

**Examining the Role of Food Literacy in Shaping Adolescents'  
Dietary Behaviours**

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# **Examining the role of food literacy in shaping adolescents' dietary behaviours**

**Rimante Ronto**

Bachelor of Public Health (Lithuanian University of Health Sciences)

Master of Public Health and Nutrition (Lithuanian University of Health Sciences)

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## **Abstract**

The high prevalence of lifestyle-related non-communicable diseases including overweight and obesity is a major public health challenge of the 21<sup>st</sup> century. The development of overweight and obesity, coronary heart disease, stroke, cancer and type 2 diabetes is more likely for dietary intakes rich in sugars, fat, and low in fruits and vegetables. Currently, adolescents' dietary behaviours generally do not align with national healthy dietary guidelines and have been described as poor, with low intake of fruit and vegetables and high intake of sweetened beverages, sweets and convenience foods. Interventions aiming to improve adolescents' dietary behaviours have shown minimal to modest outcomes, warranting further attention in this area.

Food literacy has been identified as a potential construct that influences the outcomes of dietary interventions as it connects food and nutrition knowledge with food skills, and critical decision making about dietary behaviours. Although food literacy is increasingly recognised as important, very little was known about how adolescents become food literate. There was a lack of high-quality evidence on this topic, which creates a challenge in clarifying the strength and nature of the association between food literacy and dietary behaviours among adolescents. What was known is that schools are influential settings in forming adolescents' dietary behaviours. Therefore, this research program aimed to explore the role of food literacy in shaping adolescents' dietary behaviours in order to inform the development of future interventions to facilitate healthy dietary behaviours of adolescents.

This thesis describes four research studies designed to address the overall research aim. The findings were published in six peer-reviewed journal articles. The research is underpinned by the pragmatic paradigm. Pragmatism was suitable for this research because food literacy and dietary behaviours are complex structures and by using a mixed methods approach, it enabled a richer understanding of the relationship between food literacy and dietary behaviours to be achieved. In addition, a conceptual framework was developed to guide this research. The overall findings of the studies suggest that food literacy may influence adolescents' dietary behaviours. However, numerous barriers were identified that prevent adolescents from increasing their food literacy, which consequently could prevent healthier dietary behaviours and suggests future work to address these issues is needed.

Study 1 involved a systematic review of the literature to synthesise evidence on the relationship between food literacy and adolescents' dietary behaviours. Thirteen studies met the inclusion criteria and were critically appraised. None of the selected studies measured food literacy comprehensively, however eight out of thirteen studies showed positive outcomes. For example, adolescents with greater food knowledge and frequent food preparation behaviours were shown to have healthier dietary practices. Study 1 concluded that food literacy may have an impact on adolescents' dietary behaviours. The findings of this review have been published in a peer-review academic journal and informed the development of Study 2.

Study 2 used a cross sectional design that consisted of two components: quantitative and qualitative. The quantitative component described home economics teachers' (HETs) perspectives on the importance of various aspects of food literacy for adolescents to learn, HETs' attitudes and self-efficacy in food literacy and assessed schools' food environment. HETs are engaged in curriculum delivery which is most aligned to food literacy in the Australian school context. The qualitative component of the survey explored HETs' views on food literacy education in Australian high schools. A total of 205 HETs completed the quantitative part of the questionnaire and 78 HETs left a free-text comment regarding food literacy education in Australian high schools. The quantitative component of the survey found that HETs ranked most aspects of food literacy as very important for adolescents to learn but they focused more on developing basic skills and knowledge in comparison to broader aspects of food literacy such as animal welfare and environmental sustainability. The qualitative component identified some enablers and barriers regarding food literacy related education in high schools. Each component of Study 2 has been published in peer-review academic journals and informed the development of Study 3.

Study 3 was a qualitative study with HETs to further explore the barriers and enablers of food literacy education in Australian high schools and explore the role of HETs in enhancing adolescents' food literacy. Twenty-two semi-structured interviews were conducted with HETs in Australia. The findings showed that HETs are interested in food literacy and have pedagogical expertise in health, nutrition and cooking. They identified numerous barriers that teachers face when teaching food literacy, which had an impact on adolescents' food literacy and dietary behaviours, such as financial constraints, negative role modelling of some teachers and non-supportive school food environments including school canteens. Most importantly, food and nutrition education aiming to increase adolescents' food literacy was perceived as undervalued and not seen as important compared to other subjects. The findings of this study

have been published in peer-review academic journals and informed the development of Study 4.

The final study was a qualitative study, which involved fifteen focus groups with adolescents. It explored adolescents' understanding and importance placed on various aspects of food literacy, including the perceived impact it has on their dietary behaviours. The findings of this study showed that adolescents have limited understanding of the concept of food literacy and broader aspects of food literacy. They perceived food and nutrition knowledge as important facilitators for them to eat healthy. However, most adolescents lacked confidence in the application of food and nutrition knowledge, for example, food preparation. Also, many adolescents described themselves as having limited opportunities to increase their food literacy in home and high school settings. This study has been published in peer-review academic journal.

Collectively, these four studies highlight the significant role of high schools in providing opportunities for adolescents to increase their food literacy and healthy dietary behaviours. However, numerous barriers are likely to be impacting adolescents' opportunities to increase their food literacy levels. This thesis culminates with a series of recommendations for schools, including teachers, curriculum leaders, school food providers and parents/guardians to help adolescents to increase their food literacy and healthy dietary behaviours in order to reduce the prevalence of non-communicable diseases such as overweight and obesity in adulthood. Further research is recommended in six key areas.

**Keywords:** food literacy, adolescent, dietary behaviours, high school, home economics, public health

## **Statement of Originality**

This thesis describes original research conducted by Rimante Ronto in the School of Medicine at Griffith University. This work has not previously been submitted for a degree or diploma in any university. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made in the thesis itself.

Rimante Ronto

1<sup>st</sup> December, 2016

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## List of Acronyms and Symbols

ABS	Australian Bureau of Statistics
ADA	American Diabetes Association
AGHE	Australian Guide to Healthy Eating
ANGELO	ANalysis Grid for Environments Linked to Obesity
BMI	Body Mass Index
DGAA	Dietary Guidelines for Australian Adults
FRESH	Focusing Resources on Effective School Health
HEIA	Home Economics Institute of Australia
HET	Home Economics Teacher
HEV	Home Economics Victoria
HPS	Health Promoting School
IFHE	International Federation for Home Economics
INFORMAS	International Network for Food and Obesity/NCDs Research, Monitoring and Action Support
KAB	Knowledge-Attitude-Behaviour
MDG	Millennium Development Goals
NCD	Non-Communicable Disease
NHSC	National Healthy School Canteen
NSLP	National School Lunch Program
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RQ	Research Question
SCT	Social Cognitive Theory
SPSS	Statistical Package for the Social Sciences
WHO	World Health Organization

## **Publications, Presentations and Awards in Support of this Thesis**

The candidate has produced six publications from the research included in this thesis. The publications are co-authored with other researchers and include one systematic review of the literature and five original research papers. The contribution of the research candidate to each publication is outlined at the front of the relevant chapter. During the candidature, the research candidate has changed her family name; therefore some early publications and conference presentations appear with candidate's maiden name 'Vaitkeviciute'. The details of these publications are listed below.

### *Published journal articles:*

**Vaitkeviciute, R**, Ball, L, & Harris, N. (2015). The relationship between food literacy and dietary intake in adolescents: a systematic review. *Public Health Nutrition*, **18**(4), 649-658. DOI: 10.1017/S1368980014000962

**Ronto R**, Ball L, Pendergast D, Harris N. (2016). Food literacy at secondary schools in Australia. *Journal of School Health*, **86**(11), 823-831. DOI: 10.1111/josh.12440

**Ronto R**, Ball L, Pendergast D, Harris N. (2016). Environmental factors of food literacy in Australian high schools: views of home economics teachers. *International Journal of Consumer Studies*, **41**(1), 19-27. DOI: 10.1111/ijcs.12309

**Ronto R**, Ball L, Pendergast D, Harris N. (2016). The role of home economics teachers in enhancing adolescents' food literacy to develop healthy dietary behaviours. *Journal of the Home Economics Institute of Australia*, **23**(1), 11-19.

**Ronto R**, Ball L, Pendergast D, Harris N. (2016). Adolescents' perspectives on food literacy and its impact on their dietary behaviours. *Appetite*, **107**, 549-557. DOI:10.1016/j.appet.2016.09.006

**Ronto R**, Ball L, Pendergast D, Harris N. (2017). What is the status of food literacy in Australian high schools? Perceptions of home economics teachers. *Appetite*, **108**, 326-334. DOI: 10.1016/j.appet.2016.10.024

The research candidate has produced eight conference presentations using the research within this thesis. The research was presented at two international and six local conferences. The details of the presentations are listed in order of recency:

**Ronto R**, Ball L, Pendergast D, Harris N. The status of food literacy in Australian high schools (Oral). National Home Economics Institute of Australia Conference, Melbourne, January, 2017.

**Ronto R**, Ball L, Pendergast D, Harris N. Food literacy as a strategy to decrease unhealthy dietary behaviours among adolescents (Poster). Australian and New Zealand Obesity Society (ANZOS) Conference, Brisbane, October, 2016.

**Ronto R**, Ball L, Pendergast D, Harris N. Food literacy education at secondary schools in Australia (Oral). Nutrition Higher Degree Research (HDR) Summit, Brisbane, Australia, December, 2015.

**Ronto R**, Ball L, Pendergast D, Harris N. Environmental determinants of food literacy at secondary schools in Australia: views of home economics teachers (Poster). 11<sup>th</sup> Annual Gold Coast Health and Medical Research Conference, Gold Coast, Australia, December, 2015.

**Ronto R**, Ball L, Pendergast D, Harris N. Food literacy education at secondary schools in Australia (Oral). Fifth International Conference on Food Studies, Blacksburg, Virginia, USA, September, 2015.

**Ronto R**, Ball L, Pendergast D, Harris N. Challenges in teaching food literacy at secondary schools in Australia (Oral). Health and Physical Education Research Conference, Brisbane, Australia, June, 2015.

**Vaitkeviciute R**, Ball L, Harris N. Is there a relationship between food literacy and adolescents' dietary intake? (Poster). 10<sup>th</sup> Annual Gold Coast Health and Medical Research Conference, Gold Coast, Australia, December, 2014.

**Vaitkeviciute R**, Ball L, Harris N. Does food literacy influence adolescents' dietary intake? (Oral). New Zealand Population Health Congress (NZPHC), Auckland, New Zealand, October, 2014.

**Vaitkeviciute R**, Ball L, Harris N. The relationship between food literacy and dietary intake in adolescents: a systematic review (Poster). 9<sup>th</sup> Annual Gold Coast Health and Medical Research Conference, Gold Coast, Australia, December, 2013.

The candidate received one award, three scholarships and three grants during her candidature. The details of the award, scholarships and grants are listed in order of recency:

- 2016 Griffith University Completion Assistance Postgraduate Research Scholarship (AU\$6000)
- 2015 Griffith University Travel Grant (AU\$1500)
- 2014 PhD Publication Incentive Scheme (AU\$500)
- 2014 PhD Researcher Grant Scheme (AU\$2500)
- 2014 Highly Commended PhD presentation post-confirmation category, Higher Degree Research Seminar Series (AU\$100)
- 2013 Griffith University International Postgraduate Research Scholarship (GUIPRS)
- 2013 Griffith University Postgraduate Research Scholarship (GUPRS)



# Chapter 1 Introduction

## 1.1 Introduction to the problem

There are 1.8 billion adolescents worldwide, collectively representing a quarter of the world's population (Sawyer et al., 2012). The period of adolescence is characterised by rapid biological, psychological and emotional growth (da Rocha Leal, de Oliveira, & Pereira, 2011; McKinley et al., 2005; Sawyer et al., 2012). This stage of life plays an important role in developing healthy lifestyle habits because those habits are likely to continue in adulthood (Sawyer et al., 2012; Viner et al., 2012; World Health Organization [WHO], 2014b). All modifiable risk factors for non-communicable diseases (NCDs), including an unhealthy diet, tobacco and alcohol use and lack of physical activity have their origins in adolescence (Lancet, 2012; WHO, 2014b). WHO has urged countries to strengthen their national response regarding adolescent health by recognising it as essential for public health in order to reduce the prevalence of NCDs in adulthood (WHO, 2014b).

Adolescence is a stage of life characterised by shifting dietary habits, underpinned by changing nutritional needs and wants, including increased protein, vitamins, minerals and energy consumption (da Rocha Leal et al., 2011; Lytle, Kotz, Piper, Williams, & Kalina, 1997). During this period, most adolescents can express their independence by choosing how they fulfil these heightened nutritional needs and wants (McKinley et al., 2005). Currently, dietary behaviours of adolescents in Western countries are described as being poor, with low intakes of fruit and vegetables and high intakes of sweetened beverages and convenience foods (Diethelm et al., 2012; Nicklas, Baranowski, Cullen, & Berenson, 2001; Scully et al., 2007). More specifically, dietary behaviours of adolescents generally do not align with national dietary guidelines (Brady, Lindquist, Herd, & Goran, 2000; Olds et al., 2007; Scully et al., 2007). These unhealthy dietary behaviours are concerning as they place adolescents at greater risk of developing NCDs in adulthood, including overweight and obesity (Woodruff & Kirby, 2013).

The high prevalence of overweight and obesity is a major public health challenge of the 21<sup>st</sup> century (WHO, 2014a). The number of overweight and obese individuals is rapidly growing in developed and developing countries worldwide. Specifically, approximately 2 billion adults and 170 million children are estimated to be overweight

(International Food Policy Research Institute, 2016; WHO, 2012). In Australia, one in four children are overweight, with a trend heading towards one in three (Australian Bureau of Statistics [ABS], 2015b). Attempts to reduce the prevalence of overweight and obesity in adolescents have resulted in minimal to modest outcomes (Crowle & Turner, 2010; Kalra et al., 2012; Summerbell et al., 2005). The WHO has identified school as an important setting in providing food and nutrition education and promoting healthy dietary behaviours to adolescents (WHO, 2014b).

Adolescents spend a substantial amount of time at school. This offers an opportunity to promote healthy dietary behaviours to adolescents through holistic and comprehensive food and nutrition education and by providing healthy school food environments. The WHO recognises that a comprehensive food and nutrition education curricula can reduce unhealthy dietary behaviours in adolescents (WHO, 1996). Most school-based interventions have been successful in increasing the nutrition-related knowledge of students, but generally do not result in improved dietary behaviours (Micucci, Thomas, & Vohra, 2002). These results are thought to be explained by a failure of previous interventions have failed to connect food and nutrition knowledge with food skills, and critical decision making about dietary behaviours (Lichtenstein & Ludwig, 2010). Collectively, these concepts are called “food literacy” and have been recognised as a key factor in improving the outcomes of future interventions (Colatruglio & Slater, 2014; Pendergast et al., 2011).

Food literacy is a relatively new and emerging concept (Pendergast et al., 2011; Worsley, 2015). Vidgen and Gallegos (2014) have described food literacy as “*the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake*” (page 54). Put simply, food literacy consists of food and nutrition knowledge, skills and capacity which are collectively required to make informed food choices and improve dietary behaviours (Hawkes et al., 2015; Vidgen & Gallegos, 2014). Some studies have demonstrated positive associations between food literacy and healthy dietary behaviours such as increased consumption of fruit and vegetables (Burrows, Lucas, Morgan, Bray, & Collins, 2015; Utter, Denny, Lucassen, & Dyson, 2016), preference for healthy food (Hersch, Perdue, Ambroz, & Boucher, 2014), and decreased frequency of consumption of prepacked or processed food (Contento, Koch, Lee, & Calabrese-Barton, 2010; Robson,

Stough, & Stark, 2016). This evidence suggests that focusing on food literacy is a promising approach to facilitate healthy dietary behaviours of adolescents and warrants further investigation (Colatruglio & Slater, 2014; Pendergast et al., 2011).

In most high schools, the subject with the most focus on increasing adolescents' food literacy is the area of home economics. This subject focuses on individual and family wellbeing in their day-to-day living by enhancing students' capacity to eat well and by supporting healthy food and nutrition knowledge and food skills (Pendergast & Dewhurst, 2012; Smith, 2009). Although, food literacy is increasingly recognised as important (Lichtenstein & Ludwig, 2010), very little is known about how adolescents become food literate. The school curriculum could play a vital role in enhancing adolescents' food literacy, particularly given the contemporary decline in food and nutrition knowledge and food skills in the home environment (Brooks & Begley, 2014). However, the lack of high-quality evidence creates a challenge in clarifying the strength and nature of the association between food literacy and dietary behaviours among adolescents. Therefore, the aim of this research program is to explore the role of food literacy in shaping adolescents' dietary behaviours in order to inform the development of future interventions that facilitate healthy dietary behaviours of adolescents.

## **1.2 Research questions and the conceptual framework**

### **1.2.1 Research aim and questions**

The overall aim of this thesis is to explore the role of food literacy in shaping adolescents' dietary behaviours in Australian high schools. This thesis incorporates five research questions that aim to meet the overall aim of the thesis. The five research questions are as follows:

**RQ1:** *What is the current evidence of the relationship between food literacy and adolescents' dietary behaviours?*

**RQ2:** *Where and how is food literacy taught in Australian high schools?*

**RQ3:** *What are the facilitators and barriers that impact food literacy education and adolescents' dietary behaviours in Australian high schools?*

**RQ4:** *What is the role of home economics teachers (HETs) in enhancing adolescents' food literacy and healthy dietary behaviours?*

**RQ5:** *What is adolescents' understanding of food literacy and its impact on their dietary behaviours?*

This thesis employed a mixed methods approach over a series of four studies to answer these five research questions as outlined in Table 1.1.

**Table 1.1** Four studies included in the thesis, including objectives, research questions and data collection methods

<b>Study</b>	<b>Objective(s)</b>	<b>Research Questions</b>	<b>Methods</b>
Study 1	To investigate the relationship between food literacy and adolescents' dietary intake	RQ1	<i>Data collection:</i> a systematic review of the literature (n=13 studies)  <i>Data analysis:</i> critical appraisal
Study 2	a) To examine HETs' perspectives regarding food literacy education in Australian high schools	RQ2	<i>Data collection:</i> a cross-sectional survey with HETs (n=205 for quantitative and n=78 for qualitative components)  <i>Data analysis:</i> descriptive statistics, chi-square and content analysis
	b) To gain a better understanding of the environmental factors impacting adolescents' food literacy in the high school setting	RQ3	
Study 3	a) To explore HETs' understanding of food literacy and their role in enhancing adolescents' food literacy and healthy dietary behaviours	RQ4	<i>Data collection:</i> semi-structured interviews with HETs (n=22)  <i>Data analysis:</i> thematic analysis
	b) To explore HETs' perceptions on the role of high schools in enhancing adolescents' food literacy and healthy dietary behaviours	RQ3	
Study 4	To explore adolescents' perspectives on the importance of various aspects of food literacy and its impact on their dietary behaviours	RQ5	<i>Data collection:</i> focus groups with adolescents (n=15 focus groups with 131 adolescents)  <i>Data analysis:</i> content analysis

Study 1 was a systematic review of the literature which aimed to clarify the relationship between food literacy and adolescents' dietary behaviours. Thirteen studies met the inclusion criteria and were critically appraised. This study was prepared in the format of a manuscript (*Manuscript 1*) and is presented in Chapter 4.

Study 2 used a cross-sectional design that comprised both quantitative and qualitative components. The quantitative component investigated HETs' perspectives regarding the importance of various aspects of food literacy and their food literacy attitudes and self-efficacy, and assessed the school food environment. This study was prepared in the format of a manuscript (*Manuscript 2*) and is described in Chapter 5. The qualitative component of the survey explored HETs' views on food literacy education in Australian high schools by providing a free-text answer in the response box provided in the survey. This study was prepared in the format of a manuscript (*Manuscript 3*) and is presented in Chapter 6.

