDS ratio)	**Allocated TDF Domain (construct)**
Barriers	Nutrition training opportunities for ECEs and child care centre workers is limited with only 44% of respondent centres able to provide this support piece adequately.	44%		2. Skills (skills)

	Respondents expressed the need for additional ongoing training opportunities addressing food and feeding as well as breastfeeding			2. Skills (skills)
	Some facility directors described a feeling of 'no support' with implementation of the S*tandards and Guidelines* suggesting that the developed infrastructure surrounding this policy initiative did not meet the needs of all regulated child care settings and may have impacted the acceptance, understanding, and application within these settings			11. Environmental context and resources (Resources)
	In general there was the feeling that foods meeting specific nutrient criteria cost more than other alternatives. The cost of fresh produce throughout the year was also a concern. The limited variety of cost-appropriate healthy food options that children would eat was also articulated as was the hidden costs to maintain equipment for food service and the cost of food waste when children refused to eat the food served.			11. Environmental context and resources (Resources)

	Facility directors indicated that the level of ECEs and child care centre workers acceptance of the *Standards and Guidelines* to be a barrier affecting application			Professional role and identity (Organisational commitment)
	Some of the specific regulations lacked flexibility and infringed on professional principles held by ECEs. Specifically cited were the feelings that ECEs and classroom teachers could no longer teach and model aspects of moderation to children within their care as many foods were just simply removed from the child care environment.			11. Environmental context and resources (Organisational culture)
	The amount of time required to read labels and grocery shop to ensure foods purchased met the food and nutrient criteria outlined in the *Standards*.			11. Environmental context and resources (Resources)
	Challenges with children's food acceptance. Other comments described the struggle with child 'pickiness' and its relationship with food waste.			12. Social Influences (Social Pressure)

Facilitators	It was indicated, by facility directors, that the manual developed to support the *Standards and Guidelines* was helpful as were other additional resources such as the menu planning supports and recipes. Improvements to existing menu planning supports were suggested. Detailed sample recipes, lists of packaged food options that meet criteria, snack ideas, and fruit and vegetable alternatives were identified as additional resources that would benefit continued understanding and application.			11. Environmental context and resources (Resources)
	Connecting with other regulated child care centres was cited as helpful, particularly around menu development.			12. Social influences (social support)
Validity of measures used	The 'Nutrition and Physical Activity Questionnaire' (NAP-Q) was circulated to all regulated childcare centres in Nova Scotia. Based on a validated questionnaire used in the United States 43, the NAP-Q was adapted in consultation with research advisors representing the regulated child care community to ensure it addressed the current regulatory system that governs the operation of regulated child care settings in Nova Scotia.			
Notes Further comments from the review authors on aspects of the study that are not covered by the categories above.	A recognized limitation of our study's design is the acknowledgment that not all representatives from the regulated childcare community in Nova Scotia contributed to our developed understanding. It was beyond the capacity of the NSCCP to capture the voices of early childhood educators and food preparers who work in regulated child care settings. Also missing from the analysis are the community partners, such as Public Health Nutritionists and Early Childhood Development Consultants, who support individual centers to optimize their child care environments			

Appendix 2.2 Full description of each included study con't

Lyn 2014

Methods	**Study design:** Cross sectional **Sample size:** 20 childcare centre directors **Sample method:** Interested services were asked to send a self-assessment to the RFA to help identify areas related to nutrition and physical activity that needed improvement, 6 self-selected wellness policies that correspond to areas in need of improvement, and proposed activities related to implementation of policies. **Data collection method:** Qualitative - Semi structured interviews. 15 completed face to face, 5 via phone. Interviews were conducted in pairs for the researchers and went for duration of 60 minutes on average. The research team developed an interview protocol including questions to solicit directors' overall experiences and perceptions of the program, the processes they used to make changes to nutrition and physical activity, and any barriers they experienced **Method of analysis:** Qualitative analysis of interview transcripts was conducted using NVivo 9 software. Researchers employed 2 levels of coding. Interview recordings were profession- ally transcribed. All transcripts were imported into NVivo 9 qualitative software (QSR International Pty, Ltd, Burlington, MA, 2010).
Participants	**Service type:** Centre based childcare services. All were part of the child and adult care food program. **Country:** United States **Region:** Southwest region of the state of Georgia **Demographic/socioeconomic characteristics:** A majority of directors had worked in their current child care centre for >5 years (70%), and most directors were employed in the early childhood education field for $ 5 years. The range of directors' educational achievement varied; 37% had earned a high school diploma or General Equivalency Diploma, 26% held a graduate degree, 21% held a bachelor's degree, an16% held an associate's degree. The program included 58% (n=14) for-profit and 42% (n=10) non-profit centres. Four centres offered the Head Start program and only 1 maintained accreditation by the National Association for the Education of Young Children. A total of 55% of childcare centres were located in cities with populations over 50,000. The mean population size of cities where centres were located was 99,056 (minimum, 981; maximum, 194,107). The centres served a total of 2,042 children between the ages of 2 and 5, with a range of 40–245 children during the time of the program. There was an average of 6 lead teachers (minimum 1; maximum, 14) and an average of 4 assistant teachers (minimum, 0; maximum, 11) employed in centres during the time of the program. **Inclusion/exclusion criteria:** Inclusion – Centres had to be licenced by state. Exclusion – Centres located in an elementary school **Mean age:** Not listed **Sex:** Not listed

	Recruitment: Centre directors were invited to participate in an in-depth interview at the conclusion of the program in spring, 2011. The research team contacted directors by phone to arrange a convenient time to meet in their respective centres during a regular work day.			
Intervention	A total of 24 child care centres continued for 1 year. A DECAL staff member provided technical assistance on an ongoing basis to help centres achieve the implementation of wellness policies (Table 1) and any goals indicated in their proposal. Centres were provided with up to $2,000 to support improved healthy snacks, education materials, and physical activity equipment. Centre directors and staff were required to participate in quarterly trainings on nutrition and physical activity, menu planning, food safety, and healthy habits consistent with the wellness policies. The objectives of the program were to: (1) introduce child care providers to the concept of a wellness policy; (2) help child care providers select 6 relevant wellness policies related to nutrition and physical activity and a practical plan for implementation; (3) support centres through training, technical assistance, and funding to implement policies; and (4) Evaluate the impact of a wellness policy on children and staff.			
Outcomes	**Identified factor**	**Prevalence (range of prevalence reported within studies)** Eg. 2-100% of participants/organisations identified this factor	**Strength (**Some measure of association with implementation outcome 'r' + correlation coefficient ODDS ratio)	**Allocated TDF Domain (construct)**

Barriers	Directors unanimously reported that children did not notice or mind changes to menus, and were in fact excited to try new foods. Reflecting on the transition made between white and brown rice, 1 director said, ‘‘They [the children] don't mind trying it and if it tastes good, they're going to eat it.’’ After replacing whole milk with reduced fat milk, a director explained, ‘‘I don't even think they noticed it. I think they know the container went from dark blue to light blue. I think that's all they noticed, that was it.			6. Beliefs about Consequences (Consequents)
	Directors unanimously reported that a lack of parent engagement in their children's well-being was a primary barrier to good nutrition			12. Social Influences (Social pressure)

Facilitators	A majority of directors reported that the process of changing menus to include healthier items was not difficult after understanding which unhealthy food categories could be re-placed with healthier options (n 1⁄4 15; 75%). For example, directors described relative ease in transitioning from canned to frozen vegetables, refined grains to whole grains, and high-fat meats to lean proteins.	N=15; 75%		1. Knowledge (knowledge)
	One director commented that ‘‘It wasn't hard [.] you just have to choose something different.’’			4. Beliefs about Capabilities (Perceived behavioural control)
	Another director commented that changes to menus were ‘‘a gradual transition, just little by little we made the changes [.]’’			9. Goals (Goals)
	Another director commented specifically that “We just decided that everything we receive is whole wheat now, the crackers, hamburger buns, pasta, rolls, everything and we've also gone to brown rice. We've gone to more fish and chicken, and			8. Intention (action)

	don't get that much beef. Now it's mainly chicken, and our sausage has gone to turkey, and our bacon is turkey.”			
	1 director stated that working closely with a local food vendor allowed her to reach her goal of acquiring more fresh fruits: “I explained to them what I was trying to do and they would try to get whatever we needed, the time we would need it, and best price that we could get”			11. Environmental Context and Resources (Barriers and facilitators)
	Children like new foods			12. Social Influences (Social pressure)
Validity of measures used	Researchers at Georgia State University who led this study developed an interview protocol including questions to solicit directors' overall experiences and perceptions of the program, the processes they used to make changes to nutrition and physical activity, and any barriers they experienced. Program staff from DECAL reviewed the protocol. Their feedback was incorporated into the final protocol The Georgia State University Institutional Review Board approved the study and all participants provided written informed consent.			

Appendix 2.2 Full description of each included study con't

Pollard 1999

Methods	**Study design:** Cross sectional **Sample size:** 330 centres, obtained an 85% response rate (n=281 centres). N=2841 staff completed the questionnaire. **Sample method:** A database of contact details of all 356 long day care services in Western Australia was obtained from the children services board. Of these 26 were duplicates or no longer in operation. Leaving 330. **Data collection method:** Qualitative/Quantitative (including whether factors were prompted or not) 20 minute telephone survey was developed using The Good Food for Children 0-5 project pre-intervention Centre Survey. Some use of prompts to expand on responses ie. If the cooks suggested they required more resources, they were then asked what resources they would like. **Method of analysis:** Descriptive statistics were generated using SPSS for Windows. The survey collected information on three main areas: operational practices of the center, food service practices, and food and nutrition resource usage and requirements.
Participants	**Service type:** Long day care services **Country:** Australia **Region:** Western Australia **Demographic/socioeconomic characteristics:** **Staffing** The total number of staff employed by long day care centres was 2,832. Table 1 shows the staff employed and their employment status. Eighty-five per cent of staff employed were child care workers (32% were trained and 53% untrained). Eight per cent were employed as cooks or chefs. The mean number of children enrolled in a centre was 59 (range 10-223). Thirty-four percent of children (5,627) were attending full-time. Eighty-two per cent (218) of respondents were in the Perth metropolitan area and 18% (49) in the country. Twenty-eight per cent of centres had been operating for less than two years and 27% had been operating for more than 10 years. Ten per cent of centres had been operating for less than one year. Most centres (96%) were preparing and providing food. The results in the rest of this paper refer to these centres. Most centres provided afternoon tea (lOO%), morning tea (99%) and lunch (96%). A quarter provided breakfast. Late afternoon tea and evening meals were rarely provided (I % and 2% respectively). Parents provided food for birthdays in 79% of centres. The cook was the main person who prepared meals (85%). **Inclusion/exclusion criteria:** Inclusion – long day cares services who provide food. Exclusion – not listed **Mean age:** not listed **Sex:** not listed **Recruitment:** An independent market research company conducted the services via phone.

Outcomes	**Identified factor**	**Prevalence (range of prevalence reported within studies)** Eg. 2-100% of participants/organisations identified this factor	**Strength (**Some measure of association with implementation outcome 'r' + correlation coefficient ODDS ratio)	**Allocated TDF Domain (construct)**
Barriers	Need for more nutrition resources	72% (n=136) of services		11. Environmental context and resources (material resources)
Facilitators	**Nutrition resources** (When prompted these services said the following would be useful: monthly newsletters (86%), books (79%), workshops (79%), short course (76%), training videos (69%).	Of the services (72%, n=136) who responded that there was a need for more nutrition resources		11. Environmental context and resources (material resources)

	Nutrition workshop training topics These centres identified food safety and hygiene (n=65, 48%), nutrition requirements in children (n=59, 43%), recipes-kids/larger groups(n=39, 29%), Food requirements for infant, toddlers and young children (n=37, 27%), Menu planning (n=37, 27%), Multicultural cooking (n=26, 19%), special diets (=25, 18%), presentation creativity for meals for children (n=22, 16%), promoting of good eating habits for children (n=18, 13%), food budgeting (n=13, 10%), Buying and storage of food (n=8, 6%), quick easy meals/time management (n=8, 6%), serve size/quantities for children (n=6, 4%) other (n=12, 9%) as useful training topics for cooks working in childcare services.	70% of 136 services		2. Skills (Skills development)
Validity of measures used	The Good Food for Children 0-5 project pre-intervention survey used Sangster J. Chopra M, Eccleston P. Good Food for Children 0-5 Project Report. Improving Foodand Nutrition in Long Day Care Centres. Sydney: South Eastern Sydney Area Health Promotion Unit, 1996. The survey was piloted with 5 long day care centres for the Good Food for Children project and assessed for relevance and clarity.			

Appendix 2.2 Full description of each included study con't

Romaine 2007

Methods	**Study design:** Cross-sectional **Sample size:** 101 childcare centres licensed under the NS Day Care Act. Thirty-five services returned the completed questionnaire. **Sample method:** Random numbers were used to select a representative proportion of centres categorized by county. **Data collection method:** Quantitative questionnaire directed to the menu planner. **Method of analysis:** Data from returned surveys was entered onto Microsoft Excel and analysed using SPSS (version 11.0). Blank knowledge responses were considered incorrect.			
Participants	**Service type:** Full day care centres **Country:** Canada **Region:** Nova Scotia **Demographic/socioeconomic characteristics:** The respondents were representative of the provincial distribution. The licensing capacity categories ranged from ten to 23 to 76 to 100 children, with a median category of 26 to 50. 63% of respondents indicated that they had childcare education levels ranging from a diploma to graduate studies **Inclusion/exclusion criteria:** Not listed **Mean age:** Not listed **Sex:** Not listed **Recruitment:** Random numbers were used to select a representative proportion of centres categorized by county. 101 childcare centres licensed under the Nova Scotia Day Care Act			
Outcomes	**Identified factor**	**Prevalence (range of prevalence reported within studies)** Eg. 2-100% of participants/organisations identified this factor	**Strength (**Some measure of association with implementation outcome 'r' + correlation coefficient ODDS ratio)	**Allocated TDF Domain (construct)**
Barriers	**No training in menu planning.** "Although 63% of respondents indicated that they had childcare education levels ranging from a diploma to graduate studies, only 54% reported that they had received training in menu planning, with almost half	46%	There was significant evidence (rpb(28)=0.406, p=0.016) of a relationship between menu planning training and higher menu quality)' scores, but no	2. Skills (skills)

	receiving this over six years ago”		such evidence of a relationship for the nutritional adequacy scores.	
	No training in menu planning specific to young children Only 49% indicated that they had received training in nutrition and menu planning specific to young children.	51%		2. Skills (skills)
	18% believed that morning and afternoon snacks should consist of only one food group, while the HFHF guidelines state that each snack should consist of two food groups.	18%		1. Knowledge (Knowledge)
Facilitators	Belief that children would eat vegetables	51%		12. Social influences (Social pressure)
	Updated menu planning (HFHF) guidelines	60%		11. Environmental context and resources (resources)
	Recipe resources for menu planning	37%		11. Environmental context and resources (resources)
	Costed recipes to assist with menu planning and budget	28%		11. Environmental context and resources (resources)
Validity of measures used	The questionnaire consisted of four sections. General questions (n=19) were used to gather information on educational background, frequency and type of training in menu planning, and characteristics of the centre. Knowledge questions (n=15) in a true/false format were based on (Canada’s Food Guide to Healthy Eating {CFGHE), the HFHF guidelines, and questions from an earlier study of childcare centres in Missouri. Questions about menu planning attitudes and practices (u^l5) were adapted from previous studies. The questionnaire was pilot tested with two childcare menu planners who did not participate in the study. Revisions to improve clarity and ease of administration were made based on the pilot test.			
Notes Further comments from the	Attempts to improve questionnaire response rate involved the use of a stamped return envelope and reminder telephone calls			

review authors on aspects of the study that are not covered by the categories above.	

Appendix 2.3 Qualitative responses

TDF Domain	Example participant and author statements from included studies
Barriers	
1. Knowledge	It was challenging to re-train the preschool staff who had preconceived notions of "what was healthy" and "what was a snack." Respondents felt that their previous menus were sufficient[28] Food service staff have limited nutrition knowledge.[29] Food service staff do not understand CACFP requirements.[29] Identifying suitable options for snacks was also mentioned often.[24] Difficulties coming up with substitutions for recipes that are higher in fat or sugar than the guidelines permit that will also appeal to children.[24] Learning what products are available and where to purchase.[24]
2. skills	Locating healthy, pre-packaged foods that meet the guidelines.[24] Adapting healthful recipes that they do find, which are typically for a small number of servings, to serve to the large number of children that they care for at their facility.[24] Difficulties in calculating the amounts of sugar, fat, etc., in each child-size portion of homemade dishes with multiple ingredients.[24] Difficulty developing menus, incorporating variety, cooking, modifying existing recipes to meet guidelines, and interpreting food labels.[24] Difficulties in generating ideas for a variety of menu items - including providing a variety of snacks that meet the new guidelines was a challenge.[24] Challenges in preparing meals and snacks that are both appealing to children and in compliance with the limitations on fat and sugar content stipulated in the guidelines.[24]
3. Professional role and identity	Cook perception of their role is just to “fill the children up”.[29] Food and nutrition not an integral or important part of the program.[29]
4. Beliefs about capabilities	Food service staff lack confidence in their kitchen maths skills.[29] Lack of confidence in cooking skills, lack of interest.[24]
6. Beliefs about consequences	Respondents felt that their previous menus were sufficient and that making changes to the menu would affect both their food budget and the amount of time needed to plan and prepare meals and snacks.[28]

	Staff were reluctant to serve foods that were not "liked" the first time around. For example, one teaching assistant exclaimed: They really like the healthy mashed potatoes. I really liked the healthy mashed potatoes. I am even going to use that recipe at home, but not the mashed cauliflower. Nobody really ate the mashed cauliflower. I think most of them had never seen it before and they kept asking what it was. Even the smell of the mashed cauliflower; it didn't smell too good. I don't think many of the kids even tried the mashed cauliflower.[28] Staff members were apprehensive about "wasting food" as they did not want to throw away expensive fruits and vegetables that children left on their plates. Therefore, if a food was not well-received the first time it was served, the preschool staff wanted to immediately remove it from the menu.[28] Respondents felt that making changes would affect their food budget.[28] Services do not serve full portions, due to perception that children would not eat the whole amount – concerns regarding food waste.[29] Convenience in relation to ordering, standard food.[29] Directors unanimously reported that children did not notice or mind changes to menus, and were in fact excited to try new foods. Reflecting on the transition made between white and brown rice, 1 director said, ‘‘They [the children] don't mind trying it and if it tastes good, they're going to eat it.’’ After replacing whole milk with reduced fat milk, a director explained, ‘‘I don't even think they noticed it. I think they know the container went from dark blue to light blue. I think that's all they noticed, that was it.[18]
11. Environmental context and resources	Food service workers reported that their kitchen supplies were insufficient.[28] Because the preschool staff had previously served a lot of pre-packaged and processed foods such as instant mashed potatoes, chicken nuggets, and tater tots, when asked to prepare meals from scratch, they noticed that they needed better pairing knives, bowls, and baking pans.[28] Staffing: most centres cook is hired less than full time to save money.[29] Additional time to prepare foods, time burden of developing new recipes.[24] Insufficient recipes.[24] Difficulty finding foods from their traditional suppliers that comply with the guidelines.[24] Food costs - Higher cost of healthy foods. Impact of rising food costs on their very limited budgets.[24] Programs lack resources to serve healthier foods.[26] Lack of time and limited resources in programs are interrelated barriers to obesity prevention.[26] Time is a huge factor in implementing a comprehensive health curriculum. Programmatically, we feel we only skim the surface. Funds and technical assistance would greatly help. We have many mandates without enough time or funds to implement them. We are very interested in maintaining programming on healthy lifestyles for our children and staff, but find it difficult with limited staff time and resources.

	Staff time and monetary resources are probably our biggest barriers to implementing an obesity prevention program. Time is a huge issue, both for staff training and children's activities in this area. Financial resources are needed for substitutes in order to have staff present at trainings. Getting the training is not an issue, but providing substitutes or paying staff for overtime is a huge resource issue.
12. Social influences	Staff reported that the transition was not easy, and the menu adjustment was also difficult for the children. One food service worker specifically stated: The children asked questions about the foods that they had not seen before and were skeptical about trying new foods. It seemed like the looks of things freaked them out more than the taste. Like, they kept asking why the bread was brown, but, I mean, they ate it and didn't complain about the taste.[28] Helping staff members regard a snack as a mini meal or a nutrient-dense food instead of a treat or dessert was difficult since a majority of the staff members were perceived high sugar treats as "snacks." One teaching assistant stated: "one day we give them a tasty cake, and the next day they get cheese cubes and a cherry tomato. I mean, what kid wants a cherry tomato for a snack?"[28] Staff perceptions that children do not like fruit or vegetables.[29] Staff perceptions that children want food seasoned with margarine, lard or bacon.[29] Kid culture or childcare culture for types of foods served.[29]
13. Emotions	Staff resistance, staff will inadvertently project negative attitudes about the new foods that are being offered to meet the nutrition guidelines.[24]
Facilitators	
1. Knowledge	The ED's and staff's understanding of healthy child development and the role of healthy eating were pivotal elements in the adoption of the guidelines.[23] A majority of directors reported that the process of changing menus to include healthier items was not difficult after understanding which unhealthy food categories could be re- placed with healthier options (n 1⁄4 15; 75%). For example, directors described relative ease in transitioning from canned to frozen vegetables, refined grains to whole grains, and high-fat meats to lean proteins.[18]
2. Skills	Given the organizational structure and availability of resources, such as having more highly trained and skilled staff.[23] Would be more likely to prepare a new recipe if they had tasted it or watched a demonstration on how to prepare it.[24]

3. Professional role and identity	The staff in the present study reported that effective and strong leadership was essential or the successful adoption of an innovation, such as the nutrition guidelines.[23] Staff feel there is a leader in the center and feel they have someone to turn to for direction/guidance when problems/issues arise Staff trust leadership to make the best decisions for the center Provide staff with informed solutions best for all involved All staff members work together to achieve best practice.[23] Staff share knowledge, ideas, and collaborate with one another Staff trust and feel supported by one another Networking and knowledge brokering - Information seeking/sharing through social networks Information sharing both formally (staff meetings) and informally (passing conversation/ discussions or informal meetings as issues arise) We meet and we share information so if we have issues about maybe how much we are budgeting for our food, where we are going to be buying our food, the kinds of menus we're developing… that kind of discussion goes on'.[23] The ED's and staff's commitment to healthy child development and the role of healthy eating were pivotal elements in the adoption of the guidelines.[23] Implementation of the guidelines hinges on the extent to which direct caregivers in child care homes and staff embrace them as fundamental to the well-being of the children in their care.[24] Presenting the nutrition guidelines and their rationale in a fun and engaging way to help foster a positive attitude among staff, and motivate them to promote healthy habits for children.[24]
4. Beliefs about capabilities	Staff did not believe their knowledge limited their ability to meet children's needs.[29] One director commented that ''It wasn't hard, you just have to choose something different."[18]
7. Reinforcement	Staff feel comfortable to approach Directors with problems/issues as they arise. Staff feel supported by Directors both in practice and in raising issues/ideas.[23] Regular feedback provided to staff both formally (performance evaluations annually) and informally (conversations/discussions) as issues arise.[23]
8. Intentions	Another director commented specifically that "We just decided that everything we receive is whole wheat now, the crackers, hamburger buns, pasta, rolls, everything and we've also gone to brown rice. We've gone to more fish and chicken, and don't get that much beef. Now it's mainly chicken, and our sausage has gone to turkey, and our bacon is turkey."[18]

9. Goals	Staff suggested that making gradual changes to the menu was better than doing one, complete overhaul. "When we made small substitutions, like adding chopped pine- apple to pizza or swapping whole wheat pasta for white pasta, sometimes the kids didn't even notice.[28] Another director commented that changes to menus were ‘‘a gradual transition, just little by little we made the changes’’.[18] Planning menus much farther in advance.[24] Cook food ahead of time, such as the night before or by using a crock pot.[24] Transitioning to New Foods Gradually. Gradually transitioning to healthier foods required in the new guidelines.[24] Strategies to Contain Food Costs.[24]
11. Environmental context and resources	When the new menu was implemented, staff members were required to cut potatoes, grill chicken breasts, and create soups and casseroles from scratch. Therefore, they also needed more time to prepare the foods since home cooked meals take longer to prepare than opening a package or box. Therefore, staff also requested having a food service worker stay an hour later or come in an hour earlier to help with food preparation.[28] Flexibility to dedicate time to other activities, Case 1 had greater capacity for being proactive and creative in implementing the nutrition guidelines.[23] Using software that allows her to develop a set of menus in advance using prewritten recipes – one provider only (Gabor 2010) Obtaining recipes that other providers had used or tested to better ensure that the recipes would be kid friendly, but not too expensive.[24] Develop User-Friendly Resources to Be Displayed at Child Care Facilities. Providers suggested having large colourful charts or posters that they could display at the centre for the cook, teachers, and parents to use as a reference. posters or bulletin board displays would help convey the importance of the new guidelines to staff and parents.[24] Sample Menus With Specific Product and Shopping Information List of allowable foods or alternatives to popular but unallowable foods. However, they were careful to say that in order for these lists to be useful, they must be specific.[24] Our centres that have cooks on site are much healthier.[26] Staff perceptions of being a valued staff member.[23] Supportive environment: enforcing nutrition policies, incorporating nutrition into the curriculum, promoting awareness of healthy nutrition practices through positive role modelling and the use of priming and prompting.[23] 1 director stated that working closely with a local food vendor allowed her to reach her goal of acquiring more fresh fruits: “I explained to them what I was trying to do and they would try to get whatever we needed, the time we would need it, and best price that we could get”.[18]

12. Social influences	Children like new foods.[18] Collaboration - All staff members work together to achieve best practice. Staff share knowledge, ideas, and collaborate with one another.[23] Networking /information.[23] Sharing - Child-care staff in the present study acknowledged that having good communication and well-established social networks were crucial elements of a highly functioning organization and the ANGCY. The ED played a critical role in knowledge brokering with center staff and they, in turn, relied on each other and especially on the ED for answers/solutions.[23]

Appendix 3.1 TDFQ

Domain	Item #	Generic Structure of item	Item included in Cooks survey
1. Knowledge	1.	**I am aware of the content of the** [insert name of recommendations, protocol, guidelines]	**I am aware of the content of the** Caring for Children guidelines
	2.	**I am aware of the objectives of the** [insert name of recommendations, protocol, guidelines]	**I am aware of the objectives of the** Caring for Children guidelines
	3.	**I know what my responsibilities are, with regard to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I know what my responsibilities are, with regard to** planning a menu **according to the** Caring for Children guidelines
	4.	**I know how to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I know how to** plan a menu **according to the** Caring for Children guidelines
	5.	**I know when to apply** [insert name of recommendations, protocol, guidelines] **when** [insert action related to program, intervention, innovation or guidelines]	**I know when to apply** the Caring for Children guidelines **when** planning a menu
2. Skills	6.	**I have received training regarding how to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I have received training regarding how to** plan a menu **according to the** Caring for Children guidelines
	7.	**I have the skills needed to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I have the skills needed to** plan a menu **according to the** Caring for Children guidelines
	8.	**I have been given the opportunity to practice** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of	**I have been able to practice** planning a menu **according to the** Caring for Children guidelines

		recommendations, protocol, guidelines]	
3. Social/professional role and identity	9.	[Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **is part of my role**	Planning a menu **according to the** Caring for Children guidelines, **is part of my role**
	10.	**It is my responsibility to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**It is my responsibility to** plan a menu **according to the** Caring for Children guidelines
	11.	[Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **is consistent with other aspects of my job**	Planning a menu **according to the** Caring for Children guidelines **is consistent with other aspects of my job**
4. Beliefs about capabilities	12.	**I am confident that I can** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I am confident that I can** plan a menu **according to the** Caring for Children guidelines
	13.	**I am capable of** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, even when little time is available**	**I am capable of** planning a menu **according to the** Caring for Children guidelines**, even when little time is available**
	14.	**I have the confidence to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, even when other professionals I work with are not doing this**	**I have the confidence to** Plan a menu **according to the** Caring for Children guidelines **even when other professionals I work with are not doing this** **Add interviewer note that 'other professionals' refers to the educators that work within the childcare centre**
	15.	**I have the confidence to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, even when** [participants, clients, patients,	**I have the confidence to** plan a menu **according to the** Caring for Children guidelines **even when** the children who attend the service **are not receptive**

		individuals, children] **are not receptive**	
	16.	**I have personal control over** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I have personal control over** planning a menu **according to the** Caring for Children guidelines
	17.	**For me,** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, is easy**	**For me,** planning a menu **according to the** Caring for Children guidelines, **is easy**
5. Optimism	18.	**Even when I feel uncertain about my ability to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, I usually expect that things will work out okay**	**In uncertain times, when** planning a menu **according to the** Caring for Children guidelines, **I usually expect that things will work out okay** **Interviewer note:** Add in examples of uncertain times eg. having new children start at the beginning of the year and not knowing their needs/ likes, food budget uncertainty, not knowing how children and staff will respond to new menus
	19.	**When I** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, I feel optimistic about my job in the future**	**When I** plan a menu **according to the** Caring for Children guidelines**, I feel optimistic about my job in the future**
	20.	**I do not expect anything will prevent me from** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I do not expect anything will prevent me from** planning a menu **according to the** Caring for Children guidelines
6. Beliefs about consequences	21	**I believe** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, will lead to benefits for the** [participants, clients, patients, individuals, children]	**I believe** planning a menu **according to the** Caring for Children guidelines **will lead to benefits for the** children who attend the service

	22	**I believe** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **will benefit public health.**	**I believe** planning a menu **according to the** Caring for Children guidelines, **will benefit public health.** **Interviewer note: define public health 'Ie. health of the whole population, obesity prevention'**
	23	**In my view,** [insert action related to program, intervention, innovation or guidelines] **according to** the [insert name of recommendations, protocol, guidelines], **is practical.**	**In my view,** planning a menu **according to** the Caring for Children guidelines, **is useful**
	24	**In my view,** [insert action related to program, intervention, innovation or guidelines] **according to** the [insert name of recommendations, protocol, guidelines], **is worthwhile**	**In my view,** planning a menu **according to** the Caring for Children guidelines **is worthwhile**
7. Reinforcement	25	**I get recognition from management at the organisation where I work, when I** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I get recognition from management at the organisation where I work, when I** plan a menu **according to the** Caring for Children guidelines
	26	**When I** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, I get recognition from my colleagues**	**When I** plan a menu **according to the** Caring for Children guidelines **I get recognition from my colleagues**
	27	**When I** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, I get recognition from those who it impacts**	**When I** plan a menu **according to the** Caring for Children guidelines**, I get recognition from those who it impacts**
	28	**When I** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]**, I get recognition from** [my Local Government or external agencies]	**When I** plan a menu **according to the** Caring for Children guidelines**, I get recognition from** Family and Community Services

8. Intentions	29	**I intend to** [insert action related to program, intervention, innovation or guidelines] **according to** the [insert name of recommendations, protocol, guidelines], **at** [each/every time relevant to action]	**I intend to** plan a menu **according to** the Caring for Children guidelines **at** every menu review
	30	**I will definitely** [insert action related to program, intervention, innovation or guidelines] **according to** the [insert name of recommendations, protocol, guidelines], **at** [each/every time relevant to action]	**I will definitely** plan a menu **according to** the Caring for Children guidelines, **at** every menu review
	31	**I intend to** [insert action related to program, intervention, innovation or guidelines] **according to** the [insert name of recommendations, protocol, guidelines], **in the next six months**	**I intend to** plan a menu **according to** the Caring for Children guidelines **in the next six months**
	32	**I have a strong intention to** [insert action related to program, intervention, innovation or guidelines] **according to** the [insert name of recommendations, protocol, guidelines], **at** [each/every time relevant to action]	**I have a strong intention to** plan a menu **according to** the Caring for Children guidelines, **at** every menu review
9. Goals	33	**Compared to my other tasks,** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **is a higher priority on my agenda**	**Compared to my other tasks,** planning a menu **according to the** Caring for Children guidelines **is a higher priority on my agenda**
	34	**Compared to my other tasks,** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **is an urgent item on my agenda**	**Compared to my other tasks,** planning a menu **according to the** Caring for Children guidelines **is an urgent item on my agenda**
	35	**I set achievable short-term goals when** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of	**I set achievable short-term goals when** planning a menu **according to the** Caring for Children guidelines

		recommendations, protocol, guidelines]	
	36	**I have clear long-term goals related to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I have clear long-term goals related to** planning a menu **according to the** Caring for Children guidelines
10. Memory, attention and decision processes	37	[Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **is something I do automatically**	Planning a menu **according to the** Caring for Children guidelines **is something I do automatically**
	38	**I can maintain my full attention when I** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I can maintain my full attention when I** Plan a menu **according to the** Caring for Children guidelines
	39	[Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **is something I forget**	Planning a menu **according to the** Caring for Children guidelines **is something I forget**
11. Environmental context and resources	40	**In the organisation I work, all necessary resources are available to** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]]	**In the organisation I work, all necessary resources are available to** Plan a menu **according to the** Caring for Children guidelines
	41	**I have support from the management of the organisation to** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I have support from the management of the organisation to** plan a menu **according to the** Caring for Children guidelines **Add interviewer note: Specify that management is the nominated supervisor of the service**
	42	**The management of the organisation I work for are willing to listen to any problems I have when** [Insert	**The management of the organisation I work for are willing to listen to any problems I have when**

		action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	planning a menu **according to the** Caring for Children guidelines
	43	**The organisation I work for provides the opportunity for training to** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**The organisation I work for provides the opportunity for training to** plan a menu **according to the** Caring for Children guidelines
	44	**The organisation I work for provides sufficient time for me to** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**The organisation I work for provides sufficient time for me to** plan a menu **according to the** Caring for Children guidelines
	45	**The organisation I work for provides sufficient financial support for me to** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**The organisation I work for provides sufficient financial support for me to** plan a menu **according to the** Caring for Children guidelines
	46	[Insert action related to program, intervention, innovation or guidelines]] **according to the** [recommendations, protocol, guidelines] **is included in my organisations reporting outcomes.**	Planning a menu **according to the** Caring for Children guidelines **is included in my organisations reporting outcomes.**
12. Social influences	47	**People who are important to me think that I should** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**People who are important to me think that I should** plan a menu **according to the** Caring for Children guidelines
	48	**People whose opinion I value would approve of me** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of	**People whose opinion I value would approve of me** planning a menu **according to the** Caring for Children guidelines **at** every menu review

		recommendations, protocol, guidelines] **at** [each/every time relevant to action]	
	49	**I can count on support from colleagues whom I work with when things get tough** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **at** [each/every time relevant to action]	**I can count on support from colleagues whom I work with when things get tough** Planning a menu **according to the** Caring for Children guidelines **at** every menu review
	50	**Colleagues whom I work with are willing to listen to my problems when** [Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **at** [each/every time relevant to action]	**Colleagues whom I work with are willing to listen to my problems when** Planning a menu **according to the** Caring for Children guidelines **at** every menu review
13. Emotion	51	**I am able to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **in a calm way**	**I am able to** plan a menu **according to the** Caring for Children guidelines, **in a calm way**
	52	**I am able to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **in a relaxed way**	**I am able to** plan a menu **according to the** Caring for Children guidelines, **in a relaxed way**
	53	**I am able to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **without feeling nervous or anxious**	**I am able to** plan a menu **according to the** Caring for Children guidelines **without feeling anxious**
	54	**I am able to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **without feeling distressed or upset**	**I am able to** plan a menu **according to the** Caring for Children guidelines **without feeling distressed or upset**