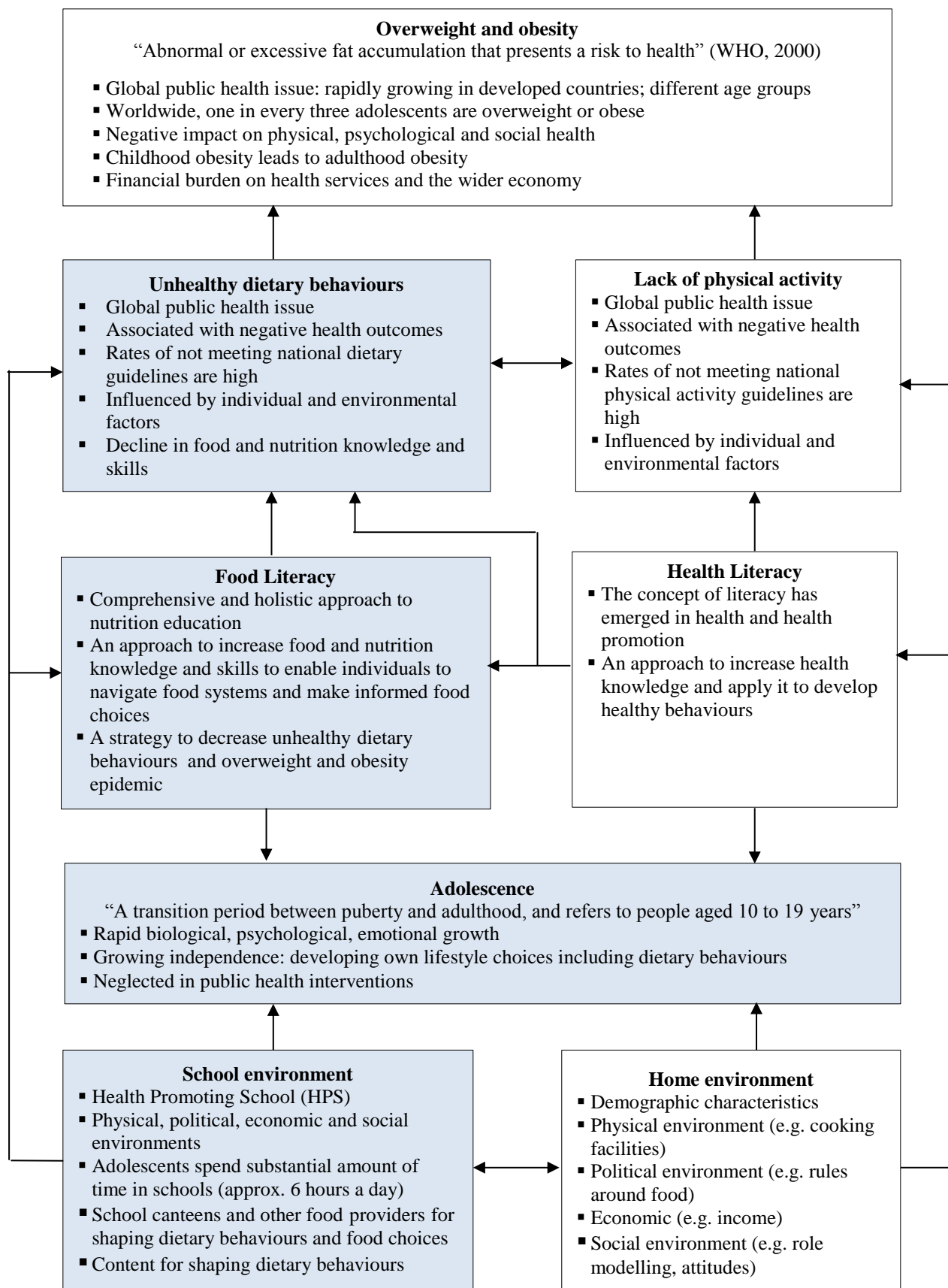
Study 3 was a qualitative study with 22 HETs who participated in semi-structured interviews. This study had two aims: (i) to explore HETs' role in enhancing adolescents' food literacy levels, and (ii) to explore the role of Australian high schools in enhancing adolescents' food literacy. The findings of this study were prepared in the format of two manuscripts (*Manuscripts 4 and 5*) and are presented in Chapter 7 and Chapter 8 respectively.

Study 4 was a qualitative study that involved 15 focus groups with adolescents. This study aimed to explore adolescents' understanding and importance placed on various aspects of food literacy, including the perceived impact it has on their dietary behaviours. The findings of this study are presented in the form of a manuscript (*Manuscript 6*) and are presented in Chapter 9.

### **1.2.2 The conceptual framework**

The candidate used contemporary peer-reviewed and grey literature to construct the conceptual framework that underpins this research project (Figure 1.1). The framework provides an overview of the candidate's understanding of the pathways and factors shaping overweight and obesity. It identifies the scope of this thesis (blue shaded area), specifically the impact of food literacy and school environments on adolescents' dietary behaviours.

The candidate acknowledges that overweight and obesity is mainly influenced by unhealthy dietary behaviours and a lack of physical activity. The framework identifies the population under investigation (adolescents) and the importance of this stage of life in the development of dietary behaviours. Furthermore, the framework demonstrates how adolescents' dietary behaviours can be influenced by individual factors, such as food and nutrition knowledge and skills, as well as by environmental factors, such as school and home environments. The substantial amount of time adolescents spend in schools affords them opportunities to receive food and nutrition education to increase their food literacy. A healthy school food environment can then support adolescents to implement their food literacy and practice healthy dietary behaviours.



**Figure 1.1** Thesis conceptualisation: Food literacy, adolescents and diet

### **1.3 Significance of the research**

Food literacy is gaining considerable interest from researchers and public health professionals as a factor that shapes adolescents' dietary behaviours and a potential strategy to facilitate healthy dietary behaviours in order to decrease the prevalence of NCDs, including overweight and obesity (Colatruglio & Slater, 2014; Lichtenstein & Ludwig, 2010). However, the lack of high quality research on the relationship between food literacy and adolescents' dietary behaviours prevents the benefits of this concept from being fully realised. This thesis seeks to address this gap by employing mixed methods approach and by contributing to the body of knowledge of food literacy and its impact on adolescents' dietary behaviours, especially in the context of Australian high school curricula.

This research identifies barriers and enablers of food literacy education in Australian high schools. Therefore, the findings can be used to inform high school curriculum leaders, teachers, school food providers and parents about the factors that impact adolescents' food literacy levels and subsequent dietary behaviours. In addition, this research can help educate parents about how they can support food literacy in the home environment in order to help their adolescent children make informed food choices.

### **1.4 Thesis orientation and outline of chapters**

The thesis structure is outlined in Figure 1.2. Following an introduction and literature review, the thesis is structured as a series of published papers and manuscripts in press. All manuscripts have been published or accepted in international peer-reviewed journals. Each manuscript has been written in the style of the journal, including reference style and spelling.



<b>Chapter 1 Introduction</b>
Overview of research, conceptual framework, research aim and questions
<b>Chapter 2 Literature Review</b>
Adolescence, dietary behaviours of adolescents, overweight and obesity, food and nutrition education, school food environment, food literacy
<b>Chapter 3 Methodology</b>
Research approach, paradigms, methods
<b>Chapter 4 Food Literacy and Adolescents' Dietary Behaviours</b>
Vaitkeviciute, R, Ball, L, & Harris, N (2015) The relationship between food literacy and dietary intake in adolescents: a systematic review. <i>Public Health Nutrition</i> , 18(4), 649-658.
<b>Chapter 5 Food Literacy Education and High Schools' Food Environment</b>
Ronto R, Ball L, Pendergast D, Harris N (2016) Food literacy at secondary schools in Australia. <i>Journal of School Health</i> , 86(11), 823-831.
<b>Chapter 6 Environmental Factors of Food Literacy Education</b>
Ronto R, Ball L, Pendergast D, Harris N. (In Press) Environmental factors of food literacy at secondary schools in Australia: views of home economics teachers. <i>International Journal of Consumer Studies</i> , 41(1), 19-27.
<b>Chapter 7 The Role of HETs in Food Literacy Education</b>
Ronto R, Ball L, Pendergast D, Harris N. (2016). The role of home economics teachers in enhancing adolescents' food literacy to underpin healthy dietary behaviours. <i>Journal of the Home Economics Institute of Australia</i> , 23(1), 11-19.
<b>Chapter 8 The Status of Food Literacy Education in High Schools</b>
Ronto R, Ball L, Pendergast D, Harris N. (2017). What is the status of food literacy in Australian high schools? Perceptions of Home Economics teachers. <i>Appetite</i> , 108, 326-334.
<b>Chapter 9 Adolescents' Perspectives on Food Literacy</b>
Ronto R, Ball L, Pendergast D, Harris N. (2016) Adolescents' perspectives on food literacy and its impact on their dietary behaviours. <i>Appetite</i> , 107, 549-557.
<b>Chapter 10 Discussion and Conclusion</b>
Integration of findings to address research questions, contributions of the research, future research directions, recommendations

**Figure 1.2** Overview of the thesis structure

Chapter 1 has introduced the thesis with an outline of the research aim, research questions, the conceptual framework and the significance of the research. Chapter 2 presents a synthesis of the current literature on relevant topics including adolescents' health and dietary behaviours, dietary-related conditions, such as overweight and obesity, the importance of high schools in providing food and nutrition education to adolescents and finally, food literacy as a strategy to facilitate healthy dietary behaviours. Chapter 3 outlines the methodology and methods of this research to address the five research questions. It provides information on the research paradigm, research design and briefly

outlines each study including data collection and analysis methods in order to set the scene for the following chapters. Chapter 4 presents findings of Study 1, a systematic review of the literature. Chapter 5 and Chapter 6 present findings from the cross-sectional survey with HETs. Chapter 7 and Chapter 8 present findings from a qualitative study with HETs which used semi-structured interviews. Chapter 9 describes findings from a qualitative study involving fifteen focus groups with adolescents. Finally, Chapter 10 discusses the findings as a body of work and explores the research implications and recommendations for changes to practice, policy and future research.

## **Chapter 2 Literature Review**

### **2.1 Introduction**

The purpose of this literature review is to gain a better understanding of food literacy and its role in shaping adolescents' dietary behaviours. The first section of the literature review broadly discusses issues related to dietary behaviours. The focus of this discussion then narrows to the population under investigation for this thesis to examine why adolescence as a critical period for overall health and wellbeing. The second section of the review emphasises the importance of the Australian high school setting for health and explains the role of Australian high schools in providing food and nutrition education, equipping adolescents with food related knowledge and skills, and supporting adolescents' dietary behaviours via the school food environment. The third section describes the origins of the concept of food literacy, including current definitions, and outlines the conceptualisation of food literacy. The last section investigates the relationship between food literacy and adolescents' dietary behaviours.

This review includes peer-reviewed journal articles that were identified through bibliographic databases, including Medline (EBSCO Host), Cochrane library, PsycINFO, Web of Science, PubMed and Scopus. A combination of search terms were used, including *obesity, overweight, food literacy, nutrition literacy, nutrition, food, diet, nutrition knowledge, food knowledge, cooking knowledge, food preparation knowledge, food skills, cooking skills, food preparation, food purchasing, food selection, food labels, label reading, adolescent, youth, teenager, teens*. These databases afford broad coverage of allied health including nutrition and public health literature. To complement this search strategy, reference lists and forward citation were cross-matched. Grey literature was sourced when appropriate to provide more comprehensive evidence relevant to the current investigation. References include peer-reviewed journal articles, books, government documents and webpages of professional organisations.

### **2.2 Adolescent Health**

#### **2.2.1 Dietary behaviours**

Unhealthy dietary behaviours are one of the key risk factors of NCDs, which were responsible for 38 million deaths worldwide in 2012 (WHO, 2014a). The development of

overweight and obesity, coronary heart disease, stroke, cancer and type 2 diabetes are influenced by a dietary intake that is rich in sugars, fat (especially saturated fat), and low in fruits and vegetables (Dhir & Ryan, 2010). Dietary behaviours are highly complex, difficult to characterise and influenced by individual and environmental factors, such as demographic characteristics, lifestyle, socioeconomic conditions and social-psychological characteristics (Johnson-Askew, Fisher, & Yaroch, 2009). Additionally, food choices are affected by household characteristics, such as financial resources, available transportation, storage and kitchen equipment and facilities (Hartmann, Dohle, & Siegrist, 2013).

Preventing chronic conditions that are influenced by dietary behaviours is important. Accordingly, many countries have developed and implemented national dietary guidelines for children and adults for improving overall wellbeing and as a primary prevention strategy of chronic diseases. For example, the Australian Guide to Healthy Eating (AGHE) encourages the consumption of a variety of foods from five food groups namely bread and cereals, lean meat and substitutes, vegetables, fruits, and dairy foods (Kellett, Smith, & Schmerlaib, 1998; National Health and Medical Research Council, 2013). Foods from those groups are considered essential for a balanced diet (Kellett et al., 1998). Australians who more closely follow the Dietary Guidelines for Australian Adults (DGAA) (National Health and Medical Research Council, 2013) have been shown to have significantly lower all-cause mortality risk (Russell et al., 2013). However, a large proportion of Australian adults are not meeting these dietary guidelines (ABS, 2014; Ball, Mishra, Thane, & Hodge, 2004).

Contemporary lifestyles, dual incomes, advances in food preparation and storage, and convenient retail food outlets encourage individuals to consume convenience foods from restaurants, cafes or take away outlets (Lai-Yeung, 2007). Caraher and Seeley (2010) stated that daily consumption of convenience and ready-prepared foods are rapidly becoming the norm. Eating away from home is becoming more popular than eating meals prepared at home, caused by increased acceptance of fast food outlets, home delivery of restaurant food and pre-packed foods at supermarkets (Lai-Yeung, 2010). Popkin and colleagues (2012) described it as a global nutrition transition. In the UK, the amount of money spent on eating out was found to be greater than that spent on meals inside the home (Caraher & Seeley, 2010). Similarly, a survey in Hong Kong showed that people have increased their visits to fast food outlets and 25% of those who ate dinner in fast food outlets were accompanied by children (Lai-Yeung, 2007). Of particular concern is

that consumption of convenience foods has been found to be associated with poorer diet quality and increased rates of overweight and obesity in adolescents and adults (Kramer et al., 2012; van der Horst, Brunner, & Siegrist, 2011). Convenience foods are often low in fibre and vitamins, high in saturated fat, sugar and salt (Condrasky, Corr, Sharp, Hegler, & Warmin, 2010; Guthrie, Derby, & Levy, 1999; Lai-Yeung, 2007). Despite their low nutritional value, these foods are among the lowest-cost sources of dietary energy (Engler-Stringer, 2010). Reliance on convenience foods in place of more nutritious home cooked foods represents a major concern for health promotion and public health nutrition professionals (Engler-Stringer, 2010).

### **2.2.2 Adolescence**

According to the WHO (2003a), adolescence is a transition period between puberty and adulthood, and refers to people aged 10 to 19 years). There are 1.8 billion adolescents worldwide, comprising a quarter of the world's population (Sawyer et al., 2012). In 2015, there were 2.8 million (13% of total population) adolescents living in Australia (ABS, 2015a). Adolescence is characterised by rapid biological, psychological, emotional growth, transformation and is a time of particular vulnerability to social and peer pressure (da Rocha Leal et al., 2011; McKinley et al., 2005; Sawyer et al., 2012). It is also recognised that adolescence leads to the development of new behaviours that could influence overall health and wellbeing (Viner et al., 2012).

### **2.2.3 The importance of adolescent health**

Successful public health interventions have reduced infectious diseases, malnutrition and mortality of young children and increased life expectancy of children and adolescents (Sawyer et al., 2012). However, many countries have reported an epidemiological transition from infectious to chronic conditions (Omran, 2005) which are now prevalent in the adolescent population. There has been a shift in adolescents' health issues, with an increased prevalence of risk factors that contribute to the epidemic of non-communicable diseases (NCDs) in adults (Beaglehole et al., 2011; Sawyer et al., 2012). It is recognised that common risk factors, namely an unhealthy diet, tobacco and alcohol use, and lack of physical activity, are associated with NCDs and all these risk factors have their origins in adolescence (Lancet, 2012; WHO, 2014b).

Adolescence is a crucial stage of life for developing healthy lifestyle habits as these habits and behaviours most often continue into adulthood (Sawyer et al., 2012; Viner et al., 2012; WHO, 2014b). Currently, nearly 70% of premature adult deaths reflect behaviours that start during adolescence (Resnick, Catalano, Sawyer, Viner, & Patton, 2012). Lifestyle behaviours developed during adolescence could also have an impact on physical and cognitive development (WHO, 2014b). Therefore, adolescence is a critical phase of life to build the foundations of good health and establish healthy lifestyle behaviours, which consequently lead to healthy adulthood (Lancet, 2012; WHO, 2014b). However, the WHO has stated that adolescence has been largely neglected in public health interventions compared to other age groups due to the perceptions that adolescents are generally healthy (Patton et al., 2012) and typically require more complex interventions than in other age groups (Dick & Ferguson, 2015; WHO, 2014b).

The WHO (2014a) has urged countries to strengthen their national response regarding adolescent health and recognise that it is an essential period for improving overall population health. Globally, adolescence is increasingly seen as an important focus for global health policy and is explicitly identified in the Millennium Development Goals (MDG) (Sawyer et al., 2012; United Nations, 2010). It has been recognised that in order to achieve the MDGs associated with maternal health and child mortality it is important to focus on adolescent health (Sawyer et al., 2012). In addition, MDGs are important in order to reduce the prevalence of NCDs, as two of three deaths worldwide every year are attributable to NCDs (WHO, 2008). The association between adolescent and adult health suggests that investments in adolescent health have enormous implications for economic productivity, effective social functioning and overall population health (Resnick et al., 2012).

#### **2.2.4 Dietary behaviours of adolescents**

Adolescence is a stage of life characterised by different nutritional needs, wants and consumption habits (da Rocha Leal et al., 2011). During this life stage, most adolescents express their independence through many choices, including their dietary behaviours (McKinley et al., 2005). Adolescents begin to develop their own dietary behaviours as they increasingly decide what, where and when to eat (da Rocha Leal et al., 2011; McKinley et al., 2005). Adolescents' food choices are influenced by many factors, such as food and nutrition knowledge, physiological needs, food preferences, parental practices, peer pressure, media messages, social norms, fast food outlets, and personal

experiences with food (Bell, Simmons, Sanigorski, Kremer, & Swinburn, 2008). Poor dietary habits during adolescence may affect wellbeing and performance, growth and development, and increase the likelihood of developing diet-related health issues, especially overweight and obesity (Bell et al., 2008).

Poor dietary intake among adolescents is concerning for health practitioners and researchers (Woodruff & Kirby, 2013). The dietary behaviours of adolescents in Western countries have been frequently described as poor, with low consumption of dairy, fruits, vegetables, grains and high consumption of soft drinks, sweets and convenience foods (Diethelm et al., 2012). More specifically, the dietary intake of adolescents does not meet national dietary guidelines (Brady et al., 2000; Scully et al., 2007). Typically, adolescents eat half the recommended amount of fruit and vegetables and consume much more fat and sugar than recommended (Diethelm et al., 2012). Similar trends have been observed in Australia, with two-thirds of adolescents failing to consume foods daily from the five recommended food groups, a third of the adolescents reporting that they do not eat fruits and vegetables daily, and 22% reporting that they eat convenience foods every day (ABS, 2014, 2015b; Savige, Ball, Worsley, & Crawford, 2007).

Developing healthy dietary behaviours during adolescence offers an important opportunity to establish lifelong healthy dietary habits and should be viewed as an investment in future health and quality of life (Sawyer et al., 2012). There have been successes in reducing unhealthy lifestyle behaviours in adolescents, such as the increased use of condoms to prevent sexually transmitted diseases, and reduced cigarette smoking. However, limited improvements have been recorded in dietary behaviours of adolescents (Dick & Ferguson, 2015). Findings from the Australian study “*Healthy Kids Queensland*” showed that the nutritional quality of diets tend to decrease with increasing age (Abbott et al., 2007). Therefore, adolescence is an important stage in life for developing healthy dietary behaviours, which will influence long-term health (da Rocha Leal et al., 2011) and reduce the risk of developing of overweight and obesity and other diet-related health issues in adulthood (Sawyer et al., 2012).

### **2.2.5 Overweight and obesity in adolescence**

Overweight and obesity are defined as “abnormal or excessive fat accumulation that presents a risk to health” (WHO, 2000). More specifically, overweight is commonly defined as having a Body Mass Index (BMI)  $\geq 25$  kg/m<sup>2</sup> and obesity defined as BMI  $\geq 30$

kg/m<sup>2</sup>. Worldwide, approximately 170 million children are estimated to be overweight (WHO, 2012). This means that potentially one in every three adolescents are obese (Dick & Ferguson, 2015). In Australia, one in four children is overweight with a trend heading towards one in three (ABS, 2015b).

The prevalence of overweight and obesity among adolescents is increasing in both developed and developing countries, but at different rates and patterns (Jackson-Leach & Lobstein, 2006). In more economically developed countries, the prevalence of overweight and obesity are high in lower socio-economic groups (Jackson-Leach & Lobstein, 2006; Patton et al., 2012; Wang & Lobstein, 2006; WHO, 2000). Conversely, in countries that are less economically developed, overweight and obesity rates of adolescents are highest among families with the highest income or education levels (Jackson-Leach & Lobstein, 2006). In addition, overweight and obesity rates of adolescents are higher in urban areas compared to rural areas in these developing countries (Dhir & Ryan, 2010).

Adolescents may suffer from medical conditions caused by overweight or obesity because they are at greater risk of metabolic, endocrine, respiratory, cardiovascular, skeletal and hepatic complications (Dhir & Ryan, 2010). Obesity in adolescence is associated with a very high risk of obesity in adulthood. One study found that 70% of overweight adolescents have one or more risk factors for cardiovascular disease, while 23% had three or more risk factors (Sawyer et al., 2012). The American Diabetes Association (ADA) indicates that up to 85% of children diagnosed with type 2 diabetes are overweight or obese at diagnosis (Jackson-Leach & Lobstein, 2006). It is predicted that if childhood overweight and obesity rates keep increasing, children may experience shorter lifespans than their parents (Lee et al., 2010; Warschburger, 2005). Furthermore, overweight and obese children and adolescents also face psychosocial consequences of obesity (Jackson-Leach & Lobstein, 2006; Kalra et al., 2012). It has been found that many overweight or obese children are not happy about their body shape which puts them at higher risk of low self-esteem, low self-worth, psychological stress, anxiety and depression (Kalra et al., 2012; Warschburger, 2005). In addition, overweight and obese children are more likely to be subjected to victimisation, school bullying, social marginalisation and poor academic performance (Jackson-Leach & Lobstein, 2006; Kalra et al., 2012; Warschburger, 2005). Therefore, strategies that contribute to decreasing the prevalence of overweight and obesity will have wide-ranging impacts on the lives of adolescents.



Overweight and obesity in adolescence is influenced by behavioural factors, such as dietary intake and physical activity (Dhir & Ryan, 2010). Behavioural factors could, in turn, be influenced by an adolescent's environment, such as socioeconomic deprivation or family composition (e.g. single parent family) (Dhir & Ryan, 2010). A longitudinal study showed that children who were overweight before the age 8 years are at significantly increased risk of obesity in adulthood (Jackson-Leach & Lobstein, 2006). Furthermore, a systematic review of the literature found that childhood obesity was associated with adult disease outcomes such as diabetes, hypertension, stroke, coronary heart disease, asthma, cancers and all-cause mortality (Park, Falconer, Viner, & Kinra, 2012). These findings support the claim that adolescent dietary lifestyle behaviours shape health outcomes into adulthood.