	55	**I am able to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines], **even when I feel stressed**	**I am able to** plan a menu **according to the** Caring for Children guidelines, **even when I feel stressed**
14. Behavioural regulation	56	**I have a detailed plan of how I will** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I have a detailed plan of how I will** plan a menu **according to the** Caring for Children guidelines,
	57	**I have a detailed plan of when I will** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines]	**I have a detailed plan of when I will** plan a menu **according to the** Caring for Children guidelines,
	58	**I have a detailed plan on how to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **when** [participants, clients, patients, individuals, children] **are not receptive**	**I have a detailed plan on how to** plan a menu **according to the** Caring for Children guidelines **when** children who attend the service **are not receptive**
	59	**I have a detailed plan on how to** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **when there is little time**	**I have a detailed plan on how to** plan a menu **according to the** Caring for Children guidelines, **when there is little time**
	60	**It is possible to adapt how I** [insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **to meet the my needs as a** [insert role]	**It is possible to adapt how I** plan a menu **according to the** Caring for Children guidelines **to meet the my needs as a** service cook
	61	[Insert action related to program, intervention, innovation or guidelines] **according to the** [insert name of recommendations, protocol, guidelines] **is compatible with other aspects of my job**	Planning a menu **according to the** Caring for Children guidelines **is compatible with other aspects of my job**

Appendix 4.1 Hunter New England Human Research Ethics Committee approval

Health
Hunter New England
Local Health District

23 September 2015

Dr L Wolfenden
Population Health
Wallsend Campus

Dear Dr Wolfenden

Re: HNE Kids Healthy Eating and Physical Activity Program (06/07/26/4.04)

Thank you for submitting a request for an amendment to the above project. This amendment was reviewed by the Hunter New England Human Research Ethics Committee. This Human Research Ethics Committee is constituted and operates in accordance with the National Health and Medical Research Council's *National Statement on Ethical Conduct in Human Research (2007)* (National Statement) and the *CPMP/ICH Note for Guidance on Good Clinical Practice*. Further, this Committee has been accredited by the NSW Department of Health as a lead HREC under the model for single ethical and scientific review.

I am pleased to advise that the Hunter New England Human Research Ethics Committee has granted ethical approval for the following amendment requests:

- To collect menus from Hunter New England menu-based long day care services;
- To conduct site visits to a random sample of participating menu-based long day care services as pre and post intervention to:
  - Collect service menu information
  - Conduct plate waste assessments on meals provided
  - Ask child care staff to complete a short food questionnaire regarding child food intake
- For the Information Statement for Nominated Supervisors (Version 2 dated 22 September 2015);
- For the Nominated Supervisor Consent Form (Version 1 dated 31 August 2015);
- For the Nominated Supervisor Brief Demographic Questionnaire (Version 1 dated 31 August 2015);
- For the Nominated Supervisor Pen and Paper Questionnaire Items (Version 1 dated 3 August 2015);
- For the Service Cook Information Statement (subsample participating in site visits) (Version 2 dated 22 September 2015);
- For the Service Cook Pen and Paper Questionnaire Items (Version 1 dated 21 August 2015); and
- For the Adapted Short Food Survey for Service Educators (Version 2 dated 22 September 2015)

For the study: **HNE Kids Healthy Eating and Physical Activity Program**

Hunter New England Research Support & Development Office
Locked Bag No 1
New Lambton NSW 2305
Telephone: (02) 49214950 Facsimile: (02) 49214818
Email: HNELHD-HREC@hnehealth.nsw.gov.au
http://www.hnehealth.nsw.gov.au/ethics/Pages/Research-Ethics-and-Governance-Unit.aspx

Appendix 4.1 Hunter New England Human Research Ethics Committee approval con't

Approval has been granted for this study to take place at the following site:

- **Hunter New England Local Health District**

Approval from the Hunter New England Human Research Ethics Committee for the above study is given for a maximum of 5 years from the date of the approval letter of your initial application after which a renewal application will be required if the study has not been completed. The above study is approved until **November 2016.**

The *National Statement on Ethical Conduct in Human Research (2007)* which the Committee is obliged to adhere to, include the requirement that the committee monitors the research protocols it has approved. In order for the Committee to fulfil this function, it requires:

- A report of the progress of the above study to be submitted at 12 monthly intervals. Your review date is **November 2015.** A proforma for the annual report will be sent two weeks prior to the due date.
- A final report must be submitted at the completion of the above study, that is, after data analysis has been completed and a final report compiled. A proforma for the final report will be sent two weeks prior to the due date.
- All variations or amendments to this study, including amendments to the Information Sheet and Consent Form, must be forwarded to and approved by the Hunter New England Human Research Ethics Committee prior to their implementation.
- The Principal Investigator will immediately report anything which might warrant review of ethical approval of the project in the specified format, including:
    - any serious or unexpected adverse events
        - Adverse events, however minor, must be recorded as observed by the Investigator or as volunteered by a participant in this study. Full details will be documented, whether or not the Investigator or his deputies considers the event to be related to the trial substance or procedure.
        - Serious adverse events that occur during the study or within six months of completion of the trial at your site should be reported to the Ethics Officer of the Hunter New England Human Research Ethics Committee as soon as possible and at the latest within 72 hours.
        - Copies of serious adverse event reports from other sites should be sent to the Hunter New England Human Research Ethics Committee for review as soon as possible after being received.
        - Serious adverse events are defined as:
            - Causing death, life threatening or serious disability.
            - Cause or prolong hospitalisation.
            - Overdoses, cancers, congenital abnormalities whether judged to be caused by the investigational agent or new procedure or not.
    - Unforeseen events that might affect continued ethical acceptability of the project.

Hunter New England Research Support & Development Office
Locked Bag No 1
New Lambton NSW 2305
Telephone: (02) 49214950 Facsimile: (02) 49214818
Email: HNELHD-HREC@hnehealth.nsw.gov.au
http://www.hnehealth.nsw.gov.au/ethics/Pages/Research-Ethics-and-Governance-Unit.aspx

Appendix 4.1 Hunter New England Human Research Ethics Committee approval con't

- If for some reason the above study does not commence (for example it does not receive funding); is suspended or discontinued, please inform Dr Nicole Gerrand, the Manager, Research Support & Development Office as soon as possible.

The Hunter New England Human Research Ethics Committee also has delegated authority to approve the commencement of this research on behalf of the Hunter New England Local Health District. This research may therefore commence.

Should you have any queries about your project please contact Dr Nicole Gerrand as per the contact details at the bottom of the page. The Hunter New England Human Research Ethics Committee Terms of Reference, Standard Operating Procedures, membership and standard forms are available from the Hunter New England Local Health District website.

Please quote **11/09/21/3.04** in all correspondence.

The Hunter New England Human Research Ethics Committee wishes you every success in your research.

Yours faithfully

For: Ms M Hunter
Acting Chair
Hunter New England Human Research Ethics Committee

Hunter New England Research Support & Development Office
Locked Bag No 1
New Lambton NSW 2305
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http://www.hneheath.nsw.gov.au/ethics/Pages/Research-Ethics-and-Governance-Unit.aspx

Appendix 4.2 ANZCTR registration

Trial registered on ANZCTR

Registration number	ACTRN12615001032549
Ethics application status	Approved
Date submitted	4/09/2015
Date registered	1/10/2015
Date last updated	18/10/2018
Type of registration	Prospectively registered

Titles & IDs

Public title	A randomised controlled trial of an intervention to improve the implementation of nutrition guidelines in childcare services
Scientific title	The impact of a multi-strategy childcare-based intervention to improve compliance with nutrition guidelines versus usual care in long day care services on child intake while in care.
Secondary ID [1]	NIL
Universal Trial Number (UTN)	NIL
Trial acronym	
Linked study record	

Appendix 4.3 Nominated supervisor information statement

<service ID>

Hunter New England Population Health

Direct Contact Details
Phone: (02) 4924 6477 Fax: (02) 4924 6490
Locked Bag 10, Wallsend NSW 2287
Email: PHEnquiries@hnehealth.nsw.gov.au
www.hnehealth.nsw.gov.au

Health
Hunter New England
Local Health District

<DATE>

The Nominated Supervisor
<service name>
<service address line 1>
<service address line 2>

Dear Nominated Supervisor,

INFORMATION STATEMENT FOR NOMINATED SUPERVISORS – Good for Kids, Good for Life Study

Version 2, dated 22/09/2015

The *Good for Kids. Good for Life* program has been providing support to childcare services to promote physical activity and healthy eating in children over the past 10 years. In the next two years, we are planning to provide support to help childcare services implement the 'Caring for Children' guidelines on their menus.

To get an understanding of how to best help your service with your menu planning processes, we are writing to ask whether you would be willing to provide us with a copy of your service menu (the most recent cycle and the current cycle). For a small number of services, we will also be contacting you to ask whether you would be willing for us to visit your service to get a better understanding of the food preparation processes.

Why is the research being done?

We are aware that early childhood education and care services have some policies and practices in place to help with providing healthier foods to children. We would like to understand how your service operates and what might be useful in helping you and your cook plan a menu so that they meet nutrition guidelines for the sector. We would also like to get an understanding of meal time processes and the types of food that children are currently eating while in care.

Who can participate?

Nominated supervisors of childcare services located within the Hunter New England region, which are open for greater than eight hours per day can participate in this research. Services must also be responsible for providing all meals and snacks (including two mid meals and one main meal) to children during care hours.

What will you be asked to do?

In a week's time, we will be contacting you via telephone to remind you to send us your menus, if you haven't already. During that phone call we will also ask you a few brief questions related to your service operations. We will also be asking a small number of services to participate in a service visit. As part of the service visit, we will contact you via telephone to arrange a convenient date within the period of October-November 2015. You will not be required to prepare anything or do anything differently on the scheduled day of the visit.

On the day of the visit, two members of the *Good for Kids* support team will attend your service for the entire day. As part of the visit, you will be provided with a written survey to complete. The purpose of this survey is to ask you about the nutrition policies and practices you have in place at your service to encourage the provision of healthier foods to children, and to update our records with any new service contact details. The survey should take approximately 10 minutes to complete. We will be also be asking your service cook to compete a written survey about current processes that relate to planning menus and providing healthier food choices for children in your service. A letter will be been posted to your service cook, informing them of the written survey should you be selected to participate.

Appendix 4.3 Nominated supervisor information statement con't

On the morning of the service visit, the *Good for Kids* team members will also ask your service educators to complete a short food survey for participating children that they usually look after at your service. The survey takes approximately 15 minutes to complete and involves recording the number of serves of different food groups that the child usually eats when they attend your service. A team member will provide brief training to your educators on how to complete the form on the day of the visit and answer any questions you may have. Each educator will be asked to complete approximately five short food surveys.

Lastly, team members will collect all recipes on your menu and conduct plate waste measures on the foods served for the morning snack, lunch and afternoon snack on the day of the visit. The plate waste measures will be undertaken with minimal disruption to normal routine. The purpose of the plate waste measures is to assess the food intake of the children who attended care on the day of the service visit.

What are the risks and benefits of participating?
Participation in the written survey and service visits will allow the Good for Kids team to tailor our support to help services with planning menus so that they meet the nutrition guidelines for the sector. This will help us provide support that is more useful for services and improve the evaluation of the *Good for Kids* program. We don't anticipate there will be any risk to your service from participation in the service visits.

How will your privacy be protected?
Any information provided during the written surveys and the service visits will be stored electronically in a secure facility. All information transferred electronically will be done in a file which is password protected. It will not be possible to identify individuals or services from any publication or presentation arising from the research.

What choice you do have?
Participation in this research is voluntary. Whether or not your service decides to participate in the written survey or service visit, the decision will not disadvantage your service in any way. If your service does participate, you may withdraw your service from the research at any time without giving a reason, and you will have the option of withdrawing any information your service have provided.

How will the information collected be used?
Information provided during the written survey and service visits will be used in the development and evaluation of support strategies to help childcare services implement nutrition guidelines. Data from the written surveys and service visits may also be presented at scientific conferences, be published within scientific journals or form part of student theses, or provided to the NSW Ministry of Health. No other childcare service or organisation will be able to find out the results of individual services.

What do you need to do to participate?
If you would like to participate in the study, please return a copy of your menu using the reply paid envelope or fax number provided below. We will be contacting you to invite you to participate in the site visit. If you would like to participate, please indicate during the phone call whether you do or do not consent to participate, and we will arrange to send/email you a written consent form to return via replied paid envelope. Alternatively please contact Kirsty Seward via phone (02) 4924 6565 or email Kirsty.seward@hnehealth.nsw.gov.au if there is anything that you do not understand, or if you would like more information.

Thank you for considering this invitation

The research is part of Kirsty Seward's studies at the University of Newcastle, supervised by Associate Professor Luke Wolfenden, Doctor Sze Yoong, Doctor Rebecca Wyse and Professor John Wiggers from the School of Medicine and Public Health.

Yours sincerely

Appendix 4.3 Nominated supervisor information statement con't

Dr Luke Wolfenden
Manager – Healthy Children's Initiative
Hunter New England Population
Health

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference: 06/07/26/4.04 and ratified by the University of Newcastle :H-2008-0342

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, manager, Research Ethics and Governance Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 49214950, email Nicole.Gerrand@hnehealth.nsw.gov.au

Appendix 4.4 Service cook information statement

<Service ID>

Hunter New England Population Health
Direct Contact Details
Phone: (02) 4924 6477 Fax: (02) 4924 6490
Locked Bag 10, Wallsend NSW 2287
Email: PHEnquiries@hnehealth.nsw.gov.au
www.hnehealth.nsw.gov.au

Health
Hunter New England
Local Health District

<DATE>

The Service Cook
<Service Name>
<Address>
<Suburb> <State> <Postcode>

Dear Service Cook

INFORMATION STATEMENT FOR SERVICE COOKS– GOOD FOR KIDS CHILDCARE MENU SURVEY

Version 2, dated 22/09/2015

The *Good for Kids. Good for Life* program has been providing support to childcare services to promote physical activity and healthy eating in children over the past 10 years. In the next two years, we are planning to provide support to help childcare services implement the 'Caring for Children' guidelines in their menus. To get an understanding of how to best help your service with your menu planning processes, we are writing to ask whether you would be willing to complete a paper and pencil survey, provide us with additional information regarding the recipes you have used while planning your menu and allow us to undertake plate waste assessment in your kitchen.

Why is the research being done?
We are aware that early childhood education and care services have some policies and practices in place to help with providing healthier foods to children. We would like to understand how your service operates and what might be useful in helping you plan a menu so that it best meet nutrition guidelines for the sector. We would also like to get an understanding of meal time processes and the types of food that children are currently eating while in care.

Who can participate?
Service cooks of childcare services located within New South Wales, which are open for greater than eight hours per day. Services must provide all meals and snacks (including two mid meals and one main meal) to children while in care.

What will you be asked to do?
The nominated supervisor of your service has provided us with permission to contact you and invite you to participate in this study. Your supervisor has also agreed to allow us to visit your service where we will have the opportunity to get a better understanding of how your service operates and what foods are provided to children. You will not be required to prepare anything or do anything differently on the scheduled day of the visit.

During the service visit, a *Good for Kids* team member will provide you with a written survey to complete. The purpose of this survey is to ask you about the current processes that relate to the planning of menus and the provision of healthy food choices for children in your service. The survey should take approximately 10 minutes to complete.