Health issues associated with overweight and obesity are not just a burden on individuals and families but also place a financial burden on health services and the wider economy (Dee et al., 2014). A systematic review conducted by Dee and colleagues (2014) found that higher BMI was associated with higher direct and indirect healthcare costs due to reduced productivity and early premature mortality. Direct costs included hospitalisation, inpatient and outpatient treatment, and drug costs. Indirect costs consisted of morbidity due to long and short-term disability, sickness absence, early retirement, work absenteeism and lost productivity due to increased mortality (Dee et al., 2014). In Australia, the total annual direct cost of overweight and obesity was \$21 billion in 2005, while indirect costs were estimated at \$35.6 billion per year, which resulted in an overall total cost of \$56.6 billion (Colagiuri et al., 2010). Therefore, it is important to take action to reduce the prevalence of overweight and obesity and the financial burden on individuals, families and the Australian population.

### **2.2.6 Factors influencing adolescents' dietary behaviours**

Adolescents' dietary behaviours are influenced by many factors that could protect or undermine their health. These could be broadly classified into individual and environmental factors. Behavioural theories and conceptual frameworks provide the basis of understanding dietary behaviours of adolescents. Social cognitive theory (SCT) and social ecological models have been the most commonly used to explain dietary behaviours (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003). The SCT explains behaviour as a reciprocal interaction between personal factors, environmental influences, and behaviour and includes concepts, such as behavioural capabilities

(knowledge and skills required to perform a behaviour), self-efficacy (confidence to perform a specific behaviour), observational learning (learning how to do a behaviour by watching someone do it), expectations, functional meanings, and reinforcement (Baranowski et al., 2003; Story, Neumark-Sztainer, & French, 2002). Neumark-Sztainer and colleagues (1999) investigated factors influencing food choices of adolescents with their findings supporting a number of factors described in the SCT. This research included personal factors (taste, food preferences, body image); socioenvironmental factors (parent influence, food availability); and behavioural factors (meal patterns, vegetarian lifestyle) (Neumark-Sztainer et al., 1999).

Social ecological models recognise the two-directional interactions between people and their environments. Bronfenbrenner's ecological model divides environmental factors into four interactive levels: micro-, meso-, exo- and macrosystems (Bronfenbrenner, 1979). Broadly, the microsystem refers to the most proximal contexts in which a person is participating directly, such as family, peers, and teachers. The mesosystem refers to the interaction of few microsystems in which a person is involved. The exosystem refers to contexts within larger social systems that a person is not directly involved with but that could affect him or her, such as media and community influences. The most distal system is the macrosystem and it incorporates cultural contexts, such as cultural values, laws, and customs of a particular society (Bronfenbrenner, 1979; Story et al., 2002). Environments that affect dietary behaviours could be multilevel, multi-structural, multifactorial and multi-institutional in nature and also interrelate with each other (Baranowski et al., 2003). In order to change environments, procedures such as legislation and policy changes could be put in place, for example making only healthy food choices available in school canteens (Baranowski et al., 2003). Social ecological models are often used in obesity prevention strategies for improving food environments which consequently would lead to healthy dietary behaviours (Swinburn, Egger, & Raza, 1999; Van Der Horst et al., 2007).

The food environment is described as *“the collective physical, economic, policy, and sociocultural surroundings, opportunities, and conditions that affect people's food and beverage choices and nutritional status”* (Swinburn et al., 2015, page 1). Swinburn (1999) developed a conceptual framework named ANGELO (ANalysis Grid for Environments Linked to Obesity), which enables the identification of obesogenic factors in the environment. Although, food and physical activity are recognised as the main factors influencing obesity, physical activity will not be discussed in more detail as it is

not within the scope of this thesis. The ANGELO framework comprises two levels of environment (micro-environmental settings and macro-environmental sectors) and four types of environment (Swinburn et al., 1999). Micro-environmental settings refer to places where groups of people gather for specific purposes that involve food, for example schools, homes and workplaces. Macro-environment sectors refer to groups of industries, services or supporting infrastructure, for example media, technologies, food manufacturing and marketing (Swinburn et al., 1999). Table 2.1 summarises these four types of environments. This framework is suitable for identifying barriers and enablers in specific settings and/or sectors, for example schools, fast food outlets or identifying priority setting/actions (Simmons et al., 2009; Swinburn et al., 1999).

**Table 2.1** Four types of environment within the ANGELO framework.

<b>Type of environment</b>	<b>Meaning</b>	<b>Example</b>
<b>Physical</b>	<i>What is available?</i> (Tangible and less tangible factors)	Food outlets, vending machines, supermarkets, restaurants, nutrition labels
<b>Economic</b>	<i>What are the financial factors?</i>	Cost of food production, monetary incentives, financial support for health promotion programs, healthy food prices
<b>Political</b>	<i>What are the rules?</i>	Laws, regulations, policy (formal and informal), institutional rules, school nutrition policy
<b>Sociocultural</b>	<i>What are the attitudes, beliefs, perceptions, values, practices?</i>	Social and cultural norms; “culture”, “ethos”, “climate” of school regarding food, role models

(Swinburn et al., 1999)

Story and colleagues (2002) developed a conceptual framework based on the SCT and the social ecological model to explain adolescents’ dietary behaviours. The authors stated that behaviour and environment are reciprocal systems, meaning that the influence occurs both ways (Story et al., 2002). This conceptual framework positioned factors that influence adolescents’ dietary behaviours into four broad levels of influence, which are outlined in Table 2.2.

**Table 2.2** Four levels of influence that has an impact on adolescents' dietary behaviours

<b>Levels of influence</b>	<b>Factors</b>	<b>Example</b>
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<b>1. Individual (intrapersonal)</b>	Psychosocial	Attitudes, beliefs, knowledge, self-efficacy, taste and food preferences
	Biological	Hunger, gender, age
	Behavioural/Lifestyle	Perceived barriers such as cost and time demands; convenience, meal patterns, dieting
<b>2. Social environmental (interpersonal)</b>	Family, friends, peer networks	Role-modelling, reinforcement, social support, perceived norms, family structure, family meals
<b>3. Physical environment (community settings)</b>	Accessibility and availability of foods	Schools, fast-food outlets, restaurants, shopping malls, vending machines, convenience stores
<b>4. Macrosystem (societal)</b>	Mass media, advertising, social and cultural norms, food production and distribution systems, local, state, and federal laws, policy	Media exposure and use, food advertising, norm, laws and policy of healthy foods

(Story et al., 2002)

The literature suggests that the SCT and socioecological models are the most effective in explaining and investigating dietary behaviours of adolescents because their dietary behaviours seem to be mostly influenced by individual and environmental factors. Therefore, the SCT and socioecological models informed the development of this program of research. In particular, this research investigated individual (intrapersonal), social environmental (interpersonal) and environmental factors that influence adolescents' food literacy and dietary behaviours. Furthermore, the ANGELO framework has been identified as a useful tool for identifying environmental factors within a particular setting. The ANGELO conceptual framework was used in this research to identify potential enablers and barriers of food literacy education and adolescents' dietary behaviours in high school settings. The use of the SCT, socioecological models and the ANGELO framework within this research project is described in more detail in Chapter 3, section 3.3.

It is important to note, that the International Network for Food and Obesity/NCDs Research, Monitoring and Action Support (INFORMAS) was formed which is a global network that aims to monitor, benchmark and support public and private sector actions to create healthy food environments and reduce obesity and NCDs (Swinburn et al., 2013). The network developed the INFORMAS framework based on the ANGELO framework

which aims to monitor not only the food environments but also policies and actions of public and private sector organisations related to food environments and obesity/NCD prevention, and monitoring population diet quality, risk factors and health outcomes (Swinburn et al., 2013). This is a comprehensive framework which will enable benchmarking of food environments between countries and will strengthen the accountability in order to reduce obesity and NCDs (Swinburn et al., 2013). The ANGELO framework was used for this program of research as it aimed to only identify the barriers and enablers of school food environments.

In summary, NCDs including overweight and obesity are becoming increasingly prevalent among children and adolescents worldwide. Many interrelated individual and environmental factors collectively influence dietary behaviours during adolescence, which is recognised as a critical developmental period that can continue to shape long-term health outcomes. By encouraging healthy dietary behaviours during adolescence, effective health promotion strategies may prevent and manage the development of overweight and obesity and enhance overall health and wellbeing in this population. The next section discusses the important role high schools play in promoting healthy dietary behaviours and the influence of food and nutrition education and healthy school food environments on adolescents' dietary behaviours.

## **2.3 Food and nutrition education and the school food environment**

### **2.3.1 High school settings**

Schools are an influential setting and can play an important role in protecting adolescents from a range of health-compromising behaviours (Hawkes et al., 2015; WHO, 2014b). School curricula, such as food and nutrition education, school canteens and other food providers, and school staff could influence students' dietary behaviours (Ritchie, 2001). Adolescents spend a substantial amount of time in schools. In Australia, it is expected that students will receive 10,700 hours of instruction during their primary and lower secondary years, which is approximately six hours a day (OECD, 2013). Most adolescents will eat their lunch at schools. This makes school an ideal setting for introducing health promoting activities including strategies for supporting healthy dietary behaviours.

In 1995, the WHO launched the Global School Health Initiative to strengthen health promotion and education activities at local, national, regional and global levels, which included a focus on Health Promoting Schools (HPS) (WHO, 2009). According to the WHO, a HPS “*strives to provide a healthy environment, school health education and school health services, along with school community projects, health promotion programs for staff, nutrition and food safety programs, opportunities for physical education and recreation, and programs for counselling, social support and mental health promotion*” (WHO, 1996). Many Australian schools have adopted the HPS framework based on the guiding principle that good health supports lifelong learning. The HPS framework aligns with this research in many ways, as presented below:

- It uses a holistic model of health, which considers the interrelationships between physical, mental, social and environmental aspects of health;
- It can change the attitudes and behaviour of students towards positive, life-enhancing activities that are critical to improving their health and wellbeing and which contribute to social inclusion and social justice;
- It recognises the significance of the physical environment such as safe and nutritious food in contributing to the health of students;
- It recognises the importance of the social ethos of the school in supporting a positive learning environment that strengthens healthy relationships and the emotional wellbeing of students and promotes a sense of responsibility, achievement and self-worth;
- It focuses on active student participation in both the formal and informal curricula in order to develop a range of life-long health related skills, knowledge and practices;
- It provides a positive and supportive working environment for school staff;
- It involves families by encouraging their participation in the development of their children’ health skills, knowledge and practices (World Health Organization, 2009).

According to the HPS framework, schools should deliver skill-based health education within a supportive environment for adolescents to develop and practise healthy behaviours. In addition, this framework was designed to reach school teaching and administrative staff, families, and community members. Safe and supportive schools, together with supportive school staff and peers, are crucial in helping adolescents to develop healthy behaviours and attain the best health in their transition to adulthood (Dick

& Ferguson, 2015; Viner et al., 2012). Schools provide opportunities for adolescents to increase their food and nutrition knowledge and skills through education and learning within a healthy environment by observing school staff (role-modelling) and/or using services such as school canteens and other school food providers.

### **2.3.2 Health and nutrition education in high schools**

Education can play a critical role in adolescence as during these high school years, adolescents develop attitudes, values, skills, competences and sense of self as autonomous individuals (WHO, 2003b). Alongside developmental milestone, most adolescents have access to high school education, which aims to build human capacity and agency (Worsley, 2015). During this stage of life, adolescents develop greater control over their own lives as they experience more independence from parents (WHO, 2014c). Also, they are better able to understand consequences, solve problems, and to relate to their peers (WHO, 2014c). Health education has been an essential component in public health programmes to promote health and improve quality of life (Pendergast & Dewhurst, 2012; WHO, 2003b). In addition, it has been an important strategy for preventing many diseases and injuries. This approach has drawn from the fields of public health, social science, communications, and education (WHO, 2003b). Most importantly, health education during adolescence enables adolescents to develop healthy behaviours and prevent risk and premature death (WHO, 2003b). It helps to develop informed citizens who are able to seek services and advocate for policies and environments that affect their health (Dick & Ferguson, 2015; WHO, 2003b).

The HPS framework emphasises that all children and adolescents should gain health-related knowledge and skills that enable them to build competencies in taking action to improve the health and wellbeing of themselves and others (WHO, 2009). School-based curricula approaches provide adolescents with opportunities to develop and apply these skills so that they may address health issues and increase their health and overall wellbeing (WHO, 2009). Hawkes and colleagues (2015) indicated that nutrition education is one of the key strategies to promote healthy dietary behaviours in adolescents in school settings. Contento (2007) defined nutrition education as *“any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition-related behaviours conducive to health and wellbeing; nutrition education is delivered through multiple venues and involves activities at the individual, community, and policy levels”* (page 15).

Contento (2008) describes three essential components of nutrition education, which are summarised in Table 2.3.

**Table 2.3** Three components of nutrition education designed to increase healthy dietary behaviours

<b>Component</b>	<b>Explanation</b>	<b>Targeted behavioural factors</b>
<b>A motivational component</b>	The goal is to increase awareness and enhance motivation of the intended audience. It focuses on <i>why</i> to make changes. The audience recognise positive outcomes (benefits) and barriers for taking action.	Attitudes (beliefs about behaviour and value of outcome), social norms (beliefs of others and motivation to comply), self-efficacy (beliefs about control over behaviour and power).
<b>An action component</b>	The goal is to facilitate the ability to take action. It focuses on <i>how</i> to make changes.	Intentions, goal setting/action plans.
<b>An environment component</b>	Nutrition educators work with policymakers and others to promote environmental supports for action.	Physical, social, economic, policy and systems.

(Contento, 2008)

The motivational component of nutrition education is often embedded within school curricula (Baranowski et al., 2003) by using the Knowledge-Attitude-Behaviour (KAB) model. It provides didactic nutrition education and most often aims to enhance and assess nutrition knowledge of students (Baranowski et al., 2003). This approach has been criticised for being too narrow, given that nutrition knowledge on its own does not lead to behaviour change but it could motivate people to eat healthier if they are convinced of the value of such behaviour (Baranowski et al., 2003). The SCT is also commonly used in nutrition education and its constructs refer to motivational and action components of nutrition education. It recognises the importance of self-efficacy (the confidence that one can perform a specific behaviour), skills (the ability to perform the behaviour) and self-control, such as setting goals in behaviour change (Bandura, 1986; Baranowski et al., 2003). Self-efficacy is an important construct in dietary behaviour change as people with greater levels of self-efficacy are more likely to engage in specific behaviour and maintain it (Baranowski et al., 2003). Goal setting has been found to be associated with behaviour change, such as increased consumption of fruits and vegetables, dietary fibre (Baranowski et al., 2003; Cullen, Baranowski, & Smith, 2001; Schnoll & Zimmerman, 2001). Last, the



environmental component of nutrition education refers to physical, social, economic and political environments, which include the development and implementation of policies, legislation and guidelines to help individuals to adopt healthy dietary behaviours. For example, policies for restricting or limiting access to unhealthy foods and drinks within the school environment help adolescents avoid these options and allow them to consider a range of healthy food options while at school (Baranowski et al., 2003). Although the environmental component of nutrition education is most distal to individuals, it certainly influences dietary behaviours as it enables adolescents to practice those behaviours and see them modelled by others. Therefore, all three components of nutrition education are important to increase adolescents' food and nutrition knowledge, skills and behaviours.

Nutrition education is more effective when it aims to stimulate learning, literacy, skills and action rather than just provide knowledge (Contento, 2008; Hawkes et al., 2015). Although fundamental food and nutrition knowledge is needed for the rationalisation of appropriate dietary behaviours, it also requires a greater level of application in order to be successful in developing and sustaining healthy dietary habits (Condrasky & Hegler, 2010). The World Education Forum presented a FRESH (Focusing Resources on Effective School Health) framework for school health programming (Vince-Whitman, Aldinger, Levinger, & Birttdthistle, 2000; World Health Organization, 2003b). The FRESH framework advocated skill-based health education as an essential component of a cost-effective school health programme. This approach has been shown to promote healthy lifestyles and reduce unhealthy behaviours (Vince-Whitman et al., 2000). Skill-based education has been described as *“an approach to creating or maintaining healthy lifestyles and conditions through the development of knowledge, attitudes, and especially skills, using a variety of learning experiences, with an emphasis on participatory methods”* (WHO, 2003b, page 3). A study on school health and nutrition reported the benefits of school-based nutrition education including improved academic performance, reduced social and gender inequities and improved overall health (Vince-Whitman et al., 2000). In addition, the author stated that health and nutrition education is most effective when education incorporates interactive methods in a skills-based approach (Vince-Whitman et al., 2000).

Skill-based nutrition education focuses on the development of knowledge, attitudes, values, and life skills needed to make and act on positive decisions concerning health and dietary behaviours (Vince-Whitman et al., 2000). Skill-based nutrition education has been shown to be an effective approach in promoting healthy choices,

preventing or delaying risk behaviours and provides opportunities to adolescents to develop life-skills, such as the examples described in Table 2.4 (Drummond, 2011).

**Table 2.4** Life skills that adolescents can develop through skill-based food and nutrition education

<b>Communication and interpersonal skills</b>	<b>Decision-making and critical thinking skills</b>	<b>Coping and self-management skills</b>
<p><i>Communication skills</i> Students can observe and practise ways to persuade parents and friends to make healthy food and menu choices.</p> <p><i>Refusal skills</i> Students can observe and practise ways to counter social pressures to adopt unhealthy eating practices.</p> <p><i>Advocacy skills</i> Students can observe and practice ways to present healthy nutrition messages to others through posters, performances, and presentations; gain support of influential adults such as headmasters and teachers to provide healthy foods in the school environment.</p>	<p><i>Decision-making skills</i> Students can observe and practise ways to choose nutritious foods and snacks over less nutritious options; convincingly demonstrate an understanding of the consequences of unbalanced nutrition.</p> <p><i>Critical thinking skills</i> Students can observe and practise ways to evaluate nutrition claims from advertisements and nutrition-related news.</p>	<p><i>Self-awareness and self-management skills</i> Students can observe and practise ways to recognise links between eating disorders and psychological and emotional factors; identify personal preferences among nutritious foods and snacks; develop a healthy body image.</p>

(WHO, 2003b)

In the UK, practical food skills in nutrition education were recognised as an essential part of education and necessary for healthy lifestyles (Caraher & Lang, 1999). In particular, researchers emphasised the importance of introducing food preparation skills, such as cooking, in school curricula due to the decline in food skills among adults that reportedly led to increased consumption of take-away foods (Condrasky & Hegler, 2010). Diets high in take-away or convenience foods have been found to be associated with decreased consumption of fruits and vegetables and increased consumption of saturated fat and energy (Condrasky & Hegler, 2010), pointing to the importance of skills that allow people to plan and prepare healthy homemade food. However, while most food and nutrition programs and education have focused on increasing knowledge and attitudes, there has been less focus on practical food skills (Lang, Caraher, Dixon, & Carr-Hill, 1999). It has been suggested that hands-on food preparation activities allow individuals to put their knowledge into practice in order to improve dietary behaviours (Condrasky & Hegler, 2010; Lang et al., 1999). In Australian high schools, food and

nutrition education is situated in two learning areas: home economics; and to a lesser extent, health and physical education. The home economics learning area provides comprehensive food and nutrition education by offering skill-based education in food and nutrition. The next subsection describes the role of home economics in providing nutrition education to adolescents.

### **2.3.3 Home economics**

According to the International Federation for Home Economics' (IFHE) Position Statement, home economics is a field of study and a profession, situated in the human sciences and draws from a range of disciplines to achieve optimal and sustainable living for individuals, families and communities (IFHE, 2008). Home economics draws from various disciplines and includes food, nutrition and health; textiles and clothing; shelter and housing; consumerism and consumer science; household management; design and technology; food science and hospitality; human development and family studies; education and community services and much more (Lichtenstein & Ludwig, 2010). Home economics education in the school setting is described as *“a curriculum area that facilitates students to discover and further develop their own resources and capabilities to be used in their personal life, by directing their professional decisions and actions or preparing them for life”* (IFHE, 2008, page 1).

The Australian home economics curriculum provides students with the opportunity to develop capabilities that enhance their personal empowerment in daily contexts, such as nutrition, food and health decision making and choices (ACARA, 2015; Pendergast, Garvis, & Kanasa, 2013). This focus makes home economics a key discipline for the dissemination of food and nutrition knowledge and skills in the school curriculum (Worsley, Wang, Yeatman, Byrne, & Wijayarathne, 2015). Given that HETs have expertise in health, food and nutrition, they play a significant role in providing food and nutrition education, including food skills and enhancing adolescents' dietary behaviours and overall health (Pendergast & Dewhurst, 2012). As Worsley (2015) stated, home economists *“take a broad, critical enquiry approach to nutrition education”* (page 15). It also encourages transferable skills, such as coordination, organisation and management skills, and interpretative/analytical skills. Most importantly it helps to develop life skills for independent living (Pendergast & Dewhurst, 2012). A recent Australian study found that food and nutrition knowledge gained in home economics was associated with

increased knowledge in adulthood, suggesting that this form of education has long lasting effects (Worsley et al., 2015).

There is a growing body of evidence for the benefits associated with the food preparation skills that home economics aims to develop. Engagement in these activities during adolescence is associated with healthier dietary behaviours (Larson, Perry, Story, & Neumark-Sztainer, 2006; Larson, Story, Eisenberg, & Neumark-Sztainer, 2006), which are continued into adulthood (Laska, Larson, Neumark-Sztainer, & Story, 2012). Cooking ability and frequency has been found to be associated with better family connection and mental wellbeing (Utter et al., 2016) and can empower adolescents to help others to improve their dietary behaviours (Dodd, Follmer-Reece, & Kostina-Ritchey, 2015). Caraher and Lang (1999) stated that the acquisition of cooking skills promotes adolescents' social and emotional development. However, while home economics education has shown many advantages to individual health and wellbeing, this learning area is undergoing some challenges within high school curricula.

The current Australian curriculum no longer includes home economics as a compulsory subject, but has a greater focus on more 'scientific' or 'core' subjects (Colatruglio & Slater, 2014; Dodd et al., 2015; Worsley et al., 2015). Some high schools still provide food and nutrition education for adolescents but without practical application of knowledge. While Benn (2009) indicated that practical knowledge has been considered inferior to theoretical knowledge, the practical components of nutrition education allow adolescents to experience theory and vice versa. In addition, some schools lack teachers who are trained in home economics and face academic achievement pressure to provide university-preparatory coursework, which does not include home economics (Dodd et al., 2015). Lack of home economics education in high schools, in particular the practical activities of food preparation and cooking, has been identified as a main reason for the decline in food skills and high prevalence of overweight and obesity among adults (Pendergast & Dewhurst, 2012; Worsley et al., 2015). The lack of food preparation skills and low confidence in cooking has led to decreases in the frequency of cooking in home environments (Condrasky, Graham, & Kamp, 2006) and is considered a barrier to healthy dietary behaviours (Nicklas et al., 2013).

Currently, there is a global debate regarding the contribution of poor food knowledge and preparation skills to the growing obesity epidemic (Worsley et al., 2015). There have been calls for greater food and nutrition education for students and in

particular dissemination of food preparation skills such as cooking (Worsley et al., 2015). Increasing cooking skills has been identified as a possible strategy to reduce the prevalence of obesity and unhealthy dietary behaviours by reducing the reliance on take-away foods (Pendergast & Dewhurst, 2012). In 2010, Lichtenstein and Ludwig encouraged schools to bring back home economics education and stated that this could be “*the best investment society could make*” as it could help to reduce and reverse the overweight and obesity epidemic (2010, page 1858). School has been identified as the main setting for such education as parents may not be able to teach adolescents how to cook due to a decline in their food skills (Lichtenstein & Ludwig, 2010). It has been suggested that a comprehensive curriculum is needed to teach the theoretical and practical components of food and nutrition education, such as basic cooking techniques, energy requirements, food sources, budget principles, food safety, nutrition information, the effect of food on wellbeing, and chronic diseases risk (Lichtenstein & Ludwig, 2010). The concept of food literacy has emerged to combine these different aspects of developing a healthy relationship with food, which is discussed in more detail in section 2.4.

#### **2.3.4 The importance of the school food environment**

It is important to increase adolescents’ food and nutrition knowledge and skills, but these alone will not be enough to improve adolescents’ dietary behaviours because environmental factors also play a significant role in adolescents’ food choices (Dick & Ferguson, 2015). School food environments have a large impact on adolescents’ food choices because adolescents spend a significant amount of time in school and consume a large proportion of total daily energy in this setting (Story et al., 2002). Swinburn and colleagues (2015) encouraged governments to improve food environments in order to achieve the WHO Global Action Plan targets for the prevention and control of NCDs, while the HPS framework provides specific support for school environment interventions (WHO, 2009). School food environments refer to the physical, economic, political and sociocultural environments that affect adolescents’ food choices (Swinburn et al., 1999; Swinburn et al., 2015). School policies on the topic of healthy and safe food have been recognised as a strategy to support adolescents’ healthy dietary behaviours, for example restricting or prohibiting the marketing of unhealthy foods to adolescents within the school environment (Hawkes et al., 2015; WHO, 2009). Most countries in Europe have implemented such policies, which have been associated with a decreased consumption of

sugar-sweetened beverages among adolescents (WHO, 2014b). However, similar policies have not been implemented in Australia.

In Australia, public schools are encouraged to follow the 2010 *National Healthy School Canteen* (NHSC) guidelines (Department of Health, 2013). These guidelines provide information to help canteen managers provide healthier food and drink choices within school canteens (Department of Health, 2013). In 2005, the Queensland Government implemented the *Smart Choices- Healthy Food and Drink Supply Strategy for Queensland Schools*, which was revised in 2016 to align more closely to the NHSC guidelines and reflect the *Australian Dietary Guidelines for Children and Adolescents* and the *Australian Guide to Healthy Eating* (Queensland Government, 2016). These guidelines are mandatory in all state schools and applies to all situations where food and drinks are available in school environments including school canteens, tuckshops, vending machines, school camps and sport events, classroom rewards, and fundraising and also food used in curriculum activities (Queensland Government, 2016). Food and drinks are categorised into three categories: green, amber and red; these are described in Table 2.5.

**Table 2.5** Food categories, description of each and example of foods that are allowed in Queensland schools

<b>Category</b>	<b>Description</b>	<b>Example</b>
<b>Green - Have Plenty</b>	These foods and drinks are encouraged and promoted in schools	Fruits, vegetables, legumes, cereals foods (preferably wholegrain), fish, lean meat, bread, reduced-fat dairy products
<b>Amber - Select Carefully</b>	These foods and drinks should not dominate choices and should be avoided in large serve sizes	Full-fat dairy foods, savoury commercial products, processed meats, spreads, sauces and gravy, savoury snack foods and biscuits, ice-creams, breakfast cereals (refined with added sugars)
<b>Red - Occasional</b>	The availability of these foods and drinks should be limited to no more than two occasions per term	Sugar and artificially sweetened drinks, confectionery/lollies, deep-fried foods, savoury snack foods (crisps, chips), cakes, muffins, sweet pastries

(Queensland Government, 2016)

Despite these guidelines placing restrictions on unhealthy foods in high schools, adolescents are exposed to foods from “Red” category within the school environment.

According to USA school examples, partial restriction of unhealthy foods and drinks reduces the effectiveness of healthy food policies because adolescents are still exposed to those foods (Hawkes et al., 2015). *Smart Choice* guidelines are mandatory in all state schools in Queensland, but an independent authority has not been established to evaluate the effectiveness of the guidelines, including whether the school canteens adhere to the guidelines and accountability for not following the guidelines. Swinburn and colleagues (2015) indicated that for successful implementation of policy there is a need to move from responsibility to accountability, which is a more solution-orientated approach. Accountability would enhance action such as adherence to guidelines, and consequently improve food environment and adolescents' dietary behaviours (Swinburn et al., 2015).

Several studies have identified the impact that school food environments may have on adolescents' food choices (Jenkins & Horner, 2005; Story et al., 2002; Van Der Horst et al., 2007). For example, availability and accessibility of unhealthy foods was associated with high fat consumption (Jenkins & Horner, 2005), while snack vending machines were negatively associated with fruit consumption (Kubik, Lytle, Hannan, Perry, & Story, 2003). In contrast, availability and accessibility of healthy foods, such as fruit and vegetables, were associated with increased consumption of fruit and vegetables (Hawkes et al., 2015; Jenkins & Horner, 2005). These findings align with self-reported strategies from Australian adolescents, who suggested that increased availability and accessibility of healthy foods and decreased availability of unhealthy foods would improve their dietary behaviours (Stephens, McNaughton, Crawford, & Ball, 2015). Despite these findings, Story and colleagues (2002) reported that fund raising in high schools often involves unhealthy foods, such as chips, candy and soft drinks (Story et al., 2002). In addition, some high schools have contracts with fast-food outlets and vending machine retailers (Story et al., 2002). However, this relationship is further complicated by findings from both an Australian study with adolescents and a systematic review on the school food environment which reported that adolescents who had positive perceptions regarding school environments and supportive teachers were more likely to engage in health promoting behaviours (Jamal et al., 2013; McLellan, Rissel, Donnelly, & Bauman, 1999). The evidence shows that healthy food behaviours are influenced by exposure to the eating behaviours of peers, role models and to foods that are available inside and outside of school (Hawkes et al., 2015). Taken together, these studies suggest that school food environments should both offer healthy foods and create opportunities for healthful dietary behaviours to be normative, modelled, and reinforced (Story et al.,



2002). Therefore, a healthy school food environment can help reinforce the food and nutrition messages that are received as part of the school curriculum (Driessen, Cameron, Thornton, Lai, & Barnett, 2014).

A study conducted in Australia, which investigated nutrition promotion approaches preferred by adolescents found that adolescents emphasised the importance of peers, parents and teachers' influence on their food choices and stated that they should be role models of healthy eating (Stephens et al., 2015). Adolescents learn dietary behaviours by observing others so role models, such as teachers, could play a vital role in promoting healthy dietary behaviours (Stephens et al., 2015). Teachers are the key to education and health promotion as they are caretakers of the school and students, role models, standard setters and source of influence (Vince-Whitman et al., 2000; WHO, 2003b). It has been stated that teachers' self-efficacy and attitudes could have significant implications for teacher practices and student outcomes (Pendergast et al., 2011). Therefore, it is also important to provide food and nutrition education to peers, parents and teachers in order to promote healthy dietary behaviours to adolescents (Hawkes et al., 2015).

In summary, school is an influential setting in forming adolescents' dietary behaviours. It provides adolescents with opportunities to gain food and nutrition knowledge and skills through holistic and comprehensive food and nutrition education and to practice healthy dietary behaviours within healthy school food environments. All schools should create a healthy food environment through exposure of healthy foods, positive role modelling and hands-on oriented nutrition education. The next section introduces the concept of food literacy as a potential framework for connecting food and nutrition knowledge, food skills and capacity in order to improve adolescents' dietary behaviours.

## **2.4 Food literacy**

The concept of literacy has emerged in the areas of health and health promotion. 'Literacy' refers to the ability to write and read. Extending upon this, it is *"the ability to identify, understand, create, communicate and compute using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society"* (UNESCO, 2004, page 13).

Nutbeam (2000) incorporated the concept of literacy in health promotion and defined health literacy as “*the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health*” (page 264). Three levels of health literacy were distinguished according to the cognitive effort required: (1) *basic/functional health literacy* which refers to basic reading and writing skills to be able to understand health-related information; (2) *interactive health literacy* which refers to more advanced cognitive and literacy skills to interact with health care professionals and apply health-related information; (3) *critical health literacy*, which includes more advanced cognitive skills to critically analyse the information needed for personal and community empowerment (Frisch, Camerini, Diviani, & Schulz, 2012; Nutbeam, 2000). Similarly, Schulz and Nakamoto (2005) conceptualised health literacy in three dimensions: *declarative knowledge*, which refers to factual knowledge; *procedural knowledge*, which refers to application of factual knowledge; and *judgement skills*, which refers to critical thinking.

Food literacy emerged as a component of health literacy about five years ago, with an explicit focus on skills in a food context to enable individuals to navigate in food systems and make informed consumer decisions based on nutrition recommendations (Velardo, 2015; Vidgen & Gallegos, 2014). It is important to note that the concept of food literacy is relatively new and still evolving (Cullen, Hatch, Martin, Higgins, & Sheppard, 2015; Worsley, 2015). The interest in food literacy is partly a response to the rise of food issues, diet-related conditions, food movement, the lack of nutrition education in schools and the obesity crisis (Sumner, 2013). Food literacy has been introduced as a potential means to decrease unhealthy dietary behaviours and consequently help to address the overweight and obesity epidemic and improve overall diet quality and health outcomes (Pendergast et al., 2011).

#### **2.4.1 Defining food literacy**

Food literacy is increasingly used in policy, research and practice without a general consensus of what it means (Colatruglio & Slater, 2014). Recent definitions of food literacy derived from research studies or systematic reviews are presented in Table 2.6.

**Table 2.6** Definitions of food literacy available in the literature

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<b>Author/organisation</b>	<b>Definition</b>
<b>Kolasa, Peery, Harris, &amp; Shovelin, 2001</b>	“capacity of an individual to obtain, interpret and understand basic food and nutrition information and services as well as the competence to use that information and available services that are health enhancing” (p. 2)
<b>Vidgen &amp; Gallegos, 2014</b>	“the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake” (p. 54)
<b>Home Economics Victoria, 2015</b>	“having the knowledge, skills and the capacity to source, prepare, cook and share food in a sustainable manner to promote a healthy and balanced lifestyle. Food literacy is also about individuals understanding the role that food plays in communities and cultures”
<b>Desjardins &amp; Azevedo, 2013</b>	“a set of skills and attributes that help people sustain the daily preparation of healthy, tasty, affordable meals for themselves and their families. Food literacy builds resilience, because it includes food skills (techniques, knowledge and planning ability), the confidence to improvise and problem solve, and the ability to access and share information. Food literacy is made possible through external support with healthy food access and living conditions, broad learning opportunities, and positive socio-cultural environments” (p. 69)
<b>Cullen et al., 2015</b>	“the ability of an individual to understand food in a way that they develop a positive relationship with it, including food skills and practices across the lifespan in order to navigate, engage, and participate within a complex food system. It’s the ability to make decisions to support the achievement of personal health and a sustainable food system considering environmental, social, economic, cultural, and political components” (p. 4)

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Most early studies defined food literacy as a component of health literacy and applied the three levels used in the health literacy concept. These are functional, interactive, and critical dimensions of food and nutrition that generally can be described as food literacy (Kolasa et al., 2001; Murimi, 2013). These levels of food literacy are described below:

- *Functional level:* food and nutrition knowledge, including the ability to communicate credible, evidence-based food and nutrition information and assess, understand and evaluate information;
- *Interactive level:* refers to practical food preparation skills, including developing personal skills, such as decision making, goal setting and practices regarding food and nutrition issues, to enhance nutritional health and wellbeing; and
- *Critical level:* refers to personal empowerment and includes respect for different cultural, family and spiritual beliefs that relate to food and nutrition, understanding the wider context of food production and nutritional health, and advocating for personal, family and community changes to enhance nutritional health (Colatruglio & Slater, 2014; Pendergast et al., 2011; Slater, 2013).

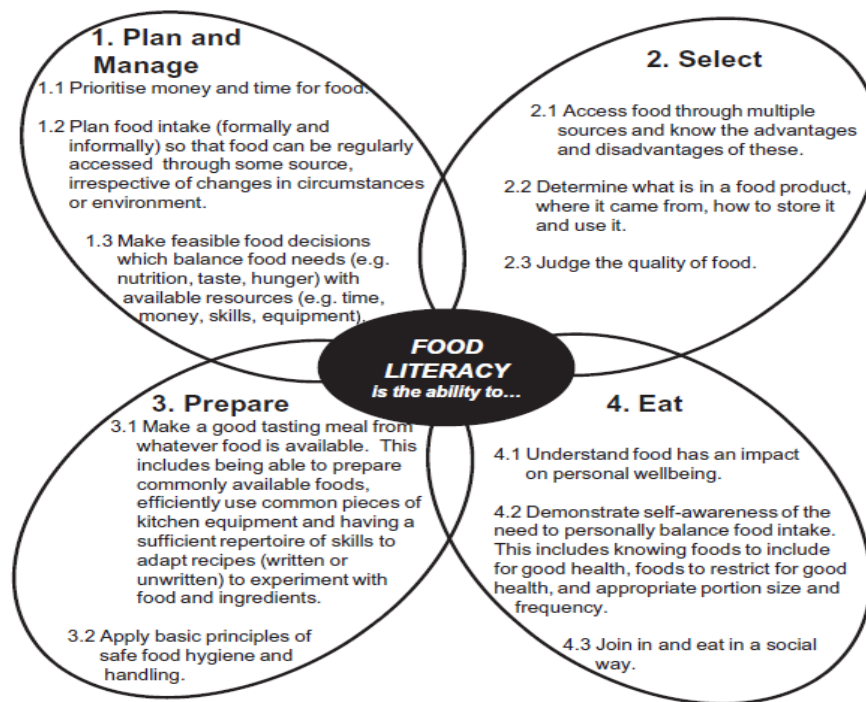
Other definitions classify food literacy also as three dimensions being: declarative knowledge, procedural knowledge and ability to apply the knowledge. *Declarative knowledge* is characterised by an awareness of facts and processes and refers to ‘*what is*’ (Velardo, 2015; Worsley, 2002). More specifically, it includes reading and acquiring knowledge about food, food sources, nutrition facts, and other knowledge involving food and nutrition (Sumner, 2013). In contrast, procedural knowledge is knowledge of skills and strategies and refers to ‘*how to*’ do something (Velardo, 2015) and includes application of declarative knowledge to food decision making, including shopping and preparation skills (Sumner, 2013). Confidence and motivation were identified as very important in order to apply declarative and procedural knowledge as it enables people to act on their food and nutrition knowledge and skills (Sumner, 2013; Velardo, 2015). Home Economics Victoria (HEV) developed a definition of food literacy for the project “*Healthy Eating and Food Literacy in Secondary Schools*”, which most closely aligns with this type of classification of food literacy (HEV, 2015). They identified three dimensions of food literacy, including food and nutrition knowledge (declarative), food skills (procedural) and capacity (attitude, motivation, confidence) and defined it as “*having the knowledge, skills and the capacity to source, prepare, cook and share food in a sustainable manner to promote a healthy and balanced lifestyle. Food literacy is also about individuals understanding the role that food plays in communities and cultures*” (HEV, 2015). As this research project outlined in this thesis focused on Australian high school settings, the definition of food literacy developed by HEV was identified as the most suitable for this research.

The variability in definitions of food literacy highlights the complexity of this concept. Food literacy can be described as the complex related set of skills, knowledge and behaviours needed in the everyday practicalities of meeting nutrition recommendations (Vidgen & Gallegos, 2014). It could be seen as a set of competencies that comprise food and nutrition knowledge and competencies together with the ability to apply nutritional knowledge and food skills to make informed food choices (Benn, 2014; Cullen et al., 2015; Vidgen & Gallegos, 2014). Some existing definitions of food literacy go beyond individual-oriented approaches and include the ability to understand social, environmental, economic, political and cultural aspects of the food system and make healthy decisions that help build a sustainable food system (Cullen et al., 2015; Sumner, 2013; Yamashita, 2016). Benn (2014) conducted a review on the concept of food literacy, which revealed both similarities and differences within understanding of food literacy, ranging from a narrow to a broader understanding of food literacy. A narrower understanding of food literacy adopts a micro perspective, most often is individual-oriented, and focuses on a single issue related to food such as cooking, growing or nutrition (Benn, 2014). In contrast, a broader interpretation of food literacy combines micro and macro settings, is both individual and socially oriented, emphasises empowerment and self-efficacy concerning food and nutrition, and fosters critical understanding of the relationship between food and wellbeing (Benn, 2014). It also goes beyond nutrition and diet to include understanding of environmental issues, inequality and insecurity (Benn, 2014).

#### **2.4.2 Deconstructing food literacy**

While food literacy as a concept is broad and highly contextual (Vidgen & Gallegos, 2014), it is important to identify aspects or components of food literacy in order to measure it. Vidgen and Gallegos (2014) stated that it is unlikely that an individual would demonstrate all components of food literacy simultaneously or all of the time. However, they indicated that each component is important in order to achieve a high level of food literacy. Vidgen and Gallegos (2014) conducted a study with experts in food and nutrition and young disadvantaged adults and identified eleven core aspects of food literacy which are grouped into four components: planning and management; selection; preparation; and eating (see Figure 2.2). The ‘planning and management’ domain included components such as planning, time management and budgeting for food and dietary intake; the ‘selection’ domain focused on accessibility of foods from different

sources, judging the quality of foods, knowing from where foods came from and understanding different ingredients that constitute foods; the ‘preparation’ domain included practical skills, such as preparing foods from basic available ingredients, ability to use kitchen equipment, ability to store food appropriately; and the ‘eating’ domain included personal and social components, such as food impact on personal wellbeing and regular social eating experiences (Vidgen & Gallegos, 2014).



**Figure 2.1** Four components of food literacy adopted from Vidgen and Gallegos (2014).

Similarly, Desjardins and Azevedo (2013) developed a model of individual food literacy from a study with disadvantaged adolescents and young adults (16 to 25 years), which also included four components:

- *Food and nutrition knowledge*: knowledge about food, nutrition, food safety, interpreting food labels, where to find information, where food comes from;
- *Food preparation skills, experience*: ability to improvise with ingredients; ability to use recipes and follow instructions; and ability to use food preparation utensils, appliances;
- *Organisational skills, experience*: planning, budgeting, buying and storing food; and

- *Psycho-social factors*: satisfaction, creativity, social connectedness (eating together, transferring skills), feeling healthy, resilience, self-efficacy, confidence, control, household food security.

In addition, Pendergast and Dewhurst (2012) conducted a global study with HETs that identified fifteen aspects of food literacy to be included in the food literacy curriculum in high schools. These aspects could be grouped broadly in three components, similarly to Desjardins and Azevedo's (2013) study: (1) food and nutrition knowledge of dietary guidelines, healthy and unhealthy foods, food safety and hygiene practices, environmental sustainability and animal welfare; (2) food skills, including food preparation and cooking, and organisation skills, such as budgeting and shopping; and (3) capacity, including creativity, values, attitude, confidence and social eating experiences (Pendergast & Dewhurst, 2012). This study also recognised two levels of food literacy that are important for adolescents to learn in order to be food literate: basic and higher-order food skills. Basic food skills refer to food preparation and cooking activities, safe and hygienic practices, application of nutrition knowledge, such as dietary guidelines. Higher-order skills refer to creativity, analysis and evaluation which consequently empower individuals to make and enact informed choices (Pendergast & Dewhurst, 2012). This classification aligns with the HEV definition of food literacy, which identified three components of food literacy (food and nutrition knowledge; food skills; and capacity) (Home Economics Victoria, 2015).