During the visit, the researchers will collect your previous two week menu (including recipes) and conduct plate waste measures on the food served for the morning snack, lunch and afternoon snack on the day of the visit. We also ask that you prepare your recipes and other potentially useful information that can help us with understanding how you prepare foods on your menu. The plate waste measures will be undertaken with minimal disruption to normal food service preparation and will allow us to see what children a eating during the day.

Appendix 4.4 Service cook information statement con't

What are the risks and benefits of participating?
Participation in the written survey and site visits will allow the Good for Kids team to tailor our support to help services with planning menus so that they meet the nutrition guidelines for the sector. This will help us provide support that is more useful for services and improve the evaluation of the *Good for Kids* program. We don't anticipate there will be any risk to your service from participation in the site visits.

How will your privacy be protected?
Any information provided during the written surveys and the site visits will be stored electronically in a secure facility. All information transferred electronically will be done in a file which is password protected. It will not be possible to identify individuals or services from any publication or presentation arising from the research.

What choice you do have?
Participation in this research is voluntary. Whether or not your service decides to participate in the written survey or site visit, the decision will not disadvantage your service in any way. If your service does participate, you may withdraw your service from the research at any time without giving a reason, and you will have the option of withdrawing any information your service have provided.

How will the information collected be used?
Information provided during the written survey and site visits will be used in the development and evaluation of support strategies to help childcare services implement nutrition guidelines. Data from the written surveys and site visits may also be presented at scientific conferences, be published within scientific journals or form part of student theses, or provided to the NSW Ministry of Health. No other childcare service or organisation will be able to find out the results of individual services.

What do you need to do to participate?
On the day of the site visit, the researchers will provide you with a survey and additional information regarding the visit. It is completely your choice whether you complete the survey. Completion of the survey is indicative of consent. If there is anything that you do not understand, or if you would like more information please contact Kirsty Seward via phone (02) 4924 6565 or email Kirsty.seward@hnehealth.nsw.gov.au

Thank you for considering this invitation

The research is part of Kirsty Seward's studies at the University of Newcastle, supervised by Associate Professor Luke Wolfenden, Doctor Sze Yoong, Doctor Rebecca Wyse and Professor John Wiggers from the School of Medicine and Public Health.

Yours sincerely

Dr Luke Wolfenden
Manager – Healthy Children's Initiative
Hunter New England Population Health

This project has been approved by the Hunter New England Human Research Ethics Committee of Hunter New England Health, Reference: 06/07/26/4.04 and the University of Newcastle HREC (H-2008-0341)

Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to Dr Nicole Gerrand, manager, Research Ethics and Governance, Hunter New England Human Research Ethics Committee, Hunter New England Health, Locked Bag 1, New Lambton NSW 2305, telephone (02) 4921 4950, email Nicole.Gerrand@hnehealth.nsw.gov.au

Appendix 4.5 Menu planning workshop invitation

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The Good for Kids team would like to invite your Nominated Supervisor and Cook to attend the

Caring for Children Menu Planning Workshops

The workshops are a great professional development opportunity for you to:

- Learn about the recommended serves from the five food groups
- Learn techniques to review and plan your menu to meet guidelines
- Share menu planning ideas and strategies with other services
- Reflect on current practice and set goals to support your individual service needs

Workshops are FREE

9:00 am to 4:00 pm

Morning tea and lunch provided

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Appendix 4.5 Menu planning workshop invitation con't

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Registration Form

Date/ Venue 1: Wednesday 12th July, Wests Newcastle, King St & Union St Newcastle

Date/ Venue 2: Thursday July 13th Taree Wingham Race Club, Bushland Drive Taree

Date/ Venue 3: Wednesday July 19th East Maitland Bowling Club, Bank St East Maitland

Date/Venue 4: Thursday July 20th Tamworth Jockey Club, Racecourse Taminda

Date Venue 5: Thursday August 3rd, Wests New Lambton 88 Hobart Road, New Lambton

To register please complete the form below and send via email

To: emma.bone@hnehealth.nsw.gov.au

or fax this registration

To: (02) 49 246 209
(Attention: Emma Bone)

Please note places are limited so be sure to register as soon as possible

Service Name			
Workshop (please write one from above)			
Address			
Suburb		Postcode	
Phone		Fax	
Email address			

Staff Attending Training				
Participant role	First name	Surname	Special diet?	Session date and location
Nominated Supervisor				
Cook				

For more information please contact Emma Bone on

(02) 6764 8038 or Emma.Bone@hnehealth.nsw.gov.au

www.goodforkids.nsw.gov.au

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Appendix 4.6 Outline of menu planning workshop

Workshop Focus & Learning Outcomes

- Healthy foods for children through menus that meet the new Caring for Children guidelines.
- Review of the Australian Guide to Healthy Eating
  - -Five food groups & recommended serves for children from each food group
  - -Serve recommendations for while children are in care
- Menu Planning & assessing menus to help meet recommendations
- Reflect on current practice, planning & setting goals

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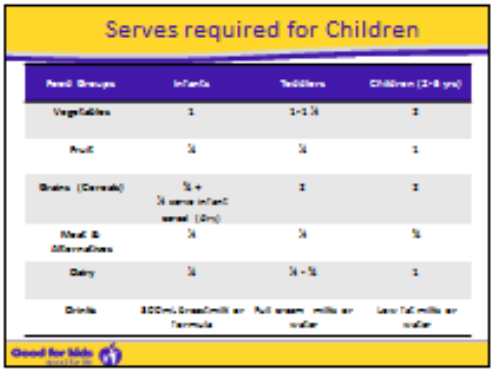
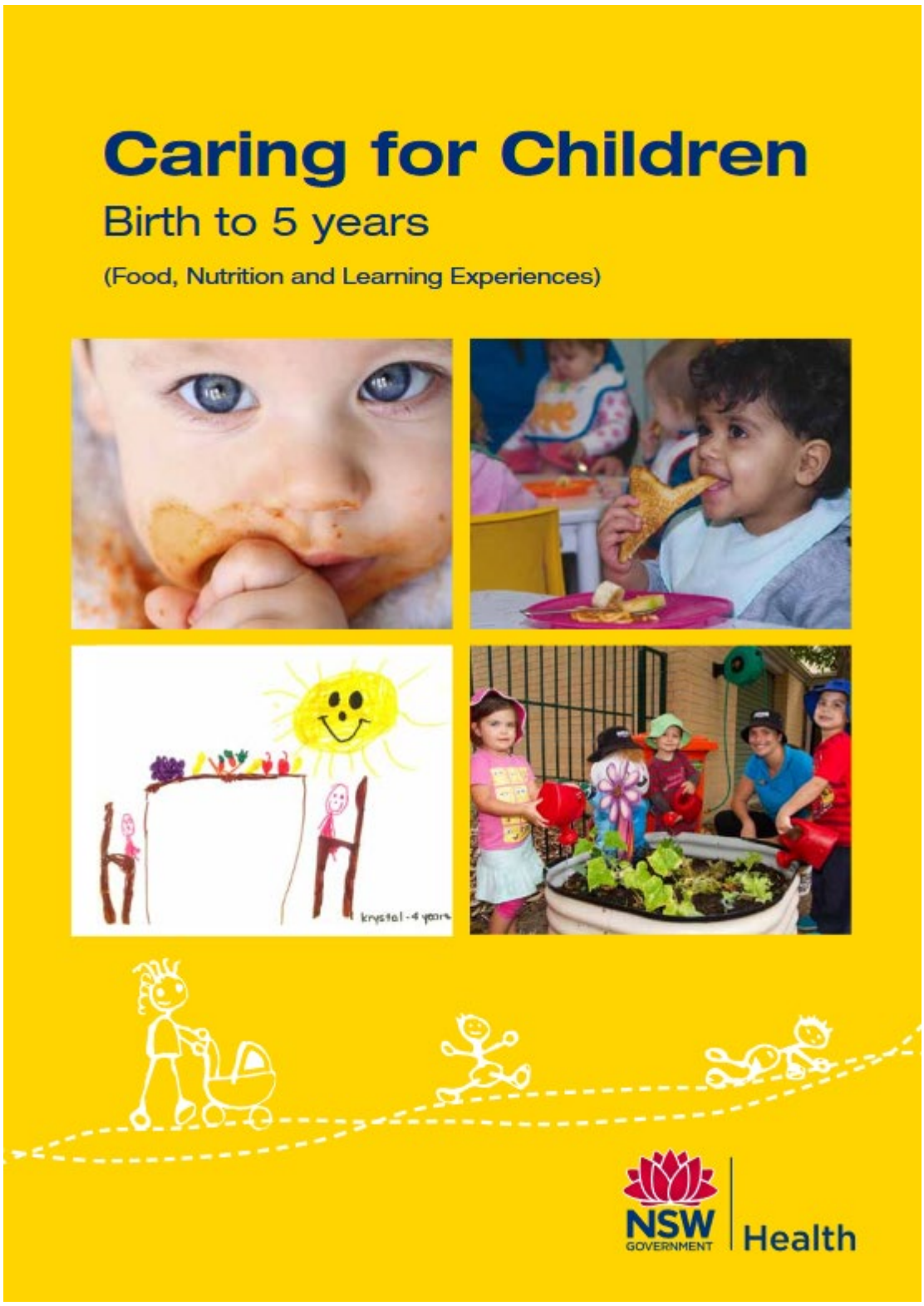
Appendix 4.7 Sample menu planning workshop content



Appendix 4.8 Caring for children resource cover page



Appendix 4.9 Caring for children menu planning checklist

Two Week Menu Cycle Planning Tool

Menu Component	Frequency while in care for 6hrs	Week 1					Week 2				
		Mon	Tue	Wed	Thur	Fri	Mon	Tue	Wed	Thur	Fri
One main meal	daily										
One morning tea	daily										
One afternoon tea	daily										
Red meat *(70g raw, per child)*	at least 6 times per fortnight										
+ one iron containing food**	same day										
White meat *(75g raw, per child)*, fish *(100g raw, per child)* or non-meat meals (based on eggs, cheese, tofu, or legumes)	up to 4 times per fortnight										
+ two iron containing foods**	same day										
+ a raw veg or fruit high in vitamin C***	with non meat meals										
1 vegetable serve *(½ cup)**	2 serves daily per child										
1 vegetable serve *(½ cup)**											
1 fruit serve* *1 medium or 2 small pieces, or 1 cup canned*	1 serve daily per child										
1 dairy food serve* *1 cup milk or 200g yoghurt or 40g cheese* ****	1 serve daily per child										
1 serve bread, cereal, rice or pasta* *1 slice bread or ½ cup rice or pasta*	2 serves daily per child										
1 serve bread, cereal, rice or pasta* *1 slice bread or ½ cup rice or pasta*											
High fibre varieties *wholemeal, wholegrain, high fibre white*	daily										
The menu includes water as a drink											

* Refer to page 48 for more examples of what quantity is a serve

** Additional iron containing foods include wholemeal high fibre bread and bread with added iron, iron fortified breakfast cereal or infant cereal, dried fruit, and Milo™

*** Fruit and raw vegetables high in vitamin C include citrus fruits, tomato, cauliflower, broccoli, kiwi fruit, capsicum, rockmelon

**** Choose reduced fat dairy food for children aged 2 years and over

Adapted from the Hunter New England Local Health District, Good for Kids Good for Life 'Menu Manager', 2008.

Section 3 • Food Preparation and Menu Planning 93

Appendix 4.10 Recipe ideas handout

Choosing Recipes - Baked Items

"Baked items" can be used occasionally on the menu for variety. These types of foods can include savoury or fruit muffins, scones, pikelets , fruit bread/buns or fruit rice pudding. Healthier versions of these items may contribute to core food group serve requirements.

To increase the likelihood of a "baked item" recipe contributing to serves of a core food group:

- Choose a recipe that uses flour, grains, fruit, vegetables or reduced fat dairy as a core ingredient
- If flour or grains are the core ingredients, use wholegrain varieties or try substituting white flour for at least half wholemeal, half white.
- If possible, adapt recipes to include additional high fibre ingredients e.g. oats, wheat germ, fruit, vegetables
- Look for recipes that have less added sugar e.g. recipes that contain ingredients like apple puree as a sweetener instead of sugar
- Use recipes that include poly or monounsaturated fats eg margarine or oil
- As a general rule, provide smaller serve sizes than the recipe suggests. Remember childcare caters for small children with small stomachs E.g. make "mini- sized" muffins

To decrease the likelihood of a "baked item" recipe being a ""sometimes food" avoid recipes with:

- Large amounts of saturated fat eg real butter
- Large amounts of sugar/ honey
- Chocolate, icing or other confectionary
- Large portion sizes

Calculating the amount of food groups serves a "baked item" recipe provides:

Banana pikelet recipe: Serves 20 children	
Wholemeal flour 2.5cups (~375g)	In this recipe, flour is in the ingredient in the greatest quantity and contributes 0.5 serves of breads and cereals per child. Calculation: 375g of flour divided by 35g = 11 serves (35g flour is the equivalent of 1 serve of breads and cereals) . 11 serves divided by 20 children = approx. 0.5 serves of breads and cereals per child.
2 small bananas (85g)	Decide if these core food group ingredients are in sufficient amounts to contribute significantly to other food groups. Most baked item recipes will not contribute to more than 1 or 2 food groups. E.g. this recipe provides 1.75 serves of fruit in total, and only 0.01 serves of fruit per child for 20children, so it would be easiest to meet fruit serves for the day elsewhere in the menu.
2.5 cups of milk	
5 eggs	
Margarine 150g	These ingredients do not contribute to core food groups.
5 Tb sugar	

Appendix 4.10 Recipe ideas handout con't

Choosing Recipes - Main Meals

Nutritionally, main meals in Care should be aiming to provide a substantial proportion of children's meat or meat alternatives and vegetable requirements for the day. They are also often a easy way to contribute to bread and cereal recommendations for the day.

Look for recipes:

- That can easily be adapted to include extra vegetables such as grated vegies to include in sauces e.g. including grated carrot and zucchini in bolognaise
- That provide, or can be altered to provide adequate meat serves
- Can utilise economical sources of lean meat
- That work well with vegetable side dishes e.g. grated salads, coleslaws, cauliflower and cheese
- That may appeal to children's interests e.g. utilise herbs or vegies grown in the centre garden; a relevant cultural recipe.
- That are tasty and novel for children. E.g. self-serve meals, stir-fry served in mini noodle boxes, wraps wrapped in colourful serviettes etc.
- That are already tried and tested! Why not develop a network of local cooks to share recipes and ideas that really work?

How a main meal recipe contributes to children's nutrition requirements:

Main Meal Ingredients- Spaghetti bolognaise (serves 20 children 2-5 years)	
Lean mince 1.5kg	This recipe meets meat/meat alternative recommendations for the day (3/4 of a serve. Calculation: 1.5kg divided by 20 children equals approx. 70g raw red meat per child. 70g raw red meat is the equivalent of 3/4 of a serve.
4 onions 6 carrots 1/2 bunch celery 3 garlic cloves 800g canned tomatoes	When weighed on the scales ,the combined weight of these vegetables was approximately 2300g. The meal therefore provides 1.5 serves of vegetables per child. Calculation: 2300g divided by 75g (75g = 1 serve of vegetables) = 30.7 serves 30.7 serves divided by 20 children = 1.5 serves per child As the recommendation is 2 serves of vegetables per day, half a serve of vegetables can be planned for morning or afternoon tea or as a side dish.
2kg wholemeal pasta	This amount of pasta provides 1 serve of breads and cereals per child. Calculation: 2000g divided by 100g = 20 serves (100g pasta is the equivalent of 1 serve of breads/cereals) 20 serves divided by 20 children = 1 serve per child. As the recommendation is 2 serves of breads/cereals per day, another serve can be planned for morning or afternoon tea.
3/4 cup tomato paste 2 tsp dried herbs 4 Tb oil Pepper	Ingredients used in smaller quantities or that aren't necessarily part of core food groups don't need to be included as part of calculations.

Appendix 4.11 Overcoming barriers handout

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Planning for Change: Overcoming Barriers

It can be helpful when planning to make changes, to think about potential barriers that may arise and having a plan to address these. The following table provides some tips and suggestions that may help.

Potential Barriers	Options to consider
Fussy Children	Children may not accept new foods or flavours straight away, but persistence will often increase their acceptance over time. Educators play an important role. Positive comments about the food, giving children praise for tasting food (but not *insisting* they eat) and acting as role models can all assist Talk to educators to see if menu changes can be linked to current children's interests or form part of a learning experience e.g. through a cooking activity See if food- based learning experiences can be a regular activity so children get used to trying new foods e.g. Taste – test Tuesdays Ask educators to provide feedback about the children's response to the menu over time.
Food Wastage	To minimise wastage, write a list of the food and drink items you need for the week's menu, and only buy what's on the list. Waste may temporarily increase when the menu changes, talk to the team about this possibility Encourage everyone to help – meet with your nominated supervisor and room leader Discuss monitoring waste Providing feedback to the cook Strategies to support fussy children Make some gradual changes; start including vegies on the fruit platter for morning tea and increase the amount of vegies served over time, also try providing a new food alongside a familiar food See our fact sheet on "How Do I" for ideas for increasing serves of different food groups in a child-friendly way.

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Potential Barriers	Options to consider
Working in Isolation	Menu changes are most successful when they involve a whole of service approach. It's best if cooks and nominated supervisors organise regular times to catch up and discuss the menu It's best to also have open lines of communication with Educators. Educators need know about menu changes, the rationale behind them and how they can provide constructive feedback regarding the menu Where appropriate the nominated supervisor, cook, educators and parents can all be involved in the goal setting and action planning process. These goals can also be potentially incorporated into service Quality improvements plans.
Budget	It's convenient to buy all your food from the same supplier however often groceries can be cheaper if you shop around for cheapest prices on various items. Maybe negotiate a discount with your local fruit and veg shop for your regular business? Some online grocery warehouses have cheap deals on long life shelf items like tinned foods. Buy in bulk where possible Plan a seasonal menu so fruit and vegies are likely to be cheaper. If you are able to slow cook meat- cheaper cuts are perfect for this and great for your winter menu

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NSW GOVERNMENT Health Hunter New England Local Health District

Appendix 4.12 Menu feedback report

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Menu Review Feedback 2016

[redacted]

22nd September, 2016

Dear Nicole and Annie,

Your menu has been reviewed by a dietitian and compared to the Caring for Children guidelines. This review was based on two weeks of your menu (Weeks commencing 18th and 25th July, respectively) and includes morning tea, lunch and afternoon tea. This information can be used to ensure your menu provides the recommended serves for each food group for children in your care. We also suggest that you take the time to look at all weeks of your menu and how they compare to the guidelines.

Currently:

- 7/10 days the menu provides the recommended serves for breads and cereals.
- 8/10 days the menu provides the recommended serves for vegetables and meat and alternatives.
- 10/10 days the menu provides the recommended serves for fruit. Well done!
- 9/10 days the menu provides the recommended serves for dairy.
- 6/10 days serve one or more 'sometimes' foods. The Caring for Children guideline recommends that 'sometimes' foods are not included on early childhood education and care service's menus. Aim to include a MAXIMUM of 1 'sometimes' food per fortnight.

HNELHD-GoodForKids@hnehealth.nsw.gov.au 4924 6499 If you need to be in contact with the team again, please use the details below:

Key = Meeting Guidelines

= Not Meeting Guidelines

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NSW GOVERNMENT Health Hunter New England Local Health District

Service ID: [redacted]

Appendix 4.12 Menu feedback report con't

Good for kids
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Two week Summary:

Menu: [redacted]

Food Group	Recommended serves per fortnight per child	The menu currently provides per fortnight per child	Comments
Breads & Cereals 	20	22.75	Congratulations! The menu provides the recommended serves of breads & cereals. Check the daily feedback to ensure the recommendations are met each day.
Vegetables 	20	23.5	Well done! The menu provides the recommended serves of vegetables. Check the daily feedback to ensure the recommendations are met each day.
Fruit 	10	15	Congratulations! The menu provides the recommended serves of fruit on all days.
Dairy & alternatives 	10	14.75	Well done! The menu provides the recommended serves of dairy & alternatives. Check the daily feedback to ensure the recommendations are met each day.
Meat & alternatives 	7.5	8.5	Congratulations! The menu provides the recommended serves of meat & alternatives. Check the daily feedback to ensure the recommendations are met each day.
Sometimes Foods 	Not recommended more than once per fortnight	7	Sometimes foods are high in energy, fat, sugar or salt. Check the daily feedback for suggestions to replace these foods in the menu.

Your menu provides the following amount of meat and alternatives over two weeks:

Guideline:	Recommended:	Your menu:	Comments:
Provision of lean red meat	6 occasions/ fortnight	4 occasions	This recommendation was not met by the menu. Aim to include more red meat meals.
Provision of lean white meat and non-meat meals	A variety up to 4 occasions/ fortnight	6 occasions	This recommendation was not met by the menu. Swap some white meat or vegetarian meals for red meat meals.

Appendix 4.13 Sample newsletter

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Early Childhood Education & Care Services

Newsletter Menu Services
Edition No 1, 2015

Meeting the Caring for Children guidelines

Top 2 Focus areas

Menus collected and analysed from services across the area showed that there are two areas that services find more difficult to meet the requirements;

1. Providing adequate vegetable
2. Providing adequate meat and meat alternatives and meeting the iron requirement.

Click here for the Caring for Children Manual

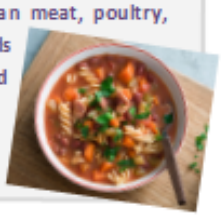
What about Fussy eaters?

- Children may not accept new foods or flavours straight away
- Together with educators provide children with opportunities to try these foods over multiple occasions e.g. through cooking or learning experiences
- Make this a regular activity so children get used to trying new foods e.g. Taste-test-Tuesdays
- Involve children with an exciting menu launch; have a vegie week leading up, or a small group of children to help with food preparation

Recommended Serves

The recommended serves from these two core food groups for each child (2—5 years) per day in care for 8 hours are;

- 2 serves from the vegetables, legumes and beans food group
- 3/4 serve from the lean meat, poultry, fish, eggs, tofu, seeds and legumes food group.



What about Food Wastage?

- Waste may temporarily increase when the menu changes. Consider monitoring waste over time
- Talk to your team about this possibility and brainstorm strategies to minimise waste
- Consider providing a new food as part of a taste-test food experience or serving it alongside a familiar food
- Make some gradual changes; start including vegies on the fruit platter for morning tea and increase the amount of vegies served

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Appendix 4.14 MOU

Good for kids
good for life

Date: <insert date>

Dear <insert NS name>,

Registration for the Caring for Children Menu Planning Support Program

The "Good for Kids" team recognises the important role Early Childhood Education and Care services have in promoting health and wellbeing of young children, and we would like to invite you to participate in the ***Caring for Children Menu Planning Program,*** to offer you extra support in these areas. The *"Good for Kids"* team have been working with childcare services for the past 10 years. In this time we have delivered healthy eating and physical activity programs that have resulted in changes in policies and practices and improved health outcomes for young children.

The aim of the ***Caring for Children Menu Planning Program*** is to provide support to child care services around assessing and planning their service menu to meet the requirements of the recently updated nutrition guidelines outlined in the Caring for Children manual.

What are the benefits of participating?

Our team recognises that each service has unique philosophies and contexts. We will provide tailored support and resources to enable the sustainable implementation of the program in your service.

We aim to do this by:

- Offering individualised support, through a dedicated Support Officer assigned to your service
- Offering on-site visits and support telephone calls to talk through your progress and assist you with action planning, finding workable solutions to barriers, and helping you to achieve your goals.
- Providing tailored menu feedback reports allowing you to assess your menu in detail
- Providing resources such as :
  - The "Caring for Children" manual and resource kit
  - The *Good for Kids, Good for Life* menu planning resources
  - The *Good for Kids, Good for Life* Children's Services menu planning newsletters
  - Action planning templates that support best practice

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Appendix 4.14 MOU con't

What is your role?

Your role is to work with your Support Officer to review your current practice and make improvements to your menu that allow your service to meet best practice recommendations, by undertaking the following:

- Participating in the on-site visits, follow up phone calls and the planning process
- Communicating your goals, your plans to achieve your goals and your services progress to your staff
- Nominating a staff member (perhaps your Educational Leader) to assist you (optional)
- Reviewing your nutrition policies and job descriptions where needed
- Celebrating your achievements!

Kind regards,

<project officer name>

I, _____, Nominated Supervisor of Go Kindy Little Legends Child Care Centre wish to participate in the Menu Planning Program, as outlined, being offered through Hunter New England Local Health District (Population Health Unit).

_____ (Signature)

_____ (Date)

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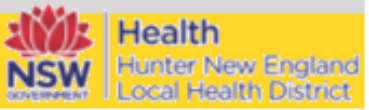

Appendix 4.15 Nominated supervisor baseline pen and paper survey

Service ID:_____ Date Completed:_____

GOOD FOR KIDS. GOOD FOR LIFE

Nominated Supervisor Survey 2015

Version 8 dated 28/9/15

This survey is being conducted by Hunter New England Local Health District as part of the

***Good for Kids. Good for Life* Program.**

The Good for Kids. Good for Life team provides support for early childhood education and care services and aims help improving healthy eating and physical activity environments in services.

Note: Individuals will not be identified in any way in the reporting of results.

- **All instructions are in *Italics***
- **Please answer the questions to the best of your capacity. This survey will ask you about your role in menu planning and the processes in place to support with doing this.**
- **Accuracy of the information is important to us and will be used to help us plan support for your centre**
- **There are no right or wrong answers. Some of the questions you may find difficult to answer, but please take your time and answer to the best of your knowledge.**

PLEASE TICK AND/OR RECORD ALL ANSWERS WHERE INDICATED.

For enquiries, please contact

Kirsty Seward
Hunter New England Local Health District
Phone: 02 4924 6565
Fax: 02 4924 6490
Email: Kirsty.seward@hnehealth.nsw.gov.au

Postal Address: Hunter New England Population Health
Locked Bag 10
WALLSEND NSW 2287

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

The first few questions are about your role as Nominated Supervisor:

1. How long have you worked as a nominated supervisor **at this service?** *(tick one box only)*	
1. Less than 1 year	
2. 1-5 years	
3. 5-10 years	
4. More than 10 years	

2. How long have you worked as a nominated supervisor in total (including at this service and any other services if applicable)? *(tick one box only)*	
1. Less than 1 year	
2. 1-5 years	
3. 5-10 years	
4. More than 10 years	

3. How long in total have you worked in the early education and care setting (including as a nominated supervisor and any other roles e.g. an educator)? *(tick one box only)*	
1. Less than 1 year	
2. 1-5 years	
3. 5-10 years	
4. More than 10 years	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

The next questions are about the healthy eating practices and policies at your service

4. Does your service have a written nutrition policy? *(tick one box only)*	
Yes **(continue to question 4(a)**	
No **(skip to question 5)**	

4(a) If yes, please indicate if your service's written nutrition policy includes the following components? *(Please circle yes or no)*		
a) The service menu is consistent with childcare recommendations (i.e. providing at least 50% of the serves specified in the Australian Dietary Guidelines)	Yes	No
b) Statement that the service menu will be displayed for families and carers	Yes	No
c) Statement that families and carers will be informed of any menu changes	Yes	No
d) Statement indicating that a variety of fruits and vegetables will be offered in recommended amounts (two serves of vegetables, one serve of fruit)	Yes	No
e) Explanation that special dietary needs will be accommodated	Yes	No
f) Statement that food will be served in a form that older children can eat without assistance	Yes	No

5. Does your service currently include goals or outcomes relating to the provision of healthy foods in your quality improvement plan (QIP)? *(tick one box only)*	
1. Yes **(proceed to question 5(a))**	
2. No **(skip to question 6)**	
3. Don't know **(skip to question 6)**	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

5(a) If yes, who is primarily responsible for ensuring the service meets the healthy eating outcomes/goals identified in your QIP (*tick **one** box only*)		
1. Service management/director		
2. Me (Nominated Supervisor)		
3. Service Cook		
4. Educators		
5. Other		**Please specify**_____
6. Don't know		

6. Do you have a system in place to monitor how the service will meet these healthy eating outcomes? (*tick **one** box only*)		
1. Yes		Please provide a brief description of how and when the service progress is monitored? (For example; monthly at team staff meetings, informal discussions, communication book, checklist completed weekly) _____ _____ _____
2. No		

7. Is your service menu displayed for parents/carers to view (*tick one box only*)	
1. Yes, displayed in the service	
2. Yes, available online	
3. No	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

8. Are families informed of daily menu changes? (for example, if an ingredient is unavailable and the main meal is changed for the day) (*tick all that apply*)		
1. Yes, the change is displayed in the service or on sign-in sheet		
2. Yes parents are informed via email		
3. Yes parents are informed via text message		
4. Yes, via other method		**Please specify method**_____ _____
5. No parents are not informed of the change		

9. How often are structured learning experiences about healthy eating implemented as part of your curriculum/program? (e.g. Food guessing games, A-Z of fruit and vegetables, food preparation, experiential activities about food knowledge or skills such as cooking and vegetable gardens) (*tick **one** box only*)	
1. Never	
2. Rarely	
3. Monthly	
4. Once per week	
5. 2-4 times per week	
6. Daily	
7. Don't know	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

10. Do educators role model and promote healthy eating behaviours to children? (e.g. Only eating healthy foods in front of the children, role modelling an enjoyment of healthy food, *(tick **one** box only)*	
1. Yes, frequently	
2. Yes, occasionally	
3. Rarely	
4. No	
5. Not sure	

11. Do educators make supportive and positive comments during meal times? (eg. reinforce healthy eating behaviours and the benefits of healthy eating, praise for trying new foods) *(tick **one** box only)*	
1. Yes, frequently	
2. Yes, occasionally	
3. Rarely	
4. No	
5. Not sure	

The next questions are about menu planning processes at your service

12. Who is responsible for menu planning at your service *(tick all that apply)*		
1. You (nominated supervisor)		
2. Service Director		
3. Management committee		
4. Service cook		
5. External dietitian		
6. Other		**Please specify** _____

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

13. How frequently do you modify the types of food provided on your menu? (*tick **one** box only*)		
1. At least weekly		
2. At least monthly		
3. Quarterly (e.g. each season)		
3. Every 6 months		
4. Every 12 months		
6. Other		**Please specify** _____

14. Do you communicate with the cooks (or person responsible) about planning the menu? (*tick **one** box only*)	
1. Yes **(Proceed to question 14(a))**	
2. No **(Skip to question 15)**	

14 (a) If **yes**, please indicate the main way/s that you communicate? (*tick all that apply*):		
1. Formal/scheduled meetings		
2. Informal meetings/discussions only as required		
3. Communications book		
4. Email/electronic communications (eg. email, software programs)		
5. Informal written notes (e.g. post it notes)		
6. Other		**Please specify** _____

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

15. Does your service have an agreed process for **direct** communication about the menu between the **service cook** and **educators**? (*tick **one** box only*)	
1. Yes **(Proceed to question 15(a))**	
2. No **(Skip to question 16)**	
3. No, communication is facilitated via the nominated supervisor **(skip to question 16)**	

15 (a) If **yes**, please indicate the main way/s this happens? (*tick all that apply*):		
1. Formal/regular meetings where cook and educators attend		
2. Daily staff briefing meetings		
3. Informal meetings/discussions only as required		
4. Communications book		
5. Email/electronic communications (eg email, software programs)		
6. Other		**Please specify** _____

16. Do you provide support to your cook (or other person responsible) so that they are able to plan menu that provides food consistent with the early education and care nutrition guidelines (e.g. the caring for children guidelines)? (*tick **one** box only*)	
1. Yes **(Proceed to question 16(a))**	
2. No **(Skip to question 17)**	
3. Don't know **(skip to question 17)**	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

16 (a) Please indicate the support you provide: *(tick all that apply)*		
1. Training opportunities		
2. Written menu planning resources		
3. Face to face discussions/meetings		
4. Mentoring support from other educator(s) or staff with nutrition expertise		
5. Referring to external support e.g. local health district services, dietitian, cooks support networks		
6. Other		**Please specify** _____

17. Does the service allocate sufficient time for planning menus to meet early education and care nutrition guidelines? (*tick **one** box only*)	
1. Yes, all the time	
2. Yes, some of the time	
3. No, minimal time is allocated to menu planning	
4. Don't know	

18. Does your service provide adequate budget to plan a menu that meets early education and care nutrition guidelines?? (*tick **one** box only*)	
1. Yes, more than adequate, we have a generous budget	
2. Yes, just adequate	
3. No, not quite adequate, we could do with a slightly larger budget	
4. No, very inadequate	
5. Don't know	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

19. Do you believe your cook/s (or person responsible for planning the menu) has the necessary skills to plan a menu that meets nutrition guidelines? (*tick **one** box only*)	
1. Yes, no further training needed	
2. Yes, but some training would be beneficial	
3. No, training is needed	
5. Don't know	

20. Do you actively seek feedback from parents and families about the service menu? (*tick **one** box only*)		
1. Yes, via service sign-in sheet		
2. Yes, via email		
3. Yes, via text message		
4. Yes, face to face during drop off and pick up times		
5. Referring to external support eg local health district services, dietitian, cooks support networks		
6. Yes, other method		**Please specify** _____
7. No		

21. Generally, how helpful is parent's feedback in helping you decide what changes to make to your service menu? (*tick **one** box only*)	
1. Very helpful	
2. Somewhat helpful	
3. Somewhat unhelpful	
4. Not at all helpful	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

22. Do you inform parents when your service is meeting the early education and care nutrition guidelines? (*tick **one** box only*)	
1. Yes	
2. No	

23. Does the service make changes to the menu based on feedback you have received from families? (*tick **one** box only*)	
1. Yes, often	
2. Yes, occasionally	
3. Rarely	
4. Never	
5. Don't know	

24. Do you review your service menu to assess if it meets nutrition guidelines? (*tick **one** box only*)	
1. Yes **(Proceed to question 24 (a))**	
2. No **(skip to question 25)**	

24 (a) How often do you review your service menu to assess if it meets the early education and care nutrition guidelines?? (*tick **one** box only*)		
1. Every menu change		
2. Every month		
3. Every quarter (seasonally)		
4. Every 6 months		
5. Yearly		
6. Other		**Please specify** _____

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

26. Do you inform other staff (e.g. educators, administrative, director) when your service menu meets the early education and care nutrition guidelines? (*tick **one** box only*)	
1. Yes	
2. No	

27. If you believe your menu meets nutrition guidelines, do you inform assessment and compliance (ACO) officers when they visit your service for accreditation? (*tick **one** box only*)	
1. Yes	
2. No	

28. When thinking about the other competing demands of managing your service, how important is providing a menu that meets early education and care nutrition guidelines to you at the moment? (*tick **one** box only*)	
1. Very important	
2. Somewhat important	
3. Important	
4. Sometimes not important	
5. Not important at all	

29. Overall, how receptive do you believe your service is to changing menus to meet early education and care nutrition guidelines? (*tick **one** box only*)	
1. Extremely receptive	
2. Very receptive	
3. Slightly receptive	
4. Slightly unreceptive	
5. Very unreceptive	

Appendix 4.15 Nominated supervisor baseline pen and paper survey con't

Thank you for completing this survey. We really appreciate the time you have taken to provide us with this information. This will help improve the support we provide

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Hunter New England Population Health
Locked Bag 10
WALLSEND NSW 2287
Fax: 02 4924 6490

Appendix 4.16 Service cook baseline pen and paper survey

Service ID:_____ Date Completed:_____

GOOD FOR KIDS. GOOD FOR LIFE

Cooks Survey 2015

Version 8 dated 28/9/15

This survey is being conducted by Hunter New England Local Health District as part of the

Good for Kids. Good for Life Program.