Due to the complexity of the concept and different components of food literacy, it is challenging to measure food literacy as a whole, which may explain why a tool has not yet been developed to measure it (Vidgen & Gallegos, 2014). However, Desjardins and Azevedo (2013) identified measurable outcomes of food literacy, which are presented in Table 2.7.

**Table 2.7** Measurable components of food literacy identified by Desjardins (2013)

<b>Personal skills and attributes related to food preparation</b>	<b>External determinants</b>	<b>Potential outcomes (as expressed by young people themselves)</b>
<ul style="list-style-type: none"> <li>- Food skills (techniques, knowledge, planning)</li> <li>- Self-efficacy and confidence</li> <li>- Ability to improvise and problem-solve</li> <li>- Ability to find and use social and other supports</li> </ul>	<ul style="list-style-type: none"> <li>- Socio-cultural environment</li> <li>- Learning environment</li> <li>- Food access, cooking facilities</li> <li>- Living conditions (income, employment, housing)</li> </ul>	<ul style="list-style-type: none"> <li>- Preparation of healthier meals and greater likelihood of consuming a healthy diet</li> <li>- Feeling better, physically and mentally</li> <li>- Greater connectedness to others with respect to food and eating</li> <li>- Improved response to change</li> <li>- Feeling of satisfaction in preparing food for themselves and others</li> <li>- Attraction to culinary training and job opportunities</li> <li>- Improved household food security</li> </ul>

(Desjardins & Azevedo, 2013)

A food literacy definition matrix, informed by previous definitions and studies of food literacy, was developed by the research candidate to identify measurable aspects of food literacy (Fordyce-Voorham, 2011; Home Economics Victoria, 2015; Kolasa et al., 2001; Pendergast et al., 2011; Vidgen & Gallegos, 2014) and is summarised in Table 2.8. The table include three components of food literacy: food and nutrition knowledge, food skills and food behaviours or capacities. These components and its impact on dietary behaviours are described in more detail below.



**Table 2.8** Food literacy definition matrix informed by previous various definitions and studies of food literacy

	<b>To plan</b>	<b>To manage</b>	<b>To select</b>	<b>To prepare</b>	<b>To eat</b>
<b>Knowledge</b>	Know how to develop shopping list to meet nutrition requirements; Know how to plan a budget for food; Know how to plan time for food; Know the quantities of food to buy, in order not to waste food.	Know how to follow and buy food according to the shopping list; Know how to manage a budget, to have money for shopping; Know how to access different sources of food.	Know about food labels, what to look for in them when selecting food; Know that can select food from multiple sources and advantages/disadvantages of these sources; Know which foods is healthy/unhealthy and why; Knowing the environmental, social and ethical consequences of the ways in which foods are produced, packaged and distributed.	Know how to prepare food from scratch; Know how to prepare food from all of the food groups (meat, vegetables, pasta, etc.); Know basic principles of safe food hygiene and handling; Know how to use common kitchen equipment ; Know how to prepare food according recipes or/and adapt it.	Know principles for everyday eating: only eat when you hungry, try to get some routine, eat slowly, eat consciously; eat breakfast, lunch and dinner; Know about portion size and frequency.
<b>Skills</b>	Able develop shopping list (have abilities to do a list); Able to plan a budget for food to meet nutrition requirements; Able to plan time for food.	Able to prioritize budget for food; Able to manage a budget; Able to access different sources of food; Able to buy food in quantity required, in order not to waste.	Able to read and understand a nutrition label, as well as what's not on it, understand what ingredient list mean; Able to calculate serving size; Able to purchase food; Able to source enough food for requirements; Able to select food from different sources; Able to select healthy food and what is in season; Able to critically judge advertisements, promotions, marketing and everything else; Able to judge the quality of raw and processed food which might include freshness and how does the price compare to other times in the year; Able to choose native and seasonal foods in keeping with where you live.	Able to prepare food from scratch, fresh ingredients, food in season; Able to prepare food from all of the food groups (meat, pasta, vegetables and etc.); Able to understand what is in food product and how to store it; Able to cook, boil, fry food; Able to use kitchen equipment confidently; Able to prepare food safely; Able to keep hygiene requirements; Able to prepare food using recipes or/and adapt one, adapt to your abilities and available equipment.	Able and be willing to try unfamiliar foods; Able to join in, sit down and eat in a social way; Able to eat according eating principles.

<b>Behaviours</b>	Frequency of developing or developing shopping list when going shopping Frequency of planning or planning a budget for food; Frequency of planning or planning time for shopping.	Frequency of managing or managing the budget; Frequency of accessing or accessing different sources of food; Buying food in quantities required.	Frequency of reading or reading nutrition labels; Frequency of using or using nutrition label to select food; Frequency of selecting or selecting food from different sources; Frequency of selecting or selecting healthy food; Frequency of purchasing or purchasing food; Judging the quality of food, critically judging the advertising, promotions and marketing messages; Buying local produce.	Frequency of preparing or preparing food; Frequency of preparing or preparing food from scratch or/and with fresh ingredients, from all food groups; Frequency of using or using confidently kitchen equipment and skills; Frequency of using or using recipes, adapting them with available products, abilities and kitchen equipment.	Frequency of or doing: eating in social way; Frequency of doing: eating according eating principles; Frequency of trying to eat unfamiliar foods.
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(Desjardins & Azevedo, 2013; Fordyce-Voorham, 2011; Home Economics Victoria, 2015; Kolasa et al., 2001; Pendergast et al., 2011; Vidgen & Gallegos, 2014).

### *Food Knowledge*

Food knowledge includes a personal awareness and understanding of verbal or written information about nutrition and food, such as through books, the internet, and recipes, and individual knowledge about planning, managing, selecting and preparing foods (Fordyce-Voorham, 2011; Vidgen & Gallegos, 2014). It has been established that changing food knowledge is an important step in the process of behaviour change (Clifford, Anderson, Auld, & Champ, 2009). Food knowledge includes understanding nutrition and food in order to meet healthy dietary recommendations. For example, knowledge of national nutrition guidelines, how to plan and manage a budget for food, read recipes or food labels, how to select and prepare food from scratch, or how to use kitchen equipment (Fordyce-Voorham, 2011; Vidgen & Gallegos, 2014). Experts who were included in an Australian study emphasised the importance of new food tasting experiences, meal planning knowledge based on food groups (shopping list) and nutrition knowledge (Fordyce-Voorham, 2011). Research on behaviour change suggests that knowledge on its own is not sufficient to change individual dietary behaviours, for example to translate food guidelines into actual dietary intakes (Caraher, Wu, & Seeley, 2010; Hartmann et al., 2013; Kelly, Melnyk, & Belyea, 2012). Therefore, with respect to dietary behaviours, it has been suggested there is a need to move from “knowledge about what” to “knowledge about how” (Hartmann et al., 2013).

### *Food Skills*

Food skills include hands-on practical experiences and an ability to execute or perform specific tasks, such as planning, managing, selecting, and preparing foods

(Fordyce-Voorham, 2011; Vidgen & Gallegos, 2014). It is stated that skills in food planning, managing, selecting, and preparing, empower adolescents to make their own healthy meals from fresh and seasonal food produce and/or to make healthier food choices, possibly including increased consumption of fruits and vegetables instead of relying on convenience foods (Condrasky et al., 2010; Fordyce-Voorham, 2011). General food skills, such as food handling techniques, hygiene, food purchasing and storage could be seen as a part of life skills and an important part of education (Lang et al., 1999). Furthermore, food skills have been claimed as an essential set of practical skills that young people require to make healthy food choices and equip themselves for independent adult life (Lang et al., 1999). Food skills, such as shopping, meal planning and meal preparation, have been found to be important determinants of adolescents' dietary intake; these skills assist adolescents in making effective food decisions later in life (Oogarah-Pratap, 2007).

Most studies refer to cooking skills as a proxy for food skills. Cooking skills may be part of necessary life-skills, but on their own they are not sufficient to bring change in dietary behaviour on their own. However, without cooking skills it is difficult to achieve a healthy lifestyle (Caraher & Seeley, 2010). While most adults believe that they have some food skills, their skills may be limited or not fully used. Therefore, lack of or declining food skills, as well as food insecurity or inadequate access to healthy food, results in barriers to eating and enjoying healthy foods and is connected to unhealthy dietary intake and consequently the development of overweight and obesity (Hartmann et al., 2013; James, 2008). Food preparation skills appear to be less relevant to young people, and youth may be unskilled in cooking due to lack of exposure and opportunity to acquire food skills from parents and other sources (Caraher & Seeley, 2010; Lang et al., 1999; Short, 2003).

Food skills programmes are widely used as a means to improve confidence in food preparation skills (Barton, Wrieden, & Anderson, 2011). In the UK, compulsory cooking classes for 11 to 14 year olds have been introduced as an obesity prevention strategy (Caraher & Seeley, 2010). Moreover, one study found that healthier caregiver cooking methods was significantly associated with reduced risk of adolescent overweight and obesity (Kramer et al., 2012). Adolescents in a Hong Kong study indicated that cooking skills were an important skill set that everyone should be allowed to learn (Lai-Yeung, 2007). Similarly, adolescents from a study in Finland showed that those who had healthy food preparation and cooking skills had a greater probability of healthy dietary intake (Räihä, Tossavainen, Turunen, Enkenberg, & Halonen, 2006). As such, poor cooking

skills could have long-term consequences by preventing broader food choices and reducing the chances of choosing and eating healthy food (Caraher & Seeley, 2010; Lai-Yeung, 2007). Therefore, cooking skills are an essential life skill and should be taught in all schools (Caraher & Seeley, 2010). Currently, nutrition research may fail to acknowledge the importance of the skill component in nutrition-related interventions (Cullen et al., 1998).

### *Food Behaviours and Capacity*

Food behaviours combine food knowledge and food skills and transform learned food knowledge and skills into day-to-day behaviours. More specifically, the concept of food behaviours is described as the frequency of applying food knowledge and skills to plan, manage, select, prepare and eat foods (Vidgen & Gallegos, 2014). For example, frequency of reading food labels, recipes, frequency of planning a budget, preparing and purchasing food. Studies have established a positive relationship between food behaviours and dietary intake of adolescents. For example, it was found that frequent cooking was associated with healthier dietary practices (da Rocha Leal et al., 2011; Larson, Perry, et al., 2006) and healthier food-related behavioural intentions were associated with a higher frequency of healthy foods purchased (Surkan et al., 2011). Similar findings were observed in a longitudinal cohort study, which revealed that food behaviours track over time (Laska et al., 2012). Adolescents who received assistance to prepare dinner were more likely to engage in food preparation-related behaviours as young adults (19 to 23 year old), such as buying fresh vegetables, writing grocery lists, and preparing dinner with chicken, fish or vegetables (Laska et al., 2012). Higher frequency of food preparation was associated with less frequent convenience food consumption and individuals was more likely to meet healthy dietary recommendations for fat, fruit and vegetable, whole grain and other foods (Chu et al., 2013; Larson, Perry, et al., 2006). These findings point towards the importance of measuring food behaviours as a component of food literacy in adolescents.

In summary, food literacy is a relatively new concept. The literature suggests that food literacy could be a promising approach to improve unhealthy dietary behaviours of adolescents and that it offers an integrative framework for investigating and understanding the factors shaping dietary behaviours (Colatruglio & Slater, 2014; Pendergast et al., 2011). The next section investigates the possible relationship between food literacy and adolescents' dietary behaviours.

## 2.5 Food literacy and adolescents' dietary behaviours

Interest in food literacy is expanding beyond academia into government programs, with a Queensland Government initiative highlighting the potential of food literacy as a way to change unhealthy dietary behaviours of school-age children. The main goal of the project was to develop food literacy of school-age children to change dietary behaviours in the city of Ipswich, where overweight and obesity rates are comparatively high (Pendergast et al., 2011). Although, the intervention showed some short-term positive changes in dietary intake, it did not measure food literacy comprehensively. Likewise, there continues to be a lack of research that measures the impact of food literacy on adolescents' dietary behaviours or determine the strength and nature of the association between food literacy and dietary behaviours in adolescents. Without a way to accurately and consistently measure food literacy, the relationship between food literacy and dietary behaviours among children and adolescents will remain unclear. Given that food literacy has been identified as a potential strategy to address the health concerns associated with obesity (Colatruglio & Slater, 2014; Pendergast et al., 2011), it is important to investigate the relationship between food literacy and adolescents' dietary behaviours. The first research question devised for this thesis addressed this gap in the literature:

***RQ1:** What is the current evidence on the relationship between food literacy and adolescents' dietary behaviours?*

Study 1 was developed that aimed to investigate the evidence of the relationship between food literacy and adolescents' dietary behaviours via a systematic review of the published literature. This study is presented in the format of a manuscript (*Manuscript 1*) in Chapter 4.

## 2.6 Conclusion

This chapter has reviewed the literature relating to the proposed research detailed in this thesis. The literature review justified the importance of the study population and reported on health-related issues in this stage of life, specifically dietary behaviours. It established the influence of high schools on forming and developing adolescents' dietary behaviours. Finally, it identified food literacy as a potential strategy to decrease unhealthy dietary behaviours of adolescents. Based on the existing literature, food literacy may influence adolescents' dietary behaviours, though has not yet been measured in a

consistent or comprehensive way. Therefore, it is important to explore how food literacy is taught in Australian high schools; which aspects of food literacy are considered to be the most important for adolescents to learn, and which aspects have the most influence on their dietary behaviours. In addition, while the literature suggests that school food environments also affect adolescents' food literacy and dietary behaviours, there is limited research to support this assumption. Therefore, the following research questions were developed for this thesis to fill these gaps identified in the literature:

***RQ2:** Where and how is food literacy taught in Australian high schools?*

***RQ3:** What are the facilitators and barriers that impact food literacy education and adolescents' dietary behaviours in Australian high schools?*

***RQ4:** What is the role of home economics teachers (HETs) in enhancing adolescents' food literacy and healthy dietary behaviours?*

***RQ5:** What is adolescents' understanding of food literacy and its impact on their dietary behaviours?*

The next chapter discusses the research methodology, paradigm, overall research design and methods chosen to collect and analyse data in order to answer the posited research questions of this thesis.

## **Chapter 3 Methodology and Methods**

### **3.1 Introduction**

The literature review presented in Chapter 2 highlighted current understandings regarding food literacy and its influence on adolescents' dietary behaviours. Researchers and practitioners have urged action to increase adolescents' food literacy in order to decrease unhealthy dietary behaviours and consequently decrease overweight and obesity. However, the literature review showed limited evidence regarding this relationship and pointed out the need for further research to understand how food literacy impacts adolescents' dietary behaviours and the role of high schools in providing food and nutrition education to increase adolescents' food literacy. Therefore, this research aims to explore the role of food literacy in shaping adolescents' dietary behaviours in the high school setting. This chapter provides an overview of the research approach taken to address the research questions and includes a description of the research paradigm and overall research design, the choice of methodology, data collection and analysis methods used in this research.

### **3.2 Research paradigm**

A research paradigm is a set of assumptions accepted by a community of researchers that provides an organising structure or a philosophical framework for theory and research (Feilzer, 2010; Neuman, 2005). The research paradigm has an impact on the research design and methods selected to answer research questions. The evolution of different research paradigms has a long but important history. Positivism and constructivism are recognised as two dominating paradigms or worldviews in social sciences (Feilzer, 2010). Positivism is used widely in social research and broadly defined as 'natural science' (Neuman, 2005). This paradigm believes in a singular reality meaning that there is the one and only truth to be discovered and underpins quantitative research methods (Creswell & Clark, 2007). In contrast, constructivism believes in multiple realities and favours subjectivity and qualitative research methods (Feilzer, 2010). Some researchers integrate both quantitative and qualitative research methods by using mixed methods approaches and as a consequence, an alternative framework has emerged to accommodate the diverse nature of such research (Feilzer, 2010).

Pragmatism is an alternate paradigm that states there are singular and multiple realities and moves toward solving practical problems in the 'real world' (Creswell & Clark, 2007; Feilzer, 2010). This paradigm allows researchers to move beyond the positivism-constructivism dichotomy and allows researchers to use a variety of methods or techniques when appropriate (Creswell & Clark, 2007). The pragmatic research paradigm gained popularity in social science as it offered researchers a way to investigate phenomena from different perspectives by using multiple methods, resulting in an enriched understanding of the phenomena under investigation (Creswell & Clark, 2007; Feilzer, 2010).

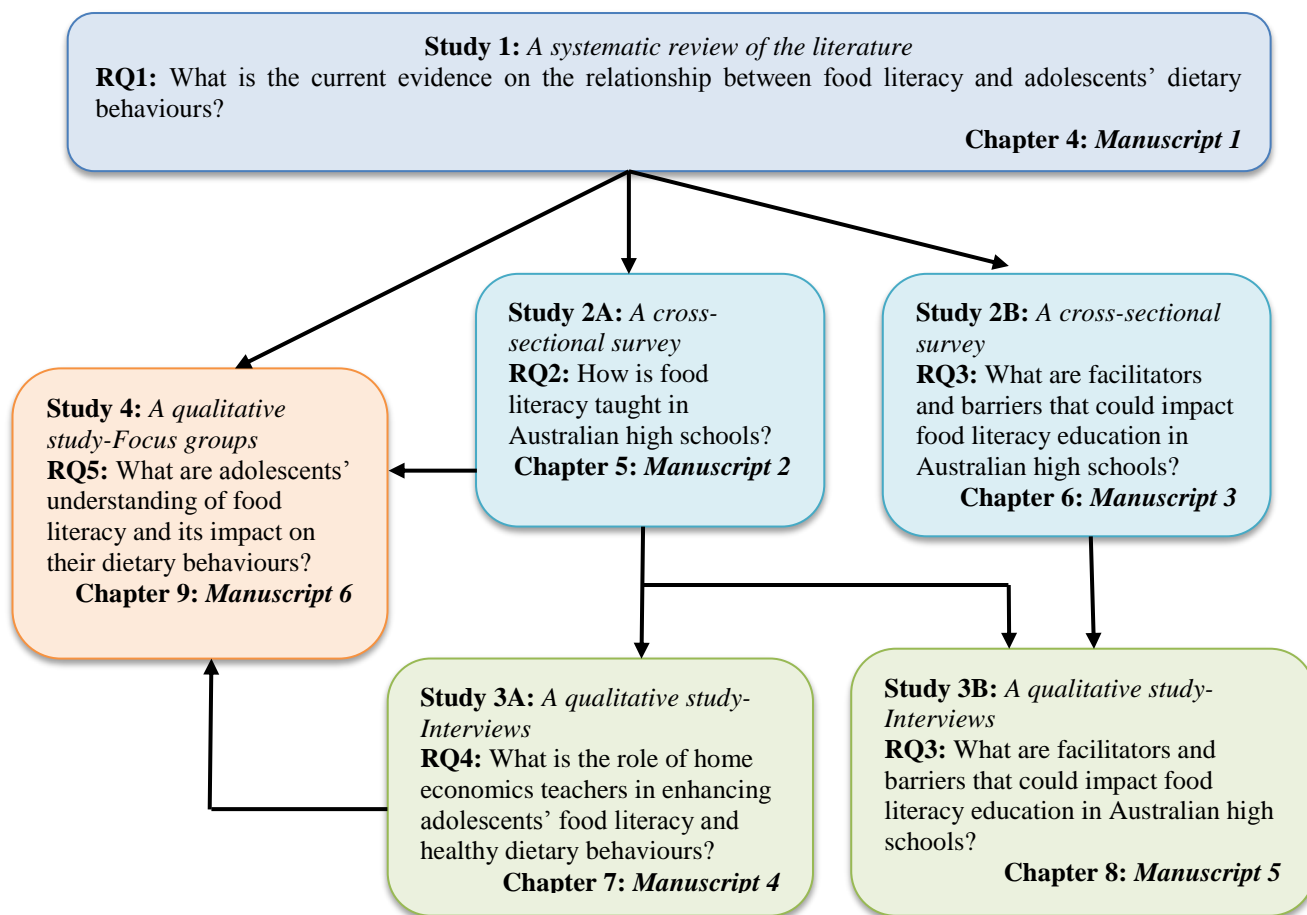
This research project is underpinned by the pragmatic paradigm. Pragmatism is suitable for this research because a mix of quantitative and qualitative methods are required to understand the relationship between the two complex concepts of food literacy and dietary behaviours. This paradigm provides a framework a mixed methods approach, where multiple data sources, analyses and methods are used across multiple studies (Creswell & Clark, 2007).

### **3.3 Research design**

A mixed methods approach was used to fulfil the aims of this research because it enables a more complete and richer understanding of the issues under investigation, compared to quantitative or qualitative methods alone (Creswell & Clark, 2007; Neuman, 2005). A mixed methods approach involves an integration of both quantitative and qualitative research methods and the combination of the strengths of each to answer research questions (Creswell et al., 2011). It subsequently allows researchers to view issues from multiple perspectives to enhance and enrich the meaning of a singular perspective (Creswell, Klassen, Plano Clark, & Smith, 2011).

This thesis comprises of four studies; a systematic review of the literature (Study 1), a cross-sectional survey (Study 2), a qualitative study with HETs (Study 3) and a qualitative study with adolescents (Study 4). The relationship between the four studies is presented in Figure 3.1.



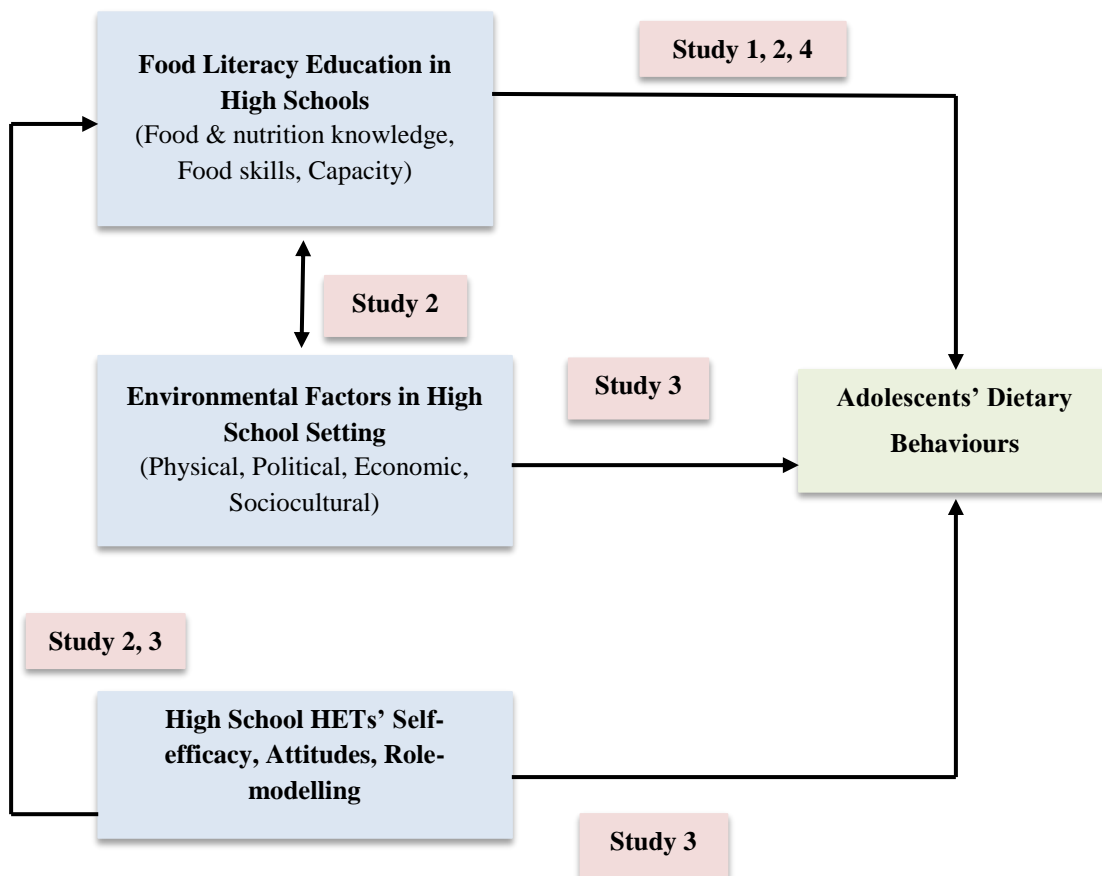


**Figure 3.1** Relationship between studies in this thesis

The first study was a systematic review of the literature (Study 1) developed to investigate current evidence for the possible relationship between food literacy and adolescents' dietary behaviours. The findings of the review informed the development of a cross-sectional survey with HETs (Study 2), which had two aims. First, (a) it aimed to quantitatively assess the perceived importance and time dedicated to various aspects of food literacy in Australian high schools; teachers' self-efficacy and attitudes towards food literacy; and schools' food environment. Second, (b) it aimed to explore HETs' views in relation to food literacy education in Australian high schools. The findings from the survey informed the development of a qualitative study with HETs (Study 3). This study also had two aims: (a) to explore the role of HETs in enhancing adolescents' food literacy and dietary behaviours, and (b) to explore the barriers and enablers of food literacy education in Australian high schools. Finally, the systematic review, the survey and the qualitative study with HETs informed the development of a qualitative study with adolescents (Study 4), which explored adolescents' understanding of food literacy and the importance of various aspects of food literacy to inform dietary behaviours.

Six manuscripts have been produced to address these six research aims (see Figure 3.1). Four studies are described briefly in sections 3.3.1-3.3.4. Detailed methodologies for each are given in Chapters 4-9.

The conceptual pathways between food literacy, school food environment, and HETs' attitudes and self-efficacy to adolescents' dietary behaviours is presented in Figure 3.2. The studies developed for this research were based on the SCT (Bandura, 1986; Bandura & Walters, 1977) and social ecological models (Bronfenbrenner, 1979) because adolescents' food literacy and dietary behaviours are mostly influenced by individual and environmental factors. This research investigated the influence of individual (intrapersonal), social environmental (interpersonal) and environmental factors on adolescents' food literacy and dietary behaviours.



**Figure 3.2** A conceptual framework for the overall research design of this thesis

Intrapersonal factors such as knowledge, skills, attitudes and capacities can influence adolescents' dietary behaviours. Based on the literature, there is a pathway between food literacy that includes the three components of food and nutrition knowledge, skills and capacities, and adolescents' dietary behaviours. A systematic

review of the literature (Study 1) investigated the current evidence for this relationship. In addition, Study 2 and Study 4 were developed to identify the most important aspects of food literacy that impact on adolescents' dietary behaviours.

Social environmental (interpersonal) factors refer to the most proximal contexts in which adolescents interact, for example family, peers and teachers. The literature review in Chapter 2 established that role modelling, such as another person's attitudes, knowledge and skills, could influence dietary behaviours as adolescents learn by observing others and that teacher's self-efficacy in knowledge and skills, and their attitudes could have significant implications for teacher practices and student outcomes (Pendergast et al., 2011). As home economics is identified as a learning area where food literacy could be taught comprehensively, Study 2 and 3 were developed to investigate high school HETs' self-efficacy and attitudes towards food literacy and their role in enhancing adolescents' food literacy and healthy dietary behaviours.

Adolescents spend a substantial amount of time in high schools. Consequently, school is an influential setting for forming dietary behaviours and developing food literacy during adolescence. Social ecological models suggest that food environments have an impact on an individual's dietary behaviours. Study 2 and 3 focused on identifying barriers/limitations and enablers/strengths of food literacy education in Australian high schools and the environmental factors in high school food environments. The ANGELO framework was used to identify possible barriers and enablers of food literacy education and dietary behaviours in high school settings, in particular the physical, political, economic, and sociocultural food environment. The next subsections from 3.3.1 to 3.3.4 provide a brief description of the studies and methods used for data collection and analysis.

### **3.3.1 Study 1: A systematic review of the literature**

Systematic literature reviews gained recognition in research, policy and practice due to the well-organised approach and application of robust scientific methods to synthesise evidence and answer a focused question (Baker, Costello, Dobbins, & Waters, 2014). It aims to comprehensively search and identify relevant studies, evaluate studies against inclusion and exclusion criteria, assess risk of bias, and summarise and interpret the findings of all relevant individual studies on the topic under investigation (Baker et al., 2014). Systematic literature reviews can identify gaps in the literature that could be used as a guide for future research (Petticrew & Roberts, 2008). Therefore, a systematic

review of the literature on food literacy and adolescents' dietary behaviours provided an opportunity to (i) synthesise the current evidence on the relationship between food literacy and adolescents' dietary behaviours; (ii) better understand how food literacy could be measured, and (iii) assess which components of food literacy are associated with improved adolescents' dietary behaviours.

### *Methods*

This systematic review of the literature aimed to identify recent studies that assessed adolescents' food literacy or its components such as food and nutrition knowledge, food skills and behaviours and associated dietary behaviours. Articles were sourced from six databases: MEDLINE (EBSCO Host), Cochrane Library, PsycINFO, Web of Science, PubMed and Scopus. Due to the multifaceted definition of food literacy, a food literacy definition matrix was developed to identify relevant search terms based on each component of food literacy (see Table 2.8, subsection 2.4.2). The matrix was informed by previous definitions of food literacy, and encompassed factors of knowledge, skills and behaviours with food planning, management, selection, preparation and eating. The following search terms were identified and used in combinations to search each database: *'food literacy'*, *'nutrition literacy'*, *'nutrition'*, *'food'*, *'diet'*, *'nutrition knowledge'*, *'food knowledge'*, *'cooking knowledge'*, *'food preparation knowledge'*, *'food skills'*, *'cooking skills'*, *'food preparation'*, *'food purchasing'*, *'food selection'*, *'food labels'*, *'label reading'*, *'adolescent'*, *'youth'*, *'teenager'*, *'teens'*. To complement this search strategy, reference lists and forward citations were cross-matched. The information from the included studies was summarised and interpreted. Further methodological details are provided in Chapter 4, section 4.4.

### **3.3.2 Study 2: A cross-sectional survey**

Lichtenstein and Ludwig (2010) urged schools to reintroduce home economics education in high schools in order to teach adolescents about food literacy as a way to reduce the prevalence of overweight and obesity. There is little evidence on how food literacy is presently taught in Australian high schools. Therefore, a cross-sectional survey was developed to gain a better understanding of food literacy education in Australian high schools. Cross-sectional surveys are suitable when researchers wish to observe phenomena under investigation at a single point in time (Neuman, 2005). It is a very popular data collection technique in the social sciences because of its cost-effectiveness (Neuman, 2005). A cross-sectional study design was most suitable for this study because

it allowed researchers to quantitatively assess HETs' perceptions of how food literacy is taught in Australian high schools and assess high schools' food environment. The survey consisted of two components: quantitative and qualitative. The quantitative component of the survey focused on the perceptions of HETs regarding the importance of various aspects of food literacy for adolescents; how much time HETs spend on each aspect; identifying different learning areas where food literacy was taught; HETs' self-efficacy and attitudes towards food literacy; and assessing school food environments. The qualitative component explored HETs' perceptions of environmental factors that impact adolescents' food literacy in Australian high schools by using the ANGELO framework (Swinburn et al., 1999). This component provided a broader insight of food literacy education in high schools by allowing HETs to express their views and/or experiences in a free-text response box provided in the survey.

### *Methods*

An online survey (LimeSurvey) was sent to potential participants via two major Home Economics professional associations: Home Economics Institute of Australia (HEIA) and Home Economics Victoria (HEV). A link to an online version of the survey was also posted on HEIA website. A total of 205 HETs completed the quantitative part of the questionnaire and 78 HETs left a free-text comment regarding food literacy education in Australian high schools. Quantitative data were analysed descriptively, and associations between HETs' demographic characteristics and perceptions were investigated using Pearson's chi-square analyses. Qualitative data were analysed using content analysis and the ANGELO framework to identify key environmental factors of food literacy education in Australian high schools.

This study was approved by Griffith University Human Research Ethics Committee (Reference Number MED/23/14/HREC). An introductory letter to invite participants to participate in the study is included in Appendix 1. The information sheet for the survey and the questionnaire are provided in Appendix 2 and 3 respectively. Further methodological details are provided in Chapter 5, section 5.4 and Chapter 6, section 6.

### **3.3.3 Study 3: A qualitative study with HETs**

Findings from the cross-sectional survey informed the development of a qualitative study with HETs, which had two aims. Qualitative research is well-suited to

answer questions about how and why individuals act in certain ways because this methodological approach provides a framework for individuals to share their experiences and views (Swift & Tischler, 2010). Within this context of the present study, a qualitative approach allowed the researcher to explore HETs' views and experiences and used participants own words to generate an understanding of how food literacy is taught in Australian high schools (Gill, Stewart, Treasure, & Chadwick, 2008). The survey indicated that food literacy was comprehensively taught in home economics; therefore, the first aim of the qualitative study explored HETs' understanding of food literacy and their role in enhancing adolescents' food literacy and dietary behaviours. The second aim of this study was guided by findings of the qualitative component of the survey. In the survey, HETs identified some barriers and enablers of food literacy education in Australian high schools. However, a more interactive approach, such as a semi-structured interview protocol, was needed to explore the barriers, limitations, strengths and opportunities within the high schools environment that shape adolescents' food literacy and healthy dietary behaviours.

### *Methods*

A semi-structured interview protocol was chosen as the data collection method. Although the researcher provided a basic structure for the interview, the participant or the researcher were free to pursue an idea or response in more detail at any time. It also allowed the researcher to discover or elaborate on information provided by a participant that previously may not have been considered by the research team (Gill et al., 2008). This qualitative study involved twenty-two semi-structured interviews with HETs, which aimed to discover HETs' understanding of food literacy; their background and interest in food literacy; barriers, limitations, strengths and opportunities provided by Australian high schools to enhance adolescents' food literacy and healthy dietary behaviours. Thematic data analysis was applied to identify, analyse, interpret and report themes within the data (Braun & Clarke, 2006). Further methodological details of this study are provided in Chapter 7, section 7.4 and Chapter 8, section 8.4.

This study was approved by the Griffith University, Human Research Ethics Committee (Reference number MED/57/14/HREC). An introductory email with an invitation to participate was sent to HETs who had participated in the cross-sectional survey and provided consent to be contacted again. This invitation is provided in Appendix 4. An information sheet for this study is provided in Appendix 5.

### **3.3.4 Study 4: A qualitative study with adolescents**

Although the cross-sectional survey and the qualitative study with HETs provided insight into the importance of various aspects of food literacy for adolescents to improve their dietary behaviours, there remained a need to explore adolescents' perceptions on food literacy. In particular, it was important to explore their understanding of food literacy and identify which aspects of food literacy they perceived as the most important to support healthy eating. A qualitative approach was chosen for this study as it allowed the researcher to explore adolescents' views and experiences regarding the relationship between food literacy and their dietary behaviours without limiting participants by providing answer options. Focus groups were selected as the data collection method for this qualitative study due to their interactive format and suitability to explore under-researched topics. Focus groups allow participants to build upon what others in the forum say and suggest, discuss emerging issues with each other and explain their views (Neuman, 2005; Swift & Tischler, 2010). It has been suggested that interaction is key to a successful focus group (Gill et al., 2008), therefore focus groups were gender stratified to facilitate free discussion.

#### *Methods*

A total of fifteen focus groups were conducted, with 6 to 10 participants in each group. Focus groups consisted of a series of linked quantitative and qualitative components. First, adolescents were presented with a list of 22 aspects of food literacy which were drawn from previously published literature (see Appendix 6) (Desjardins & Azevedo, 2013; Fordyce-Voorham, 2011; Smith, 2009; Vaitkeviciute, Ball, & Harris, 2015; Vidgen & Gallegos, 2014). The researcher asked participants to choose six aspects that were the most important and six aspects that were the least important for them to eat healthy. Then, participants were asked to put their answers on the paper sheet that was presented in front of the class on a whiteboard. The researcher led a group discussion on adolescents' opinions about the various aspects of food literacy to gain a better understanding on the most and least important aspects of food literacy that impact their dietary behaviours. Second, adolescents were asked to choose six aspects from the list that they (i) knew the most about; (ii) they knew the least about; and (iii) they wanted to know more about in order to be food literate. Then, a discussion followed around those aspects of food literacy. It was important to have those two activities and discussions because the first activity identified what is important for adolescents to eat healthy, whereas the second activity helped to identify possible sources of knowledge,

adolescents' knowledge and skills about various aspects of food literacy, and areas of interest in regard to food literacy. The quantitative data were analysed using descriptive statistics to describe the data; and Chi-square and Mann-Whitney U tests to reflect possible differences between gender and year levels among adolescents. Qualitative data was analysed using a content data analysis method (Fade & Swift, 2011; Miles & Huberman, 1994). Further methodological details of this study are provided in Chapter 9, section 9.4.

This study was approved by the Griffith University Human Research Ethics Committee (Reference number MED/23/15/HREC). Informed consent forms were distributed through HETs to adolescents and their parents/guardians, and are provided in Appendix 7 and 8 respectfully.

### **3.4 Conclusion**

This chapter outlined the research methodology and methods of this thesis. First, the pragmatic research paradigm was identified as the most appropriate paradigm to frame the overall research. This moved into an explanation of the overall research design, which outlined the aims and design of each of the four studies that comprise this research project. In addition, the methods used to collect and analyse data for each study were described. The following six chapters present findings from each study, which are presented in a journal article format. All manuscripts have been accepted in international peer-reviewed journals. Each manuscript has been written in accordance with specific journal style requirements, including reference style and spelling.



## Chapter 4 Food Literacy and Adolescents' Dietary Behaviours

### 4.1 Study 1- A systematic review of the literature (Manuscript 1)

#### Reader's Note:

The information in this section has been published as an original research paper in a peer-reviewed journal:

**Vaitkeviciute, R**, Ball, L, & Harris, N. (2015). The relationship between food literacy and dietary intake in adolescents: a systematic review. *Public Health Nutrition*, 18(4):649-658. DOI: 10.1017/S1368980014000962

The co-authors of this publication confirm that the research candidate has made the following contributions to this manuscript:

- Developed the study design;
- Performed data search and article selection against inclusion and exclusion criteria;
- Participated in critical appraisal of articles;
- Participated in performing quality assessment;
- Prepared manuscript for submission to the journal.

Signed:



Date: 17/11/2016

Signed:



Date: 29/11/2016

## 4.2 Abstract

*Objective:* The aim of the present systematic review was to investigate the evidence on the association between food literacy and adolescents' dietary intake.

*Design:* The review included searches of six databases with no restriction on the year of publication or language.

*Setting:* The studies eligible for review were from five countries/regions: USA (*n* 6), Europe (*n* 4), Australia (*n* 1), Middle East (*n* 1), and South Africa (*n* 1).

*Subjects:* Adolescents aged 10 to 19 years.

*Results:* Thirteen studies were eligible for inclusion. None of the studies investigated all aspects of food literacy. Eight studies reported a positive association between food literacy and adolescents' dietary intake. For example, adolescents with greater food knowledge and frequent food preparation behaviours were shown to have healthier dietary practices. Three studies found a mixed association of food literacy and adolescents' dietary intake. For example, adolescents who frequently helped to prepare dinner had healthier dietary intake, but food shopping tasks were associated with less healthy food choices. Two studies found no association between measures of food literacy and adolescents' dietary intake.

*Conclusions:* Food literacy may play a role in shaping adolescents' dietary intake. More rigorous research methods are required to effectively assess the causality between food literacy and adolescents' dietary intake in order to confirm the extent of the relationship. Evidence recommends public health practitioners and policy makers to consider new public health strategies which focus on increasing understanding of food literacy in adolescence.

**Keywords:** food literacy, eating behaviour, adolescents, systematic review

## 4.3 Introduction

Obesity is one of the most serious public health challenges of the 21<sup>st</sup> century (1, 2). Overweight and obesity is the fifth leading cause of global deaths (1), and its prevalence has increased substantially over the past two decades (2, 3). Obesity is associated with an increased risk of physical and psychosocial-conditions, including type 2 diabetes, cardiovascular and liver diseases as well as social stigmatisation, low self-esteem and depression (4). There is an increasing focus on the factors influencing the establishment of behavioural risk factors for obesity and related chronic diseases.

Specifically, health-related behaviours established in adolescence often continue into adulthood, and influence the risk of obesity (3, 5, 6).

Adolescence is a transition period between puberty and adulthood, and refers to people aged 10 to 19 years (7). Adolescence is a period of increased autonomy and independent decision-making that may influence health-related behaviours (8). Dietary intake is one way that adolescents express their independence (8), reinforcing the importance of promoting healthy eating in this stage of life (5, 6). Adolescents' dietary patterns are characterised by frequent snacking, fast food consumption, meal skipping; and many adolescents do not meet nutrition recommendations (8, 9). Adolescents and young adults are among the most frequent consumers of restaurant meals, away-from-home meals, and packaged snacks (9). These dietary intake patterns promote weight gain and are associated with increased risk of obesity, type 2 diabetes, cardiovascular diseases and some cancers (9-11). Therefore, it is essential that public health promotion strategies and interventions focus on promoting healthy dietary intake during adolescence, and subsequently into adulthood.

Previous attempts to reduce the prevalence of adolescent overweight and obesity have displayed minimal to modest outcomes (12-14). Interventions are generally successful in increasing nutrition-related knowledge, but do not observe improvements in dietary intake (15). It has been suggested that these outcomes have occurred because previous interventions have failed to connect nutrition-related knowledge, skills, and critical decision making about dietary intake (11). Collectively, these concepts are called "food literacy", and could be the key to improving the outcomes of future interventions in this area.

The concept of "food literacy" is relatively new (10). Early studies defined food literacy as "the capacity of an individual to obtain, process and understand basic information about food and nutrition as well as the competence to use that information in order to make appropriate health decisions" (16). Defined in this way, food literacy is not just nutrition knowledge; it includes skills and behaviours, from knowing where food comes from to the ability to select and prepare these foods, and behave in ways that meet nutrition guidelines. Recently, the definition has been broadened, and described as "a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat foods to meet needs and determine food intake" (17).

The concept of food literacy builds upon the work that has been done around the relationship between food knowledge and food choices, more broadly, the relationship between knowledge and behaviour. A number of well-respected behaviour change theories, such as Bandura's Social Cognitive Theory (SCT), explain how knowledge creates the precondition for change including the self-regulation of health related habits such as food choices (18, 19). Although knowledge regarding healthy eating behaviour is necessary, the extensive research on behaviour change suggests that knowledge on its own is often not sufficient to change individual behaviour (including food choices) (20). This highlights the need to move beyond knowledge to more inclusive concepts such as literacy to effect change in behaviours of interest including diet (21, 22). As such, the concept of food literacy offers an integrative framework for investigating and understanding the factors shaping food intake and dietary patterns at an individual level.

Clarifying the influence of food literacy on dietary intake is important for the development of effective obesity prevention and management strategies. In addition, understanding the extent of the association may assist in predicting the impact of health promotion strategies that focus on improving food literacy in order to improve individuals' dietary intake. Most food literacy interventions in adolescents have focused on process evaluation outcomes such as participant satisfaction, intentions, attitudes or preferences for healthy foods or changes in learned skills and behaviours, rather than changes in dietary intake (23-31). Therefore, it is important to critically review literature that has investigated associations between food literacy and dietary intake of adolescents. This systematic review aimed to investigate the association between food literacy and adolescents' dietary intake.