The Good for Kids. Good for Life team provides support for early childhood education and care services and aims to help improve healthy eating and physical activity environments in services.

Note: Individuals will not be identified in any way in the reporting of results.

- All instructions are in *Italics*
- Please answer the questions to the best of your capacity. This survey will ask you about your role in menu planning and the processes in place to support with doing this.
- Accuracy of the information is important to us and will be used to help us plan support for your centre
- There are no right or wrong answers. Some of the questions you may find difficult to answer, but please take your time and answer to the best of your knowledge.

PLEASE TICK AND/OR RECORD ALL ANSWERS WHERE INDICATED.

For enquiries, please contact

Kirsty Seward
Hunter New England Local Health District
Phone: 02 4924 6565
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Email: Kirsty.seward@hnehealth.nsw.gov.au

Postal Address: Hunter New England Population Health
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WALLSEND NSW 2287

Appendix 4.16 Service cook baseline pen and paper survey con't

1. What is your year of birth?	

2. What is your gender? (Please circle)	1. Male 2. Female

3. How many years in total have you been employed as a service cook in the early education and care setting?
_____ Years _____ Months

4. How many years in total have you been employed as a service cook in the early education and care setting?
_____ Years _____ Months

5. How many hours per week do you typically work as a cook in the service?	_____ hours

6. What training and/or qualifications do you have in food or nutrition? ***(tick those that apply)***		
1. TAFE course (menu planning course)		
2. A Registered Training Organisation course		
3. Commercial cooking qualification		
4. A university qualification		
5. 'On the job' training		
6. Other qualifications or training		*Please specify:*
7. None		

Appendix 4.16 Service cook baseline pen and paper survey con't

7. How many weeks is your service menu cycle? ***(tick one box only)***		
1. Six Weeks		
2. Five weeks		
3. Four Weeks		
4. Two Weeks		
5. Weekly		
6. Other:		*Please specify:*

The next questions focus on the menu planning process you undertake to plan a menu that meets the early education and care nutrition guidelines, for the children who attend your service.

The early education and care nutrition guidelines are outlined in the 'Caring for Children' resource which was first released in 1992. The Caring for Children resource has recently been updated and re-released in 2014 by the NSW Ministry of Health. The guidelines are practical and based on the Australian Dietary Guidelines. The guidelines also support early childhood education and care services with menu planning to provide healthy foods to children attending care.

8. Are you aware of the early education and care nutrition guidelines, which outline the recommendations for food provided to children while in care? ***(tick one box only)***					
1. Yes		2. No		3. Don't know	

9. How many serves of the Australian Dietary Guideline food groups are recommended to be provided to each child aged 2-5 years, per day while in care? ***(write your answer in the space provided)***	
Breads and cereals (e.g. Bread, rice, pasta, noodles, crumpets, English muffin, rice cakes)	
Vegetables (e.g. Fresh, frozen and tinned varieties)	
Fruit (e.g. Fresh, frozen and tinned varieties)	
Dairy (e.g. Milk, yoghurt and cheese)	
Meat and meat alternatives (e.g. Beef, fish and seafood, eggs, nuts and seeds, legumes/beans)	
Discretionary foods (e.g. Potato chips, chocolate, confectionary, sugar-sweetened soft drinks/cordials, savoury biscuits)	

Appendix 4.16 Service cook baseline pen and paper survey con't

10. What role/s do you play in menu planning ***(tick all that apply)***		
1. Developing the menu		
2. Sourcing ingredients		
3. Calculating recommended number of serves		
4. Making sure policies for the service are met (e.g. food allergy policy)		
5. Maintaining details of children's preferences and dietary restrictions		
6. Other:		*Please specify:* _____ _____

11. Does anyone help you with planning the service menu? ***(tick all that apply)***		
1. Yes- Nominated supervisor		
2. Yes- other educators		
3. Yes- Parents		
4. No- I'm fully responsible		
5. Other:		*Please specify:*

Appendix 4.16 Service cook baseline pen and paper survey con't

12. What factors do you consider when planning the menu in your service? ***(tick all that apply)***		
1. The taste of the food		
2. Whether children will like or dislike the food		
3. The cost		
4. The variety of foods provided		
5. Types of nutrients in the food (e.g. fat, protein etc.)		
6. Whether it meet guidelines (e.g. Australian Dietary guidelines)		
7. The availability of produce (seasonality of foods)		
8. Time		
9. Other service policies (e.g. food allergies, food storage)		
10. Other		*Please specify:*

13. Do you have a written plan which outlines or steps out the process for planning your menu so that it meets the early childhood education and care nutrition guidelines? ***(tick one box only)***	
1. Yes, I have a detailed plan	
2. Yes, I have a rough plan	
3. No, I have a plan but I have not written it down	
4. No, I do not have a plan	
5. Not sure	

Appendix 4.16 Service cook baseline pen and paper survey con't

14. Are the Early Childhood Education and Care Nutrition Guidelines displayed in your service? (e.g. Australian Dietary Guidelines recommended serves, Food group serve size posters, menu planning checklists) ***(tick all the apply)***		
1. Yes, service entrance/lobby		
2. Yes, in child rooms		
3. Yes, in kitchen		
4. Yes, in staff room		
5. Yes (other)		*Please specify:*
6. No		
7. Don't know		

15. How do you (or the person who plans the menu) organise your recipes that are used in the service menu? ***(tick all that apply)***		
1. Stored on the main computer		
2. Hard copies and stored in a folder		
3. Stored on a USB dedicated to menu planning		
4. Do not store/collect recipes		
5. Other		*Please specify:*

16. Do you currently receive any of the following support when you plan a menu so that it meets the Early Childhood Education and Care nutrition guidelines? ***(tick all that apply)***		
1. Training opportunities		
2. Written menu planning resources		
3. Face to face discussions/meetings		
4. Mentor support from other educator(s) or staff with nutrition expertise		
5. Receive external support (e.g. local		

Appendix 4.16 Service cook baseline pen and paper survey con't

health district services, dietitian, cooks support networks)		
6. Support from the nominated supervisor		*Please specify how your supervisory supports you* _____
7. Other		*Please specify:* _____
8. No support received		

17. How many hours do you have available weekly to dedicate to planning your service menu (e.g. Gathering recipes/ideas, assessing serves of food groups)? ***(tick one box only)***	
9. >10	
10. 5-10	
11. <5	
12. Zero	
13. Don't know	

18. How many hours does it typically take you weekly to plan the menu? ***(tick one box only)***	
1. >10	
2. 5-10	
3. <5	
4. Zero	
5. Don't know	

19. Does the service provide you with adequate equipment to plan and provide a menu that meets the Early Childhood Education and Care Nutrition Guidelines? (e.g. Required appliances and equipment for food preparation and storage) ***(tick one box only)***		
1. Yes, I have all the equipment that I need		
2. Yes, I have some of the equipment I need		

Appendix 4.16 Service cook baseline pen and paper survey con't

3. No, I do not have the equipment that I need		*If **NO**, please specify what equipment you do not have access to:*
4. Don't know		

20. Do you review your service menu to assess if it meets the early childhood education and care nutrition guidelines? ***(tick one box only)***		
1. Yes		*If **YES**, how often: (please circle)* *Every menu change* *Monthly* *Quarterly (seasonally)* *6 monthly* *Yearly* *Other (please specify):_____*
2. No		
3. Don't know		

21. Which of the following are things that you might do when moving to implementing a new menu (e.g. When changing from a winter to spring menu)? ***(tick all that apply)***		
1. Use a menu from a previous years and modify based on current circumstances		
2. Start planning completely from scratch		
3. Schedule a time to discuss changes with nominated supervisor		
4. Speak to educators about their preferences		
5. Speak to educators about the **children's** food preferences		
6. Source prepared menus from an online website		

Appendix 4.16 Service cook baseline pen and paper survey con't

7. Review recipes		
8. Contact other cooks to share recipes		
9. Don't know		
10. other		*Please specify*_____

22. How do you ensure that your menu meets the Early Childhood Education and Care nutrition guidelines (e.g. Provides at least 50% of the recommended food groups to children)? ***(tick all that apply)***		
1. I use a food website (e.g. calorie king)		
2. I estimate by looking at the recipe		
3. I use a recipe planning checklist		
4. I use the nutrition panel		
5. Other		*Please specify:* _____
6. I do not classify food groups		

23. Have educators provided positive feedback about the service menu to you in the last month? (circle answer) ***(tick one box only)***	
1. Yes, often (at least once per week)	
2. Yes, Occasionally (at least once per fortnight)	
3. Yes, rarely (once per month)	
4. No	
5. Don't know	

24. Has the nominated supervisor of the service provided positive feedback about the service menu to you in the last month? ***(tick one box only)***	
1. Yes, often (at least once per week)	

Appendix 4.16 Service cook baseline pen and paper survey con't

2. Yes, Occasionally (at least once per fortnight)	
3. Yes, rarely (once per month)	
4. No	
5. Don't know	

25. Have the parents of the children who attend the service provided positive feedback about the service menu to you in the last month? ***(tick one box only)***	
1. Yes, often (at least once per week)	
2. Yes, Occasionally (at least once per fortnight)	
3. Yes, rarely (once per month)	
4. No	
5. Don't know	

26. Have you received any negative feedback about the service menu in the last month? (circle all answers that apply) ***(tick all that apply)***	
1. Yes, from educators	
2. Yes, from the children	
3. Yes, from the nominate supervisor	
4. Yes, from parents	
5. Not sure	

27. Do you have someone within your service that you can consult for assistance to plan a menu that meets the sector nutrition guidelines? ***(tick one box only)***		
1. Yes		*If **YES**, please specify who:*_____
2. No		
3. Don't know		

Appendix 4.16 Service cook baseline pen and paper survey con't

28. Do you access any external support (e.g. cooks network, Good for Kids team) for assistance to plan a menu that meets the nutrition guidelines? ***(tick one box only)***		
1. Yes		*If **YES**, please specify the type of support:*_____ _____
2. No		
3. Don't know		

29. How easy is it for you to make changes to your service menu? ***(tick one box only)***		
1. Very easy, I can make changes at anytime		
2. Quite easy, I can make changes to some items		
3. No, I must confirm any changes with the nominated supervisor/director or others		
4. Don't know		
5. Other		Please specify: _____ _____

30. Do you have a process in place for using leftover foods (i.e. Food that is not served to the children, food which you want to store and use for another day) (***tick one box only)***		
1. Yes		*If **YES**, please specify the process you use (i.e. label and date, store in alternative fridge):*_____ _____ _____
2. No, no process in place		
3. No, we never keep any leftover food		
4. Don't know		

Appendix 4.16 Service cook baseline pen and paper survey con't

The next questions ask about the allocated budget for food provision

31. Do you have an allocated weekly or daily budget for food provided as part of your menu? ***(tick one box only)***		
1. Weekly		*If **weekly**, what is the weekly budget? $_____ (please circle: total/ per child)*
2. Daily		*If **daily**, what is the daily budget? $_____ (please circle: total/ per child)*
3. Other		*Please specify:_____*

32. Who is responsible for monitoring the allocated menu food budget? (***tick all that apply)***		
1. Nominated supervisor		
2. Myself (service cook)		
3. Educators		
4. Service director		
5. Accountant		*Please specify external or internal:_____*
6. Other		*Please specify: _____*

33. Does your service have process in place to monitor your allocated menu food budget? (***tick all that apply)***		
1. Yes, All invoices and receipts are kept		
2. Yes, A written record of all expenses is documented		
3. Yes, A budget spreadsheet is kept		
4. Other		*Please specify:_____*
5. No		
6. Don't know		

Appendix 4.16 Service cook baseline pen and paper survey con't

34. Does your service current allocated adequate for planning a menu that provides food that meets the early childhood education and care nutrition guidelines? (***tick all that apply)***	
1. Yes, more than adequate, we have a generous budget	
2. Yes, just adequate	
3. No, not quite adequate, we could do with a slightly larger budget	
4. No, very inadequate	
5. Don't know	
6. Don't know	

The next questions ask about food wastage at your service

35. Do you monitor food wastage at your service?	
1. Yes (proceed to question 35 a))	
2. No (end of survey)	

35 a) How often do you monitor food wastage? ***(tick one box only)***		
1. Daily		
2. Weekly		
3. Other		*Please specify:*
4. Don't know		

35 b) How do you monitor food wastage? ***(tick one box only)***		
1. Weigh all leftover food		
2. Visually estimate		
3. Estimate using receipts or other documents		
4. Other		*Please specify:*_____
5. Don't know		

Appendix 4.16 Service cook baseline pen and paper survey con't

35 c) On average, what percentage on average of each meal do you estimate is wasted? (E.g.10% of all Morning tea provided is returned as wastage) ***(Please provide your best guess)***	
1. Morning Tea	_____ %
2. Lunch	_____ %
3. Afternoon Tea	_____ %

Thank you for completing this survey. We really appreciate the time you have taken to provide us with this information. This will help improve the support we provide

Hunter New England Population Health
Locked Bag 10
WALLSEND NSW 2287
Fax: 02 4924 6490

Appendix 4.17 Menu assessment protocol sample

Menu Review Protocol V14

a) Data Collection

Check all required data is specified on the Menu Review Data Collection form

- Complete menu review data collection checklist against the data collection form.
- Contact service to collect any missing data as identified by the checklist pre or post baseline field data collection, depending on baseline scheduling and the amount and urgency of collecting information. Ie if large amount of data are missing, it will not be possible to spend over an hour with the cook on the day of baselines field data collection.
- Minimum number of attempts to collect all data (by phone and/ or email): 3? Max attempts: 5?
- If possible, baseline data collection visits may be utilised to prompt or assist to gather data (ie talk to baseline field officers in advance if you would like this to be done on the day of scheduled visit).

b) Analysis

I) Foods in weights/ or with missing data

- If a range of weights is provided and cannot be clarified with the cook in the follow up phone call then use the average of the range, e.g. 100-200g of mushrooms, use 150g for menu analysis.
- If the weights of any ingredients are not provided by the service cook after all contact attempts, (eg. the weight of an apple) the average weight of that food item will be sourced from the website Calorie King Australia (http://www.calorieking.com.au/)
- If the average weight of an item is not in Calorie King, the research team will meet and reach a consensus on an appropriate average weight
- Any new average weights sourced via Calorie King or by team consensus should be recorded in the "Food group Serve size Conversions" list for use in future menu analyses. Insert hyperlink to food conversions doc

II) Converting Pieces/ Slices to metric weight

- All data collected by number of pieces/ slices etc needs to be converted to a metric weight, except for regular bread, standard sized bread rolls (based on its use as reference food (1 average slice of bread) or equivalency (1/2 bread roll) in the AGTHE and so can therefore be directly converted to serves) and eggs (as whole eggs can be directly converted to a serve size, and eggs in grams is not a practical measure).
- A list of common conversions to metric weights can be found in "Food Group Serve Size Conversions" (see link in previous paragraph)
    - Conversions not included in this list should be searched for in Calorie King Australia (eg 2 average slices = 40g).
- If the food or product brand is specified, nutrition panel information can also be used to convert pieces into weights. Eg 3 Jatz crackers = 50g.