#### **4.4 Methods**

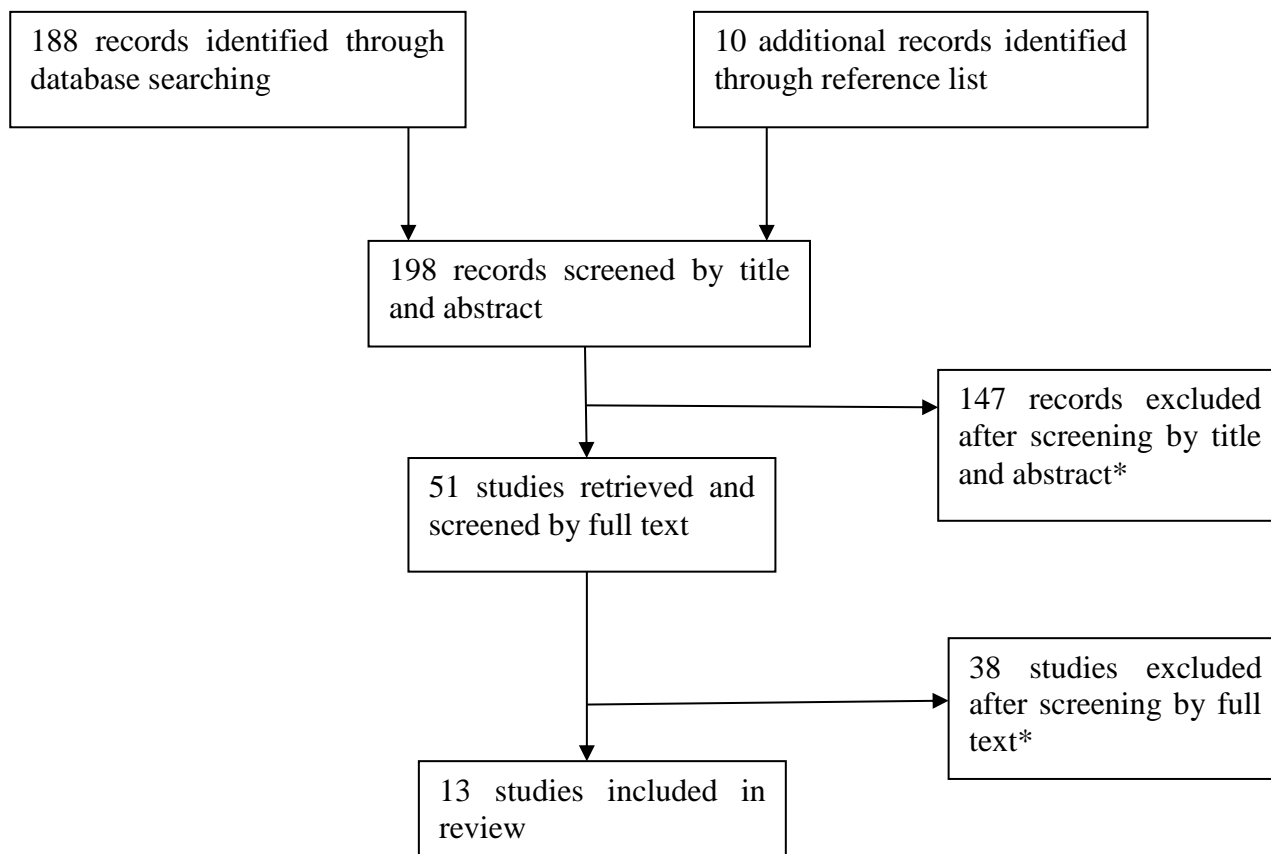
The systematic review was conducted in accordance with the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) statement checklist, which is a tool commonly used in reporting systematic reviews (32). For the purpose of this review, 'adolescence' was defined as individuals aged from 10 to 19 years and 'food literacy' was defined as "a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat foods to meet needs and determine food intake" (17).

### ***Search methods***

Articles were sourced from electronic searches of six databases: Medline (EBSCO Host), Cochrane library, PsycINFO, Web of Science, PubMed and Scopus. These databases afford broad coverage of allied health including nutrition and public health literature. Due to the multifaceted definition of food literacy, a food literacy definition matrix was developed to identify relevant search terms based on each component of food literacy. The matrix was informed by previous definitions of food literacy (16, 17, 33), and encompassed factors of knowledge, skills and behaviours with food planning, management, selection, preparation and eating. The following search terms were identified and used in combinations to search each database: *food literacy, nutrition literacy, nutrition, food, diet, nutrition knowledge, food knowledge, cooking knowledge, food preparation knowledge, food skills, cooking skills, food preparation, food purchasing, food selection, food labels, label reading, adolescent, youth, teenager, teens*. To complement this search strategy, forward citation searching was undertaken on the reference list of articles considered for review.

### ***Study selection***

A list of potentially relevant articles from each database was identified, exported and saved into EndNote® version X6. Duplicates were identified and removed; relevant articles were scanned to confirm relevance for full review by three authors independently. Articles were included for consideration if the title, abstract, or the keywords indicated the study measured an aspect of food literacy and a measure of dietary intake in adolescents. Studies were limited to adolescent populations aged 10 to 19 years old without mental health or learning difficulties. If the age range of participants extended beyond 10 to 19 years, then the studies were included if the mean age was  $\geq 10$  years or  $\leq 19$  years. There was no restriction on the year of publication or language. Differences in selections were discussed before the list of included studies was finalised. Ineligible articles were removed from the list after noting the reason for exclusion. The PRISMA flow diagram was used to document the systematic review search and selection processes of the study (see Figure 4.1) (32).



\*Reasons for exclusion:

- Study population not adolescents (adult or young children) (*n* 69)
- Did not address the main objective of the study (*n* 31)
- No food literacy or dietary intake measure (*n* 85)

**Figure 4.1** Flow chart of the literature search and review process

### ***Data extraction and analysis***

The key information from each study selected for review was extracted carefully by one researcher (R.V.) into a prepared evidence worksheet for comparison and quality assessment suggested by the American Dietetic Association guidelines (34). The key information included title, year, author, study design, purpose, study population characteristics, study protocol, outcome variables and results. This information is summarised in Table 4.1.

### ***Outcomes assessed***

Relevant study outcomes to the review were those that reflected measures of food literacy (such as food knowledge, food skill and food behaviours) and dietary intake (such as dietary recalls, food frequency questionnaires). Some of the studies considered for review focused on other food-related measures, such as social connectedness from

community gardens/kitchens, acculturation or migration outcomes in changing dietary habits, and these studies were only included if they also investigated the outcomes of an aspect of food literacy on measures of dietary intake.

### *Quality assessment*

According to the PRISMA checklist, risk of bias of methodological quality within each individual study was assessed by two independent researchers (R.V. and L.B.) using the American Dietetic Association Quality Criteria Checklist (QCC)<sup>(34)</sup>, see Table 2. The QCC is a tool that addresses scientific rigour and is commonly used to assess studies in the field of nutrition. The checklist includes ten criteria that assess the applicability to practice and scientific validity of each study. Through this tool, the quality attributes of each study were classified as positive, neutral or negative. The outcomes of the quality assessment are shown in Table 4.2.

**Table 4.1** Summary table of studies included in the present systematic literature review and narrative description

Study details	Study design	Target group	Food literacy measure	Outcome measure	Summary of findings
Caraher et al., UK (2013) (44)	Quasi-experimental intervention	9 to 11 year old n=169	Cooking confidence scale	Vegetable consumption scale	Participants enjoyed tasting new foods, making new dishes, learning new fruit and vegetable cutting skills, wanted to have more sessions with a chef. Adolescents increased their individual food preparation skills. At post-test cooking confidence and vegetable consumption significantly increased ( $P=0.002$ ) in the intervention group.
Laska et al., USA (2012) (9)	Longitudinal cohort	15 to 28 year old n=1,321	Involvement in household food tasks questionnaire	Youth/Adolescent FFQ and The Willett semi-quantitative FFQ	Adolescents who helped prepare food for dinner were more likely to engage in food preparation as emerging adults (19-23 year old), such as buying fresh vegetables, writing a grocery list, preparing dinner with chicken, fish or vegetables, and preparing an entire dinner for two or more people. It was significantly associated with enjoyment of cooking ten years later among both genders ( $P=0.003$ ).
Leal et al., Portugal (2011) (5)	Cross-sectional	7 <sup>th</sup> , 8 <sup>th</sup> , 9 <sup>th</sup> grade (mean age 13.5 year old) n=390	Cooking habits and skills questionnaire	KIDMED index score	Better cooking habits and skills were positively related with adolescents' adherence to the Mediterranean diet. Adolescents with higher KIDMED index scores knew how to cook better, cooked more often, enjoyed cooking, would like to cook more frequently, and would like to learn how to cook better ( $P<0.001$ ).
Venter et al., South Africa (2010) (35)	Cross-sectional	17 to 18 year old n=168	Dietary fat knowledge questionnaire	A screening questionnaire for fat intake	The association between fat knowledge score and intake of the participants was significant ( $P<0.05$ ). Adolescents who followed a diet high in fat mostly obtained a poor fat knowledge score, while the participants who followed a diet desirable in fat content mostly obtained average fat knowledge score. Fat knowledge scores were poor; more females achieved average scores than males.
Tsartsali et al., Greece (2009) (36)	Cross-sectional	15 to 17 year old n=200	Mediterranean dietary pattern (MDP) knowledge questionnaire	FFQ and KIDMED index score	More than half of participants had poor or very poor actual MDP knowledge. Perceived MDP knowledge was positively correlated with vegetable consumption, while actual knowledge was negatively correlated with meat consumption. Actual knowledge was the only significant predictor of MDP adherence ( $P=0.03$ ).



Mirmiran et al., Iran (2007) (37)	Cross-sectional	10 to 18 year old (mean age 14±1 year) n=7,669	Nutrition knowledge, attitudes and practices (KAP) questionnaire	The Willet semi-quantitative FFQ	There were significant differences between genders in knowledge, attitudes and practices score ( $P<0.001$ ), females having higher nutrition knowledge scores, while males better nutritional practices. There was a significant correlation between nutritional knowledge and attitudes scores ( $P<0.001$ ), but the correlation between nutritional knowledge and behaviour scores was weak (not significant).
Larson et al., USA (2006) (38)	Cross-sectional	11 to 18 year old n=4,746	Involvement in household food tasks questionnaire	Youth/Adolescent FFQ	Greater involvement in food tasks was significantly related to sex (female), grade level (middle school), race (Asian-American), socioeconomic status (low), family meal frequency (high), weight status (overweight). Food preparing was positively associated with fruit consumption in males ( $P<0.01$ ) and fruit and vegetable consumption in females ( $P<0.01$ ). Food preparing was also inversely associated with carbonated beverages consumption among females ( $P=0.01$ ) and fried food consumption among males ( $P<0.01$ ). Food shopping frequency was related to greater consumption of fried foods among females ( $P<0.01$ ).
Huang et al., USA (2004) (39)	Cross-sectional	10 to 19 year old n=301	Frequency of nutrition label reading	“Fat screener”	A greater proportion of females reported always reading nutrition labels and a smaller proportion never reading ( $P=0.04$ ) than males. African-Americans had higher per cent calories from fat than Caucasians and other ethnicity groups. Boys who always read nutrition labels consumed the greatest percent calories from fat; in girls, percent calorie intake did not differ significantly. Frequency of reading nutrition labels was not associated with healthier diet.
Pirouznia USA (2001) (40)	Cross-sectional	10 to 13 year old n=532	Comprehensive Assessment of nutrition knowledge, attitudes and practices (CANKAP) questionnaire	CANKAP questionnaire	Knowledge score did not differ by gender in 6 <sup>th</sup> grade, while in 7 <sup>th</sup> and 8 <sup>th</sup> grades girls score significantly higher ( $P=0.000$ ), same patterns for eating behaviour. No correlation was found between nutrition knowledge and eating behaviour in both genders in the 6 <sup>th</sup> grade and only males in 7 <sup>th</sup> and 8 <sup>th</sup> grades. There was a correlation ( $P<0.006$ ) between the nutrition knowledge and eating behaviour of females in the 7 <sup>th</sup> and 8 <sup>th</sup> grades.

Chapman et al., USA (1997) (45)	Pre-, post- intervention	14 to 18 year old  n=72 females only	Modified version of nutrition knowledge and attitude questionnaire	24-hour dietary recall	Post-test nutrition knowledge scores significantly increased and were higher than in control group. Total 24-hour dietary intake: both (pre- and post- test) intakes were low for meeting the nutrition needs of females involved in competitive sports. Post-test fat intake decreased in intervention group, but carbohydrate consumption increased for both groups from the pre-test. The experimental group demonstrated a correlation between the nutrition knowledge pre-test score and carbohydrate intake and the highest negative correlation was seen between nutrition knowledge score and fat intake.
Gracey et al., Australia (1996) (41)	Cross- sectional	15 to 16 year old  n=391	Nutrition knowledge questionnaire based on the Australian dietary guidelines	30-item food variety score and fat, fish, soft drinks, water consumption questionnaire	Nutrition knowledge scores were significantly greater in females ( $P=0.011$ ). Fat and soft drink consumption was significantly higher in males ( $P=0.000$ ). Nutrition knowledge score was not significant in the regression model compared with fat intake score. There was a significant positive relationship with nutrition knowledge and food variety score as a dependant variable.
Osler et al., Denmark (1993) (42)	Cross- sectional	12 to 14 year old  n=674	Nutrition (sugar, fat and fibre) knowledge questionnaire	Consumption of 14 different food items frequency questionnaire	Adolescents had better knowledge about fat and sugar than dietary fibre; immigrant children had significantly lower overall knowledge than native children. Respondents with healthy habits had higher knowledge than groups with opposite habits. Mean overall nutrition knowledge increased with increasing number of healthy dietary habits. Significant personal predictors of healthy dietary behaviour were knowledge and health attitudes.
Trexler et al., USA (1993) (43)	Cross- sectional	14 to 18 year old  n=600	Nutrition knowledge questionnaire	24-hour dietary recall	Participants from 'high risk' diet category exceed the American Heart Association dietary intake recommendations. Sodium knowledge was significantly related to the sodium intake ( $P=0.0042$ ). No other significant relationship between knowledge scores and diet quality were found.

**Table 4.2** Quality assessment attributes for each study assessed using the Quality Criteria Checklist (QCC)

Study	Criteria scores										Overall quality rating <sup>a*</sup>
	1. Clear research question	2. Participant selection free from bias	3. Comparable study groups	4. Participant withdrawals or response rate described	5. Use of blinding	6. Description of intervention protocol and/or data collection procedures	7. Outcomes clearly defined	8. Appropriate statistical analysis	9. Conclusions supported by results	10. Unlikely funding bias	
1. Caraher et al. (44)	+	+	+	+	-	+	+	+	+	NR	+
2. Laska et al. (9)	+	+	N/A	+	N/A	+	+	+	+	+	+
3. Leal et al. (5)	+	+	N/A	+	N/A	+	+	+	+	+	+
4. Venter et al. (35)	+	+	N/A	+	N/A	+	+	+	+	+	+
5. Tsartsali et al. (36)	+	+	N/A	+	N/A	+	+	+	+	+	+
6. Mirmiran et al. (37)	+	-	N/A	-	N/A	+	+	+	+	NR	∅
7. Larson et al. (38)	+	+	N/A	-	N/A	+	+	+	+	+	+
8. Huang et al. (39)	+	-	N/A	-	N/A	-	+	+	+	NR	-
9. Pirouznia (40)	+	+	N/A	-	N/A	+	+	+	+	NR	+
10. Chapman et al. (45)	+	+	+	-	-	+	+	+	+	NR	+
11. Gracey et al. (41)	+	+	N/A	-	N/A	+	+	+	+	+	+
12. Osler et al. (42)	+	+	N/A	+	N/A	+	+	+	+	+	+
13. Trexker et al. (43)	+	+	N/A	-	N/A	+	+	+	+	+	+

\* + Positive overall score: this overall score is given if criteria 2, 3, 6, 7 of the QCC and one additional criterion have received a positive score. ∅ Neutral overall score: this score is given if more criteria are met than for a negative overall score but an overall positive score is not reached. - Negative overall score: this score is given if 6 or more QCC criteria are not met. N/A- not applicable due to cross-sectional study design. NR- not reported

## 4.5 Results

A total of 198 articles were retrieved from the six database searches. Of those studies, 147 did not qualify for further review as they were either not relevant to the topic, did not incorporate adolescents, did not incorporate relevant outcome measures or was not an original research article (e.g. editorials). A full article review was conducted on the remaining 51 studies, after which an additional 38 were excluded. Of those 38 studies, eight were found not to be a study (i.e. describing an education intervention process or did not have evaluation measures), and 30 did not include a measure of food literacy or dietary intake measure (see Figure 4.1).

### *Summary of included studies*

Table 1 provides a summary of each study included for the review. The studies were published between 1993 and 2013 and included ten cross-sectional studies (5, 35-43), two intervention studies (45, 45) and one longitudinal cohort study (9). One of the cross-sectional studies (38) was a part of the longitudinal cohort study (9). Six of the studies were conducted in the USA (9, 38-40, 43, 45), four were conducted in Europe (5, 36, 42, 44), and one each in Australia (41), the Middle East (Iran) (37), and South Africa (35). The number of participants ranged from 72 to 7,669. The age range of adolescent participants was 10 to 19 years.

Questionnaires were used for data collection in all studies. None of the studies investigated all aspects of food literacy (knowledge, skills and behaviours); nine studies investigated the relationship between food knowledge and dietary intake (5, 35-37, 40-43, 45), one study investigated the relationship between food skills (such as cooking) and dietary intake (44), and four studies investigated the relationship between food behaviours (such as shopping or food preparation) and dietary intake (5, 9, 38, 39). Only two studies investigated two of the three aspects of food literacy (5, 44). Dietary intake was measured by Food Frequency Questionnaires (FFQ) (9, 36-38), 24-hour dietary recalls (43, 45), KIDMED index scores (5, 36), and other questionnaires (35, 39-42, 44).

The outcomes of the quality assessment are shown in Table 2. Eleven studies were assessed to have a positive quality rating, one study received a neutral rating and one study received a negative rating. Due to most studies utilising a cross-sectional design, some parts of the assessment checklist were not applicable and the checklist was modified in order to optimally evaluate the quality of cross-sectional studies. For these studies, the

criteria about comparable groups were not applicable, and the criterion about describing the intervention protocol was modified to ‘description of data collection procedures’. The main reasons for not achieving a positive quality rating were most often linked to omissions in the write-up of the manuscript such as participant selection and blinding processes and withdrawals/dropouts or response rates of participants.

The relationship between aspects of food literacy was examined in three broad approaches: (i) relationship between food knowledge and dietary intake; (ii) relationship between food skills and dietary intake; (iii) the relationship between food behaviours and dietary intake.

### *Food knowledge*

Of the nine studies that investigated the relationship between food knowledge and dietary intake, six studies showed a positive impact upon knowledge (5, 35, 36, 40-42), one study showed a negative impact on knowledge (37) and two studies were not able to identify a clear relationship between food knowledge and dietary intake (43, 45). More specifically, adolescents with greater food knowledge were shown to follow healthier dietary practices (42) and ate a larger variety of foods (41). In addition, adolescents with greater cooking knowledge followed healthier dietary practices (5). Interestingly, two studies reported mixed findings, such as reduced fat intake but increased carbohydrate intake (45); and an association for sodium knowledge and intake, but not other nutrients (43). Only one study found a weak, non- significant association between food knowledge and dietary behaviours, whereby adolescents with good nutrition knowledge had similar dietary practices compared to other participants (37). Four studies revealed that females had greater food knowledge than males (35, 37, 40, 41). Surprisingly, one study found that females had greater food knowledge but poorer dietary practices compared to males (37).

### *Food skills*

Only one study investigated the relationship between food skills and dietary intake (44). This intervention study found that after participating in a school-based cooking program, adolescents enjoyed tasting new foods, making new dishes and learning new cooking skills (44). Following the intervention, participants reported an increase in their food skills such as cutting fruits and vegetables, following recipes, measuring ingredients

and preparing foods. Cooking confidence of adolescents significantly increased as well as vegetable consumption (44).

### *Food behaviours*

Of the four studies that investigated the relationship between food behaviour and dietary intake, two studies found a positive impact of food preparation behaviours (5, 9), one study found a variable impact of food behaviours (38), and one study found no impact of food behaviours on dietary intake (39). Specifically, one study found that frequent cooking was associated with healthier dietary practices (5). Similar findings were observed in the longitudinal cohort study by Laska, which revealed that food preparation behaviours track over time (9). Adolescents who assisted to prepare dinner were more likely to engage in food preparation-related behaviours as emerging adults (19-23 year old) such as buying fresh vegetables, writing grocery lists, and preparing dinner with chicken, fish or vegetables (9). Likewise, helping to prepare food for dinner was associated with increased enjoyment of cooking ten years later (9). Interestingly, one study found that more frequent food preparation was associated with increased fruit consumption in male adolescents and increased fruit and vegetable consumption in female adolescents, and was also negatively associated with unhealthy food choices, including soft drink consumption in females and fried food consumption among male adolescents (38). Only one study did not find any relationship between food behaviours and dietary intake, and specifically found that frequency of reading food labels was not associated with dietary intake (39). Interestingly, three studies found that female adolescents were more involved in food-related tasks and read food labels more frequently compared to male adolescents (9, 38, 39).