Appendix 4.17 Menu assessment protocol sample con't

- For foods that often vary in size eg fruit, if size/weight is not specified serves should be based on a medium or average size for that particular food.
    - If Calorie King does not include data on the weights of small, medium and large variable weight foods then the weight for an average or medium piece of that food will be used. If this is not available in Calorie King, the research team will be consulted as to an appropriate average weight of that particular food.
- **Record any new metric weight conversions** on the "Food Group Serve Size Conversions" list for use in future menu analyses.

III) Classifying foods into food groups

- All foods (including ingredients within recipes) will be classified into one of the core foods groups
    - Breads and Cereals,
    - Meat and alternatives,
    - Dairy and alternatives,
    - Fruit
    - Vegetables
    - Discretionary choices
        - or miscellaneous/other.
- An existing nutrient database (Hubworks database), developed by the research team, based on the NUTTAB and AUSNUT nutrient databases will be used to determine the food group classification. Insert link to hubworks database
- If insufficient information is provided to enable food group classification, the dietitian will contact service cooks for additional information via phone. If all data collection attempts have been exhausted, the research team will meet to determine an appropriate classification based on available information.
- The Dietitian will cross check Hubworks with each menu item to flag any items that are missing from the Hubworks database.
- If a food cannot be sourced in the Hubworks database, the food should be taken to the research team to reach a consensus on its appropriate classification. **Once team consensus decision made this item should be added into Hubworks**.

- **Discretionary foods**
    - Any food items that are referenced in the AGHE or CFC manual as discretionary choices are automatically classified as discretionary for the menu assessment (eg. Pre-made cakes, chips, lollies, chocolate etc).
    - When a food is not referenced as discretionary in the AGHE or CFC manual or can't be easily identified as part of a core food group (by consensus of the research team), the food will be analysed as to whether it is a discretionary choice.
        - To analyse possible discretionary choices items will be searched in Calorie King/Foodworks/Online to find nutritional information per 100g of each food item. (specifically, kJ, saturated fat, total sugar, sodium, fibre and protein).

Appendix 4.18 Child food intake questionnaire sample

Office use only: Service ID No._____ Record ID No.:_____

Good for kids
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Child Food Record for Service Educators

Dear Educator, Thank you for considering completing this Child Food Record. This will provide important information about the foods that children usually eat whilst attending child care, and is crucial to help us understand how to best support children in your service to eat healthier foods. This survey is voluntary - by completing this survey you consent to be a part of the current "Good for Kids" research project.

Instructions and tips

- *To answer the questions, please think about what the child has eaten over the past month. Please answer the questions to the best of your knowledge, based on what the child **usually eats on the days that they attend.***
- *If you need to, you can consult with other staff at your service to complete the survey, including other educators and the cook*
- *You can answer each question as per day, per week, per month, or never/doesn't eat/not provided by service; select whichever option is most appropriate for each item. Please fill in **only ONE option** for each question.*
- *If the food or drink is not provided at your service, please select the never/doesn't eat/not provided by service response option*
- *Please refer to the **supporting information resource** about types of food and portion sizes to help you to complete the survey*
- *It may be useful to have a copy of the current/recent menu or recent child food records to help you remember what the child has recently eaten*
- *We are aware that it may be difficult to recall some of this information. If you cannot remember the specific amount or types of food that the child has eaten, **please give your best estimate.***

Child's First Name: _____ **Last Name Initial:** _____ **Room Name:** _____

Child's age (years): _____ **Child's gender:** Male ☐1 / Female ☐2

Q1. Which days does the child usually attend *(please tick all that apply)*:

Mon ☐1	Tues ☐2	Wed ☐3	Thurs ☐4	Friday ☐5

Q2. Which meals does the child usually eat whilst at care (*please tick all that apply*):

Breakfast ☐1	Morning tea ☐2	Lunch ☐3	Afternoon tea ☐4	Late snack ☐5

1

Appendix 4.18 Child food intake questionnaire sample con't

Office use only: Service ID No._____ Record ID No.:_____

Good for kids
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These questions are about how much FRUIT the child usually eats while attending care.

Q3. How many **times** does the child usually eat fruit? **Please select ONE option only:**

_____ times per day _____times per week Doesn't eat ☐

Q4. When the child eats fruit, please estimate how much they would usually **eat at one time** (ie at one meal or snack). There are images of sample portion sizes in the supporting resource to help you answer. **Please tick ONE option only:**

One portion:

½ medium piece of fruit eg apple, banana, orange or pear

1 small fruit eg mandarin, apricot, kiwi fruit or plum

½ cup of diced or canned fruit

1 tablespoon dried fruits eg sultanas, 2 apricot halves

½ portion ☐1 1 portion ☐2 2 portions ☐3 Doesn't eat ☐4

Q5. How many times does the child usually drink 100% fruit juice?

_____ times per day _____times per week ☐ Doesn't drink /not provided by service

These questions are about how many VEGETABLES the child usually eats while attending care.

Q6. How many times does the child usually eat starchy vegetables? *(Includes potato, sweet potato. Does **not include** deep fried potatoes/chips)*

_____ times per day _____ times per week Doesn't eat ☐

Q7. When the child eats starchy vegetables, please estimate how much they would usually **eat at one time**. There are images of sample portion sizes in the supporting resource to help you answer. **Please select ONE option only:**

One portion:

¼ medium potato or sweet potato; or about 2 tablespoons mashed potato or sweet potato

½ portion ☐1 1 portion ☐2 2 portions ☐3 Doesn't eat ☐4

2

Appendix 4.19 Nominated supervisor follow-up pen and paper survey

Service ID:_____ Date Completed:_____

GOOD FOR KIDS. GOOD FOR LIFE

Nominated Supervisor Survey 2016

Version 8 dated 28/9/15

This survey is being conducted by Hunter New England Local Health District as part of the

***Good for Kids. Good for Life* Program.**

The Good for Kids. Good for Life team provides support for early childhood education and care services and aims help improving healthy eating and physical activity environments in services.

Note: Individuals will not be identified in any way in the reporting of results.

- **All instructions are in *Italics***
- **Please answer the questions to the best of your capacity. This survey will ask you about your role in menu planning and the processes in place to support with doing this.**
- **Accuracy of the information is important to us and will be used to help us plan support for your centre**
- **There are no right or wrong answers. Some of the questions you may find difficult to answer, but please take your time and answer to the best of your knowledge.**

PLEASE TICK AND/OR RECORD ALL ANSWERS WHERE INDICATED.

For enquiries, please contact

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Phone: 02 4924 6565
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Postal Address: Hunter New England Population Health
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WALLSEND NSW 2287

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

A. Did you complete the Nominated Supervisor survey at the start of the study?	1. Yes 2. No

The first few questions are about your role as Nominated Supervisor:

1. How long have you worked as a nominated supervisor **at this service?** *(tick one box only)*	
1. Less than 1 year	
2. 1-5 years	
3. 5-10 years	
4. More than 10 years	

2. How long have you worked as a nominated supervisor in total (including at this service and any other services if applicable)? *(tick one box only)*	
1. Less than 1 year	
2. 1-5 years	
3. 5-10 years	
4. More than 10 years	

3. How long in total have you worked in the early education and care setting (including as a nominated supervisor and any other roles e.g. an educator)? *(tick one box only)*	
1. Less than 1 year	
2. 1-5 years	
3. 5-10 years	
4. More than 10 years	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

The next questions are about the healthy eating practices and policies at your service

4. Does your service have a written nutrition policy? *(tick one box only)*	
Yes **(continue to question 4(a)**	
No **(skip to question 5)**	

4(a) If yes, please indicate if your service's written nutrition policy includes the following components? (*Please circle yes or no*)		
a) The service menu is consistent with childcare recommendations (i.e. providing at least 50% of the serves specified in the Australian Dietary Guidelines)	Yes	No
b) Statement that the service menu will be displayed for families and carers	Yes	No
c) Statement that families and carers will be informed of any menu changes	Yes	No
d) Statement indicating that a variety of fruits and vegetables will be offered in recommended amounts (two serves of vegetables, one serve of fruit)	Yes	No
e) Explanation that special dietary needs will be accommodated	Yes	No
f) Statement that food will be served in a form that older children can eat without assistance	Yes	No

5. Does your service currently include goals or outcomes relating to the provision of healthy foods in your quality improvement plan (QIP)? (*tick one box only*)	
1. Yes **(proceed to question 5(a))**	
2. No **(skip to question 6)**	
3. Don't know **(skip to question 6)**	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

5(a) If yes, who is primarily responsible for ensuring the service meets the healthy eating outcomes/goals identified in your QIP (*tick **one** box only*)		
1. Service management/director		
2. Me (Nominated Supervisor)		
3. Service Cook		
4. Educators		
5. Other		**Please specify**_____
6. Don't know		

6. Do you have a system in place to monitor how the service will meet these healthy eating outcomes? (*tick **one** box only*)		
1. Yes		Please provide a brief description of how and when the service progress is monitored? (For example; monthly at team staff meetings, informal discussions, communication book, checklist completed weekly) _____ _____ _____
2. No		

7. Is your service menu displayed for parents/carers to view (*tick one box only*)	
1. Yes, displayed in the service	
2. Yes, available online	
3. No	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

8. Are families informed of daily menu changes? (for example, if an ingredient is unavailable and the main meal is changed for the day) (*tick all that apply*)		
1. Yes, the change is displayed in the service or on sign-in sheet		
2. Yes parents are informed via email		
3. Yes parents are informed via text message		
4. Yes, via other method		**Please specify method**_____ _____
5. No parents are not informed of the change		

9. How often are structured learning experiences about healthy eating implemented as part of your curriculum/program? (e.g. Food guessing games, A-Z of fruit and vegetables, food preparation, experiential activities about food knowledge or skills such as cooking and vegetable gardens) (*tick **one** box only*)	
1. Never	
2. Rarely	
3. Monthly	
4. Once per week	
5. 2-4 times per week	
6. Daily	
7. Don't know	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

10. Do educators role model and promote healthy eating behaviours to children? (e.g. Only eating healthy foods in front of the children, role modelling an enjoyment of healthy food, (*tick **one** box only*)	
1. Yes, frequently	
2. Yes, occasionally	
3. Rarely	
4. No	
5. Not sure	

11. Do educators make supportive and positive comments during meal times? (eg. reinforce healthy eating behaviours and the benefits of healthy eating, praise for trying new foods) (*tick **one** box only*)	
1. Yes, frequently	
2. Yes, occasionally	
3. Rarely	
4. No	
5. Not sure	

The next questions are about menu planning processes at your service

12. Who is responsible for menu planning at your service *(tick all that apply)*		
1. You (nominated supervisor)		
2. Service Director		
3. Management committee		
4. Service cook		
5. External dietitian		
6. Other		**Please specify** _____

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

13. How frequently do you modify the types of food provided on your menu? (*tick **one** box only*)		
1. At least weekly		
2. At least monthly		
3. Quarterly (e.g. each season)		
4. Every 6 months		
5. Every 12 months		
6. Other		**Please specify** _____

14. Do you communicate with the cooks (or person responsible) about planning the menu? (*tick **one** box only*)	
1. Yes **(Proceed to question 14(a))**	
2. No **(Skip to question 15)**	

14 (a) If **yes**, please indicate the main way/s that you communicate? (*tick all that apply*):		
1. Formal/scheduled meetings		
2. Informal meetings/discussions only as required		
3. Communications book		
4. Email/electronic communications (eg email, software programs)		
5. Informal written notes (e.g. post it notes)		
6. Other		**Please specify** _____

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

15. Does your service have an agreed process for **direct** communication about the menu between the **service cook** and **educators**? (*tick **one** box only*)	
1. Yes **(Proceed to question 15(a))**	
2. No **(Skip to question 16)**	
3. No, communication is facilitated via the nominated supervisor **(skip to question 16)**	

15 (a) If **yes**, please indicate the main way/s this happens? (*tick all that apply*):		
1. Formal/regular meetings where cook and educators attend		
2. Daily staff briefing meetings		
3. Informal meetings/discussions only as required		
4. Communications book		
5. Email/electronic communications (eg email, software programs)		
6. Other		**Please specify** _____

16. Do you provide support to your cook (or other person responsible) so that they are able to plan menu that provides food consistent with the early education and care nutrition guidelines (e.g. the caring for children guidelines)? (*tick **one** box only*)	
1. Yes **(Proceed to question 16(a))**	
2. No **(Skip to question 17)**	
3. Don't know **(skip to question 17)**	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

16 (a) Please indicate the support you provide: *(tick all that apply)*		
1. Training opportunities		
2. Written menu planning resources		
3. Face to face discussions/meetings		
4. Mentoring support from other educator(s) or staff with nutrition expertise		
5. Referring to external support e.g. local health district services, dietitian, cooks support networks		
6. Other		**Please specify** _____

17. Does the service allocate sufficient time for planning menus to meet early education and care nutrition guidelines? (*tick **one** box only*)	
1. Yes, all the time	
2. Yes, some of the time	
3. No, minimal time is allocated to menu planning	
4. Don't know	

18. Does your service provide adequate budget to plan a menu that meets early education and care nutrition guidelines?? (*tick **one** box only*)	
1. Yes, more than adequate, we have a generous budget	
2. Yes, just adequate	
3. No, not quite adequate, we could do with a slightly larger budget	
4. No, very inadequate	
5. Don't know	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

19. Do you believe your cook/s (or person responsible for planning the menu) has the necessary skills to plan a menu that meets nutrition guidelines? (*tick **one** box only*)	
1. Yes, no further training needed	
2. Yes, but some training would be beneficial	
3. No, training is needed	
5. Don't know	

20. Do you actively seek feedback from parents and families about the service menu? (*tick **one** box only*)		
1. Yes, via service sign-in sheet		
2. Yes, via email		
3. Yes, via text message		
4. Yes, face to face during drop off and pick up times		
5. Referring to external support eg local health district services, dietitian, cooks support networks		
6. Yes, other method		**Please specify** _____
7. No		

21. Generally, how helpful is parent's feedback in helping you decide what changes to make to your service menu? (*tick **one** box only*)	
1. Very helpful	
2. Somewhat helpful	
3. Somewhat unhelpful	
4. Not at all helpful	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

22. Do you inform parents when your service is meeting the early education and care nutrition guidelines? (*tick **one** box only*)	
1. Yes	
2. No	

23. Does the service make changes to the menu based on feedback you have received from families? (*tick **one** box only*)	
1. Yes, often	
2. Yes, occasionally	
3. Rarely	
4. Never	
5. Don't know	

24. Do you review your service menu to assess if it meets nutrition guidelines? (*tick **one** box only*)	
1. Yes **(Proceed to question 24 (a))**	
2. No **(skip to question 25)**	

24 (a) How often do you review your service menu to assess if it meets the early education and care nutrition guidelines?? (*tick **one** box only*)		
1. Every menu change		
2. Every month		
3. Every quarter (seasonally)		
4. Every 6 months		
5. Yearly		
6. Other		**Please specify** _____

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

26. Do you inform other staff (e.g. educators, administrative, director) when your service menu meets the early education and care nutrition guidelines? (*tick **one** box only*)	
1. Yes	
2. No	

27. If you believe your menu meets nutrition guidelines, do you inform assessment and compliance (ACO) officers when they visit your service for accreditation? (*tick **one** box only*)	
1. Yes	
2. No	

28. When thinking about the other competing demands of managing your service, how important is providing a menu that meets early education and care nutrition guidelines to you at the moment? (*tick **one** box only*)	
1. Very important	
2. Somewhat important	
3. Important	
4. Sometimes not important	
5. Not important at all	

29. Overall, how receptive do you believe your service is to changing menus to meet early education and care nutrition guidelines? (*tick **one** box only*)	
1. Extremely receptive	
2. Very receptive	
3. Slightly receptive	
4. Slightly unreceptive	
5. Very unreceptive	

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

The next questions refer to the training and support provided by the Good for Kids team during the Children Menu Program. The program was delivered over the past 6 months and aimed to support service cooks and nominated supervisors to plan a menu that meets healthy nutrition guidelines.

For the following questions, please tell us if you Strongly Disagree, Disagree, Agree or, Strongly Agree with the following statements regarding your participation in the Good for Kids, Caring for Children Menu Program. ***(For each statement, please circle the appropriate number).***

	Strongly Disagree	Disagree	Agree	Strongly Agree
30(a). The children benefited from our service's participation in the program	1	2	3	4
30(b). Our service benefited from participation in this program	1	2	3	4
30(c). The level of support I received during the program was inadequate to meet my needs	1	2	3	4
30(d). I would recommended the program to other services	1	2	3	4

The following questions will help us to evaluate the acceptability of the support provided to you and your Service Cook over the past 6 months.

31(a). I found the menu planning training provided by the Good for Kids team **acceptable**. *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*									
1	2	3	4	5	6	7	8	9	10
11. If you **did not attend** the workshop/on-site training please tick here ☐									

31(b). I found the menu planning training provided by the Good for Kids team **helpful** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*									
1	2	3	4	5	6	7	8	9	10
11. If you **did not attend** the workshop/on-site training please tick here ☐									

32(a). I found the on-site support visits provided by the Good for Kids team **acceptable**. *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

32(b). I found the on-site support visits provided by the Good for Kids team **helpful**. *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

33(a). I found the telephone support provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

33(b). I found the telephone support provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

34(a). I found the printed resources (such as recipes, menu planning tools and factsheets) provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

34(b). I found the printed resources (such as recipes, menu planning tools and factsheets) provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

35(a). I found the two newsletters provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

35(b). I found the two newsletters provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

36(a). I found the menu feedback reports provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

36(b). I found the menu feedback reports provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

Appendix 4.19 Nominated supervisor follow-up pen and paper survey con't

37(a). I found the goal setting and action planning support provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

37(b). I found the goal setting and action planning support provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

38(a). I found the memorandum of understanding provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

38(b). I found the memorandum of understanding provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

Thank you for completing this survey. We really appreciate the time you have taken to provide us with this information. This will help improve the support we provide

Hunter New England Population Health
Locked Bag 10
WALLSEND NSW 2287
Fax: 02 4924 6490

Appendix 4.20 Service cook follow-up pen and paper survey

<<Service_ID>> Date Completed:_____

GOOD FOR KIDS. GOOD FOR LIFE

Cooks Survey 2016

Version 8 dated 28/9/15

This survey is being conducted by Hunter New England Local Health District as part of the

***Good for Kids. Good for Life* Program.**

The Good for Kids. Good for Life team provides support for early childhood education and care services and aims to help improve healthy eating and physical activity environments in services.

Note: Individuals will not be identified in any way in the reporting of results.

- **All instructions are in *Italics***
- **Please answer the questions to the best of your capacity. This survey will ask you about your role in menu planning and the processes in place to support with doing this.**
- **Accuracy of the information is important to us and will be used to help us plan support for your centre**
- **There are no right or wrong answers. Some of the questions you may find difficult to answer, but please take your time and answer to the best of your knowledge.**

PLEASE TICK AND/OR RECORD ALL ANSWERS WHERE INDICATED.

For enquiries, please contact

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Appendix 4.20 Service cook follow-up pen and paper survey con't

A. Did you complete the Service Cook survey at the start of the study?	1. Yes 2. No

1. What is your year of birth?	

2. What is your gender? (Please circle)	1. Male 2. Female

3. How many years in total have you been employed as a service cook in the current service?
_____ Years _____ Months

4. How many years in total have you been employed as a service cook in the early education and care setting?
_____ Years _____ Months

5. How many hours per week do you typically work as a cook in the service?	_____ hours

6. What training and/or qualifications do you have in food or nutrition? ***(tick those that apply)***		
1. TAFE course (menu planning course)		*Please specify:*
2. A Registered Training Organisation course		*Please specify:*
3. Commercial cooking qualification		*Please specify:*
4. A university qualification		*Please specify:*
5. 'On the job' training		*Please specify:*
6. Other qualifications or training		*Please specify:*
7. None		

Appendix 4.20 Service cook follow-up pen and paper survey con't

7. How many weeks is your service menu cycle? ***(tick one box only)***		
1. Six Weeks		
2. Five weeks		
3. Four Weeks		
4. Two Weeks		
5. Weekly		
6. Other:		*Please specify:*

The next questions focus on the menu planning process you undertake to plan a menu that meets the early education and care nutrition guidelines, for the children who attend your service.

The early education and care nutrition guidelines are outlined in the 'Caring for Children' resource which was first released in 1992. The Caring for Children resource has recently been updated and re-released in 2014 by the NSW Ministry of Health. The guidelines are practical and based on the Australian Dietary Guidelines. The guidelines also support early childhood education and care services with menu planning to provide healthy foods to children attending care.

8. Are you aware of the early education and care nutrition guidelines, which outline the recommendations for food provided to children while in care? ***(tick one box only)***					
1. Yes		2. No		3. Don't know	

9. How many serves of the Australian Dietary Guideline food groups are recommended to be provided to each child aged 2-5 years, per day while in care? ***(write your answer in the space provided)***	
(a) Breads and cereals (e.g. Bread, rice, pasta, noodles, crumpets, English muffin, rice cakes)	
(b) Vegetables (e.g. Fresh, frozen and tinned varieties)	
(c) Fruit (e.g. Fresh, frozen and tinned varieties)	
(d) Dairy (e.g. Milk, yoghurt and cheese)	
(e) Meat and meat alternatives (e.g. Beef, fish and seafood, eggs, nuts and seeds, legumes/beans)	
(f) Discretionary foods (e.g. Potato chips, chocolate, confectionary, sugar-sweetened soft drinks/cordials, savoury biscuits)	

Appendix 4.20 Service cook follow-up pen and paper survey con't

10. What role/s do you play in menu planning *(tick all that apply)*		
1. Developing the menu		
2. Sourcing ingredients		
3. Calculating recommended number of serves		
4. Making sure policies for the service are met (e.g. food allergy policy)		
5. Maintaining details of children's preferences and dietary restrictions		
6. Other:		*Please specify:* _____ _____

11. Does anyone help you with planning the service menu? *(tick all that apply)*		
1. Yes- Nominated supervisor		
2. Yes- other educators		
3. Yes- Parents		
4. No- I'm fully responsible		
5. Other:		*Please specify:*

Appendix 4.20 Service cook follow-up pen and paper survey con't

12. What factors do you consider when planning the menu in your service? ***(tick all that apply)***		
1. The taste of the food		
2. Whether children will like or dislike the food		
3. The cost		
4. The variety of foods provided		
5. Types of nutrients in the food (e.g. fat, protein etc.)		
6. Whether it meet guidelines (e.g. Australian Dietary guidelines)		
7. The availability of produce (seasonality of foods)		
8. Time		
9. Other service policies (e.g. food allergies, food storage)		
10. Other		*Please specify:*

13. Do you have a written plan which outlines or steps out the process for planning your menu so that it meets the early childhood education and care nutrition guidelines? ***(tick one box only)***	
1. Yes, I have a detailed plan	
2. Yes, I have a rough plan	
3. No, I have a plan but I have not written it down	
4. No, I do not have a plan	
5. Not sure	

Appendix 4.20 Service cook follow-up pen and paper survey con't

14. Are the Early Childhood Education and Care Nutrition Guidelines displayed in your service? (e.g. Australian Dietary Guidelines recommended serves, Food group serve size posters, menu planning checklists) ***(tick all the apply)***		
1. Yes, service entrance/lobby		
2. Yes, in child rooms		
3. Yes, in kitchen		
4. Yes, in staff room		
5. Yes (other)		*Please specify:*
6. No		
7. Don't know		

15. How do you (or the person who plans the menu) organise your recipes that are used in the service menu? ***(tick all that apply)***		
1. Stored on the main computer		
2. Hard copies and stored in a folder		
3. Stored on a USB dedicated to menu planning		
4. Do not store/collect recipes		
5. Other		*Please specify:*

16. Do you currently receive any of the following support when you plan a menu so that it meets the Early Childhood Education and Care nutrition guidelines? ***(tick all that apply)***		
1. Training opportunities		
2. Written menu planning resources		
3. Face to face discussions/meetings		
4. Mentor support from other educator(s) or staff with nutrition expertise		
5. Receive external support (e.g. local health district services, dietitian, cooks support networks)		

Appendix 4.20 Service cook follow-up pen and paper survey con't

6. Support from the nominated supervisor		*Please specify how your supervisory supports you* _____
7. Other		*Please specify:* _____
8. No support received		

17. How many hours do you have available weekly to dedicate to planning your service menu (e.g. Gathering recipes/ideas, assessing serves of food groups)? ***(tick one box only)***	
1. >10	
2. 5-10	
3. <5	
4. Zero	
5. Don't know	

18. How many hours does it typically take you weekly to plan the menu? ***(tick one box only)***	
1. >10	
2. 5-10	
3. <5	
4. Zero	
5. Don't know	

19. Does the service provide you with adequate equipment to plan and provide a menu that meets the Early Childhood Education and Care Nutrition Guidelines? (e.g. Required appliances and equipment for food preparation and storage) ***(tick one box only)***		
1. Yes, I have all the equipment that I need		
2. Yes, I have some of the equipment I need		
3. No, I do not have the equipment that I need		*If **NO**, please specify what equipment you do not have access to:*
4. Don't know		

Appendix 4.20 Service cook follow-up pen and paper survey con't

20. Do you review your service menu to assess if it meets the early childhood education and care nutrition guidelines? ***(tick one box only)***		
1. Yes		*If **YES**, how often: (please circle)* *Every menu change* *Monthly* *Quarterly (seasonally)* *6 monthly* *Yearly* *Other (please specify):_____*
2. No		
3. Don't know		

21. Which of the following are things that you might do when moving to implementing a new menu (e.g. When changing from a winter to spring menu)? ***(tick all that apply)***		
1. Use a menu from a previous years and modify based on current circumstances		
2. Start planning completely from scratch		
3. Schedule a time to discuss changes with nominated supervisor		
4. Speak to educators about their preferences		
5. Speak to educators about the **children's** food preferences		
6. Source prepared menus from an online website		
7. Review recipes		
8. Contact other cooks to share recipes		
9. Don't know		
10. other		*Please specify_____* *_____*

Appendix 4.20 Service cook follow-up pen and paper survey con't

22. How do you ensure that your menu meets the Early Childhood Education and Care nutrition guidelines (e.g. Provides at least 50% of the recommended food groups to children)? ***(tick all that apply)***		
1. I use a food website (e.g. calorie king)		
2. I estimate by looking at the recipe		
3. I use a recipe planning checklist		
4. I use the nutrition panel		
5. Other		*Please specify:* _____ _____
6. I do not classify food groups		

23. Have educators provided positive feedback about the service menu to you in the last month? (circle answer) ***(tick one box only)***	
1. Yes, often (at least once per week)	
2. Yes, Occasionally (at least once per fortnight)	
3. Yes, rarely (once per month)	
4. No	
5. Don't know	

24. Has the nominated supervisor of the service provided positive feedback about the service menu to you in the last month? ***(tick one box only)***	
1. Yes, often (at least once per week)	
2. Yes, Occasionally (at least once per fortnight)	
3. Yes, rarely (once per month)	
4. No	
5. Don't know	

Appendix 4.20 Service cook follow-up pen and paper survey con't

25. Have the parents of the children who attend the service provided positive feedback about the service menu to you in the last month? ***(tick one box only)***	
1. Yes, often (at least once per week)	
2. Yes, Occasionally (at least once per fortnight)	
3. Yes, rarely (once per month)	
4. No	
5. Don't know	

26. Have you received any negative feedback about the service menu in the last month? (circle all answers that apply) ***(tick all that apply)***	
1. Yes, from educators	
2. Yes, from the children	
3. Yes, from the nominate supervisor	
4. Yes, from parents	
5. Not sure	

27. Do you have someone within your service that you can consult for assistance to plan a menu that meets the sector nutrition guidelines? ***(tick one box only)***		
1. Yes		*If **YES**, please specify who:*_____ _____
2. No		
3. Don't know		

28. Do you access any external support (e.g. cooks network, Good for Kids team) for assistance to plan a menu that meets the nutrition guidelines? ***(tick one box only)***		
1. Yes		*If **YES**, please specify the type of support:*_____ _____
2. No		
3. Don't know		

Appendix 4.20 Service cook follow-up pen and paper survey con't

29. How easy is it for you to make changes to your service menu? ***(tick one box only)***		
1. Very easy, I can make changes at anytime		
2. Quite easy, I can make changes to some items		
3. No, I must confirm any changes with the nominated supervisor/director or others		
4. Don't know		
5. Other		Please specify: _____ _____

30. Do you have a process in place for using leftover foods (i.e. Food that is not served to the children, food which you want to store and use for another day) (***tick one box only)***		
1. Yes		*If **YES**, please specify the process you use (i.e. label and date, store in alternative fridge):*_____ _____ _____
2. No, no process in place		
3. No, we never keep any leftover food		
4. Don't know		

The next questions ask about the allocated budget for food provision

31. Do you have an allocated weekly or daily budget for food provided as part of your menu? ***(tick one box only)***		
1. Weekly		*If **weekly**, what is the weekly budget? $_____* ***(please circle: total/ per child)***
2. Daily		*If **daily**, what is the daily budget? $_____* ***(please circle: total/ per child)***
3. Other		*Please specify:*_____

Appendix 4.20 Service cook follow-up pen and paper survey con't

32. Who is responsible for monitoring the allocated menu food budget? (***tick all that apply)***		
1. Nominated supervisor		
2. Myself (service cook)		
3. Educators		
4. Service director		
5. Accountant		*Please specify external or internal:*_____
6. Other		*Please specify:* _____

33. Does your service have process in place to monitor your allocated menu food budget? (***tick all that apply)***		
1. Yes, All invoices and receipts are kept		
2. Yes, A written record of all expenses is documented		
3. Yes, A budget spreadsheet is kept		
4. Other		*Please specify:*_____
5. No		
6. Don't know		

34. Does your service current allocated adequate for planning a menu that provides food that meets the early childhood education and care nutrition guidelines? (***tick one box only)***	
1. Yes, more than adequate, we have a generous budget	
2. Yes, just adequate	
3. No, not quite adequate, we could do with a slightly larger budget	
4. No, very inadequate	
5. Don't know	
6. Don't know	

Appendix 4.20 Service cook follow-up pen and paper survey con't

The next questions ask about food wastage at your service

35. Do you monitor food wastage at your service?	
1. Yes (proceed to question 35 a)	
2. No (end of survey)	

35 a) How often do you monitor food wastage? ***(tick one box only)***		
1. Daily		
2. Weekly		
3. Other		*Please specify:*
4. Don't know		

35 b) How do you monitor food wastage? ***(tick one box only)***		
1. Weigh all leftover food		
2. Visually estimate		
3. Estimate using receipts or other documents		
4. Other		*Please specify:*_____
5. Don't know		

35 c) On average, what percentage on average of each meal do you estimate is wasted? (E.g.10% of all Morning tea provided is returned as wastage) ***(Please provide your best guess)***	
1. Morning Tea	_____ %
2. Lunch	_____ %
3. Afternoon Tea	_____ %

Appendix 4.20 Service cook follow-up pen and paper survey con't

The next questions refer to the training and support provided by the Good for Kids team during the Children Menu Program. The program was delivered over the past 6 months and aimed to support service cooks and nominated supervisors to plan a menu that meets healthy nutrition guidelines.

For the following questions, please tell us if you Strongly Disagree, Disagree, Agree or, Strongly Agree with the following statements regarding your participation in the Good for Kids, Caring for Children Menu Program. ***(For each statement, please circle the appropriate number).***

	Strongly Disagree	Disagree	Agree	Strongly Agree
36(a). The children benefited from our service's participation in the program	1	2	3	4
36(b). Our service benefited from participation in this program	1	2	3	4
36(c). The level of support I received during the program was inadequate to meet my needs	1	2	3	4
36(d). I would recommended the program to other services	1	2	3	4

The following questions will help us to evaluate the acceptability of the support provided to you and your Nominated Supervisor over the past 6 months.

.

37(a). I found the menu planning training provided by the Good for Kids team **acceptable**. *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*									
1	2	3	4	5	6	7	8	9	10
11. If you **did not attend** the workshop/on-site training please tick here ☐									

37(b). I found the menu planning training provided by the Good for Kids team **helpful** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*									
1	2	3	4	5	6	7	8	9	10
11. If you **did not attend** the workshop/on-site training please tick here ☐									

38(a). I found the on-site support visits provided by the Good for Kids team **acceptable**. *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

Appendix 4.20 Service cook follow-up pen and paper survey con't

38(b). I found the on-site support visits provided by the Good for Kids team **helpful**. *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

39(a). I found the telephone support provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

39(b). I found the telephone support provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

40(a). I found the printed resources (such as recipes, menu planning tools and factsheets) provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

40(b). I found the printed resources (such as recipes, menu planning tools and factsheets) provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

41(a). I found the two newsletters provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

41(b). I found the two newsletters provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

42(a). I found the menu feedback reports provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

42(b). I found the menu feedback reports provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

43(a). I found the goal setting and action planning support provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

Appendix 4.20 Service cook follow-up pen and paper survey con't

43(b). I found the goal setting and action planning support provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

44(a). I found the memorandum of understanding provided by the Good for Kids team **acceptable.** *(Please circle your answer, 1 = not acceptable at all, 10 = very acceptable)*										
1	2	3	4	5	6	7	8	9	10	N/A

44(b). I found the memorandum of understanding provided by the Good for Kids team **helpful.** *(For each statement, please circle your answer, 1 = not helpful at all, 10 = very helpful)*										
1	2	3	4	5	6	7	8	9	10	N/A

Thank you for completing this survey. We really appreciate the time you have taken to provide us with this information. This will help improve the support we provide

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Appendix 4.21 Action plan template

Good for kids
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Goal Setting Template for Service Cook and Service Director

What are your goals?	Planned Action Steps	Who's role? e.g. Cook or Director	By when?	Outcome
.....	a)			❑ Achieved ❑ In progress ❑ Not achieved, please explain why this goal has not been met ....
	b)			
	c)			
.....	a)			❑ Achieved ❑ In progress ❑ Not achieved, please explain why this goal has not been met ....
	b)			
	c)			