## **4.6 Discussion**

This systematic review investigated the association between food literacy and the dietary intake of adolescents. Overall, the evidence from the present review suggests that food literacy may play a role in shaping youth eating behaviours (5, 9, 35, 36, 40-42, 44). In addition, findings suggest that food skills and behaviours learned in adolescence are sustained later in life (9). For example, Laska's longitudinal study found that adolescents who assisted in preparing dinner were more likely to engage in food preparation behaviours five years later (9). However, the study quality, tools utilised for collecting

data and measured aspects of food literacy should be acknowledged when interpreting the findings of the systematic review.

The studies in the systematic review incorporated a variety of methodological approaches to their study design. The lack of randomised controlled trials, and emphasis on cross-sectional studies reduces the ability to clarify the strength and nature of the association between aspects of food literacy and dietary intake. Furthermore, most of the studies used tools that were developed for the specific investigation being reported, and did not incorporate validated tools to measure aspects of food literacy (36, 39, 41-43). For food literacy to become established as an important concept in understanding the complex relationships between food knowledge, skills and behaviours and dietary choices, instruments that encompass the identified aspects of food literacy must be developed and validated. Also, none of the studies incorporated a holistic and comprehensive tool to measure food literacy. Rather, studies measured only one or two aspects of food literacy. For example, Osler's study measured food knowledge and dietary intake of Dutch adolescents (42), Caraher investigated the impact of cooking program with a chef to adolescents' vegetable consumption and food preparation skills (44). This suggests that further research is required to develop comprehensive, validated tools for measuring food literacy in order to increase the strength of future research in this area.

The quality of the studies included in the review should be considered when interpreting their findings. Although most of the studies received a positive overall quality rating (5, 9, 35, 36, 38, 40-45), it should be acknowledged that the quality assessment checklist was modified appropriately to assess the studies that utilised a cross-sectional study design. Seven studies did not describe the participant withdrawals/dropouts or response rate in their studies (37-41, 43, 45); and neither of the intervention studies described the blinding procedures utilised to prevent the possibility of measurement bias (44, 45). These attributes of the study limit confidence in determining the extent of the association between food literacy and dietary intake. Nevertheless, it should be noted that Caraher's cooking intervention study received a positive overall quality rating and also found a positive relationship between food literacy and dietary intake (44). In addition, the two studies which reported no significant impact of aspects of food literacy on dietary intake received neutral and negative overall quality ratings (37, 39). There is clearly a need for more rigorous research to effectively assess the causality between food literacy and adolescents' dietary intake in order to confirm the extent of the relationship.

None of the reviewed studies utilised the term ‘food literacy’ in their description of the study outcomes. This is likely due to food literacy being a relatively new concept and only recently defined (17). While broadly defined food literacy encompasses food knowledge, skills and behaviours, almost all studies investigated a specific aspect of food literacy, with most of them using food knowledge as a proxy of food literacy (5, 17, 35-37, 40-43, 45). Previous interventions for addressing adolescent overweight and obesity aimed to increase food knowledge of adolescents as the best public health strategy (15); however, this narrow focus may offer an explanation why many interventions up to date have displayed minimal or modest outcomes in reducing the prevalence of adolescent overweight and obesity. The present systematic review highlights the possible positive influence of food skills and behaviours on adolescents’ dietary intake. For example, Caraher’s study reported an increase in vegetable consumption of adolescents after the cooking program with a chef (44). However, these studies require further support from future research, as only one study has investigated the impact of food skills on dietary intake, and only four studies have investigated impact of food behaviours on adolescents’ dietary intake (5, 9, 38, 39, 44).

The present systematic review highlights the opportunities for future research. Firstly, as most of the studies employed cross-sectional study design, it is currently not possible to clarify any causal contributions of food literacy on adolescents’ dietary behaviours. Therefore, future research should consider a longitudinal approach to be able to investigate the potential causal contribution of food literacy on adolescents’ dietary intake. Secondly, there are opportunities for future research to develop validated tools that comprehensively measure food literacy. These tools would enhance the comparability of findings between studies, and subsequently increase the confidence in interpreting findings of the body of research in this area. Finally, there is an opportunity to investigate which aspects of food literacy are critical for improving adolescents’ dietary intake, including possible differences in male and female adolescents. There is currently a lack of evidence about the impact of food skills and behaviours on adolescents’ dietary intake. Investigating the relative influence of the components of food literacy may further inform the development of public health policies that aim to address adolescent overweight and obesity.

One of the main strengths for the present review is the systematic nature of its methodology which differs from a traditional review in which previous work is described but not systematically identified, assessed for quality and synthesized (46). Introduction



of bias was minimised by independent researchers using the same data extraction worksheet for each individual study and quality assessment checklist. This systematic review used six databases, which afford broad coverage of allied health including nutrition and public health literature. Although there are some inconsistencies in the findings of the studies, the existing research has important implications for public health practitioners and policy makers. Overall, the findings suggest that there is an influence of food literacy on dietary intake and may be an appropriate public health strategy to address growing prevalence of adolescent overweight and obesity.

### **Limitations**

The present systematic review is subject to two notable limitations. First, it was challenging to compare the findings of reviewed studies due to differences in study designs, data collection methods and participant samples. The bias of this limitation was minimized through the use of the same evidence worksheet for each individual study. In addition, the studies were grouped in accordance with the food literacy definition matrix, which helped to identify major themes and report the findings. Second, most of the evidence on the impact of aspects of food literacy on dietary intake is based on self-reported data, which may influence the reporting of actual food skills capabilities (44) and dietary intake by participants and reduces confidence in study outcomes. Some participants may have reported inaccurate information, responded in a socially desirable way or their answers subject to recall error (47). Recognising these limitations, it is equally important to acknowledge that self-report data on food consumption has been shown to be as reliable as more formal 24-hour dietary recall assessment (47).

### **4.7 Conclusions**

This systematic review found that food literacy may influence adolescents' dietary intake. It is apparent there is a lack of research that has measured all aspects of food literacy over time or longitudinally to determine the strength and nature of the association with dietary intake. The review identifies the need for rigorous research methods to attain a greater understanding of influence of food literacy on dietary intake. The systematic review suggests that improving food literacy in adolescence may improve individual's food skills and healthier dietary behaviours. The evidence recommends public health promotion practitioners and policy makers to consider new public health strategies which focus on increasing food literacy in adolescence.

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## Chapter 5 Food Literacy Education and High Schools' Food Environment

### 5.1 Study 2- A cross-sectional survey (Manuscript 2)


#### Reader's Note:

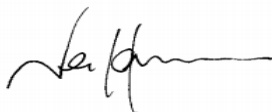
The information in this section has been published as an original research paper in a peer-reviewed journal:

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The co-authors of this publication confirm that the research candidate has made the following contributions to this manuscript:

- Developed the study design;
- Completed the human research ethics application;
- Developed questionnaire and pilot tested;
- Conducted data collection;
- Performed data analysis;
- Prepared manuscript for submission to journal.

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## 5.2 Abstract

**Background:** Food literacy can encourage adolescents to develop healthy dietary patterns. This study examined home economics teachers' (HET) perspectives of the importance, curriculum, self-efficacy and food environments regarding food literacy in secondary schools in Australia.

**Methods:** A 20-item cross-sectional survey was completed by 205 HETs. The survey focused on the importance of aspects of food literacy, HETs' self-efficacy and attitudes towards food literacy and schools' food environments. Data were analyzed descriptively, and associations between participants' demographic characteristics and perceptions were investigated by Pearson's chi-square analyses.

**Results:** HETs rated aspects of food literacy including preparing and cooking food, knowing about healthy foods and food safety and hygiene practices as very important. They indicated animal welfare, where food comes from, and plan and manage time for food shopping to be the least important aspects of food literacy. HETs reported that students' involvement in food literacy activities resulted in healthier diets and improved food practices, but the schools' food environments are not comprehensively supportive of food literacy.

**Conclusions:** HETs report that food literacy is very important for adolescents to learn. The focus is more on micro aspects in comparison to macro aspects of food literacy. Schools' food environments are ideally positioned to shape dietary intake of adolescents but their potential is not being realized.

**Keywords:** child and adolescent health, food literacy, home economics, dietary behaviors, secondary school

## 5.3 Introduction

Healthy dietary intake during adolescence is important to establish lifelong healthy dietary habits (1, 2). Healthy dietary habits help adolescents attain their full growth, promote health and well-being, and reduce the risk of overweight and obesity in adulthood (3-5). Currently, the dietary intake of adolescents in industrialized countries is regarded as poor, with low consumption of dairy, fruits, vegetables, grains and high consumption of soft drinks, sweets and convenience foods (6, 7). More specifically, the dietary intakes of adolescents do not meet national dietary guidelines (8). In Australia, two-thirds of adolescents fail to regularly consume foods from the five recommended

food groups, with a third of adolescents not eating sufficient fruits and vegetables, and a fifth reporting eating convenience foods on a daily basis (9).

The high school settings have been identified by the World Health Organization (WHO) as an ideal setting to teach adolescents about healthy dietary habits, and help them to make healthy and informed food choices (10, 11). Schools that are ‘health promoting’ result in enhanced (1) lifelong learning skills; (2) competencies and behaviors; (3) specific cognate knowledge and skills; and (4) self-attributes (10, 12). Schools provide an opportunity to introduce health related information and to increase students’ health literacy levels (10, 13). Therefore, the implementation of strategies in the school setting that promote healthy dietary habits warrants further consideration.

Comprehensive food and nutrition education curricula can reduce unhealthy behaviors in adolescents, including poor dietary habits (10). The concept of “food literacy” is an emerging concept, derived partly from a fundamental understanding of literacy and partly from health literacy (14-16). At a basic level, literacy relates to an individual’s ability to read and write (14). Nutbeam incorporated the concept of literacy in health promotion and defined health literacy as “the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health” (17). Home Economics Victoria, an Australian professional association for HETs, adapted these concepts to food and nutrition and described food literacy as “having the knowledge, skills and the capacity to source, prepare, cook and share food in a sustainable manner to promote a healthy and balanced lifestyle. Food literacy is also about individuals understanding the role that food plays in communities and cultures” (18). In order to increase adolescents’ food literacy, many schools incorporate basic food and nutrition education in the curricula to promote the attainment of personal skills such as food selection and preparation (12).

The Australian school curriculum includes mandatory food and nutrition education for students from Year 1 to Year 10 (19). This education supports adolescents to increase knowledge and develop skills to make healthy food choices and understand factors that influence dietary intake and food choices. Food and nutrition education incorporates food groups and recommendations for healthy eating including the Australian Guide to Healthy Eating and the Australian Dietary Guidelines for Children and Adolescents (19). Students develop food and nutrition related skills such as preparing and cooking food in accordance with dietary guidelines and making healthy food choices when selecting, planning and preparing foods (19). Collectively, food and nutrition education assists in the development of adolescents’ food literacy.



In most schools, the responsibility to increase adolescents' food literacy sits within the home economics learning area. This learning area orients on individual and family wellbeing in their day-to-day living through building student capacity including the application of food and nutrition knowledge into practice such as developing food skills (16). It is important to know how food literacy is taught and which aspects of food literacy are emphasized at secondary schools as a recent systematic review indicated that food literacy may influence adolescents' dietary intake (20). There is limited understanding about which aspects of food literacy are being emphasized by Home Economics teachers (HETs), and which aspects are perceived as the most important for improving adolescents' dietary intake. Therefore, this study examines HETs' perspectives regarding food literacy education in secondary schools in Australia.

## **5.4 Methods**

### ***Participants***

The target population was individuals who self-identified as a home economics teacher working at a secondary school in Australia. An introductory email with plain-language information about the study, and a link to complete an online survey was sent to potential participants in October, 2014 via two major Home Economics professional associations: Home Economics Institute of Australia (HEIA) and Home Economics Victoria (HEV). In addition, the link to an online survey was posted on the HEIA website.

### ***Instrumentation***

A 20-item self-administered survey was developed to examine HETs' perspectives around food literacy at secondary schools in Australia. Questions were developed after a review of literature on the topic of food literacy, food skills, the Australian high school curriculum and the school food environment (15, 16, 19, 21-24). The survey was tested for face validity with four experts from public health, nutrition and dietetics, and education. It was pilot tested during the development and pre-testing stages. During this process the wording, answer options and structure of some questions were changed. The final survey consisted of five sections as described below.

***Understanding and importance of aspects of food literacy.*** This section aimed to describe HETs' understanding of food literacy and the relative importance of each aspect of food literacy. Each aspect of food literacy was drawn from previously published literature (16, 20, 22, 25) and clustered into three components of food literacy namely

food and nutrition knowledge, food skills and capacity. Twenty-two aspects of food literacy were identified. A full list of food literacy aspects are presented in the results section (Table 5.3). This section included questions such as “How important do you feel it is for students to know about, to be able to do and to have the following aspects of food literacy?” These items were displayed with a 5-point Likert scale response set of “not at all important”, “slightly important”, “moderately important”, “very important”, and “extremely important”.

***Food literacy education at secondary schools.*** This section consisted of four items that examined which aspects of food literacy are taught at secondary schools in Australia. It also collected information regarding HETs’ beliefs about the association between students’ involvement in food literacy education classes and level of food literacy including food choices. For example, “How much time do you spend on the following aspects of food literacy?” The questions were followed by the list of aspects of food literacy (Table 5.3) with response options of “no time”, “a little bit of time”, “a moderate amount of time”, “a lot of time” and “most of the time”.

***Home economics teachers’ self-efficacy and attitudes towards food literacy.*** This section consisted of two items that examined HETs’ self-confidence and attitudes regarding food literacy. For example, “To what extent do you feel confident with the following activities?” The question was followed by a list of activities, such as: prepare and cook nutritious meals on a reasonable budget, and access and understand the latest research-based food and nutrition information with response options of “not at all confident”, “not very confident”, “moderately confident”, “very confident” and “extremely confident”.

***Schools’ food environments.*** This section consisted of four items that examined if HETs perceived their school’s food environments as food literacy enhancing or discouraging. The Analysis Grid for Environments Linked to Obesity (ANGELO) Framework (26) was adopted to evaluate schools’ food environments. This conceptual model divides the food environment by size (macro and micro) and by type (economic, physical, political, socio-cultural). For the purpose of this study, only the school setting as a micro environment was analyzed. Each type of environment and its elements are described in Table 5.1. These items were scored with a 5-point Likert-type scale of “strongly disagree”, “disagree”, “neither agree or disagree”, “agree”, “strongly agree” as response options.

**Table 5.1** Food environments and its elements

<b>Type of Food Environment</b>		<b>Elements</b>
Physical	What is available?	School's canteen School's geographical proximity to fast-food outlets School's kitchen for teaching adolescents' food preparation skills Space to store food Sufficient food literacy education training for teachers Sufficient food literacy enhancing activities
Economic	What are the financial factors?	Price of healthy food options at school Other off- and on-campus food providers Sufficient funding for nutrition-related programs
Political	What are the rules?	National Healthy School Canteen guidelines Australian Guide to Healthy Eating for children and adolescents Healthy lunch box policy
Socio-cultural	What are the attitudes, beliefs, perceptions and values?	School's staff supportiveness of food literacy enhancing activities School's staff are role models for healthy eating Peer pressure when it comes to what students eat

**Demographics.** Demographic questions examined HETs' age, sex, how many years they have taught food literacy, which state/territory they live in, and the type of school in which they teach.

### **Procedure**

The survey was designed for online completion using LimeSurvey. Data were collected between October and November 2014. Consent to participate in the online survey was indicated by completion of the survey. Participants were offered the chance to win one of five \$50 gift vouchers as an incentive for completing the survey.

### **Data Analysis**

Data analysis was performed using SPSS v22. First, descriptive analyses were performed to describe the population and generate frequencies of each question. Second, associations between participants' demographic characteristics and perceptions regarding the importance of each aspect of food literacy, time spent on each aspect, teacher's

confidence and attitudes towards food literacy and school's food environments were investigated using Pearson's chi-square analyses. Statistical significance was set at  $p < .05$ .

## 5.5 Results

### Demographics

Of 264 HETs who opened the survey link, 205 (77.7%) completed the survey (Table 5.2). Most participants were female (97.1%), aged between 45-59 years (62%), with over 20 years of teaching experience (54.6%) and were working in public schools (63.9%). More than half of participants resided in Victoria (63.9%), with the remainder residing in Queensland (14.6%), New South Wales (10.7%) and other states (10.8%).

**Table 5.2** Demographic characteristics of the sample

	<b>Home Teachers N=205 Number (%)</b>	<b>Economics</b>
<i>Sex</i>		
Female	199 (97.1)	
Male	6 (2.9)	
<i>Age</i>		
20-29 years	9 (4.4)	
30-39 years	29 (14.1)	
40-49 years	56 (27.3)	
50-59 years	92 (44.9)	
60 years and older	19 (9.3)	
<i>Years of experience</i>		
Student teacher	2 (1)	
1-5 years	24 (11.7)	
6-10 years	35 (17.1)	
11-15 years	20 (9.8)	
16-20 years	12 (5.9)	
Over 20 years	112 (54.6)	
<i>State/territory</i>		
Victoria	130 (63.4)	
Queensland	30 (14.6)	
New South Wales	22 (10.7)	
South Australia	12 (5.9)	
Western Australia	8 (3.9)	
Australian Capital Territory	2 (1)	

Tasmania	1 (0.5)
<i>Type of school</i>	
Public	131 (63.9)
Catholic	37 (18)
Private	19 (9.3)
Independent	18 (8.8)

### **Understanding and importance of each aspect of food literacy**

HETs rated most of the food literacy aspects as ‘important’ or ‘very important’ for students to learn (Table 5.3). The highest level of importance that nearly all HETs rated as ‘important’ or ‘very important’ for adolescents to learn was to be able to prepare and cook food from basic/available ingredients (99%, N=203), to use common kitchen equipment, utensils and appliances (98.5%, N=202) and to know ‘food safety and hygiene practices’ (98.5%, N=202). Some food literacy aspects were rated as relatively less important for adolescents to learn compared to other aspects. Lowest level of importance was attributed to animal welfare (55.1%, N=113 rated as important or very important), ability to gather food from different sources (72.2%, N=148), ability to plan and manage time for food shopping (75.1%, N=154), knowledge of where foods come from (77.1%, N=158) and environmental sustainability (83%, N=170).

### **Food literacy education at secondary schools**

Overall, 61% of respondents stated that food literacy could be incorporated in other learning areas such as technology and health and physical education. Some participants (12%, N=23) indicated other learning areas such as geography and outdoor education. Also, some of the teachers identified the Stephanie Alexander Kitchen Garden program in “other” learning areas.

Most of the HETs included all aspects of food literacy in their teaching but with different intensity. Teachers focused more on the day-to-day knowledge and skill aspects of food literacy. Nearly all HETs indicated that they are spending ‘a lot’ or ‘most time’ on teaching adolescents about food preparation and cooking (94.7%, N=194), followed by how to use common kitchen equipment, utensils and appliances (87.3%, N=179), food safety and hygiene practices (79.5%, N=163), how to follow and adapt recipes (73.2%, N=150), healthy and unhealthy foods (62.4%, N=128), and how to store food appropriately and safely (61.5%, N=126). In contrast, 77.1% of teachers indicated that they are spending ‘a little bit’ or ‘no time’ on animal welfare, how to plan and manage time for food shopping (65.4%, N=134), how to plan and manage a budget for food

(52.7%, N=108), where to obtain food (44.9%, N=92) and environmental sustainability (40%, N=82).

Nearly all HETs (88.8%) indicated that students' involvement in food literacy related activities leads 'a lot' or 'to a great extent' to increased food safety and hygiene practices, increased food and nutrition knowledge (66.4%, N=136), greater participation in food literacy enhancing activities such as cooking classes (59.5%, N=122), greater interest in nutrition and health (51.7%, N=106), increased ability to interpret food labels (46.8%, N=96) and more frequent purchasing, preparation and cooking of healthy meals (39%, N=80). Interestingly, teachers with considerable experience ( $\geq 16$  years) were more likely than less experienced teachers to report that students' involvement in food literacy learning experiences contributed to increased ability to interpret food labels ( $p < .05$ ).

### **HETs' self-efficacy and attitudes towards food literacy**

Nearly all HETs indicated that they feel 'very' or 'extremely' confident in all food literacy higher-level activities including storing all foods appropriately and safety (99.5%, N=204), use of different food preparation techniques (99%, N=203), use all food preparation facilities, utensils and appliances available (98.5%, N=202), preparing and cooking nutritious meals on a reasonable budget (97.6%, N=200), source and select wide variety of foods in accordance with dietary guidelines (97.6%, N=200), interpret food labels and instructions (94.7%, N=194), and access and understand the latest research-based food and nutrition information (94.1%, N=193).

Nearly all respondents agreed that food literacy should be mandatory in secondary schools through all years (90%, N=185) and also agreed that school is an important place to enhance adolescents' food literacy levels (99.5%, N=204). However, only 43.4% of HETs agreed that students at their school are food literate. Furthermore, nearly all HETs believed that food literacy is an essential life skill (98%, N=201) and 79.1% believed that food literate people make healthier food choices. Only one third of respondents agreed that food and nutrition knowledge on its own is enough to make healthy food choices.

**Table 5.3** HET's perspectives on how important is for students to know, to be able and to have each aspect of food literacy (very or extremely important)

<b>Aspect of food literacy</b>	<b>Very/extremely important N=205 Number (%)</b>
<i>For adolescents to know:</i>	

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Food safety and hygiene practices	202 (98.5)
Healthy and unhealthy foods	199 (97.1)
Where to find food and nutrition information	195 (95.1)
Appropriate portion sizes for different foods	186 (90.7)
Dietary guidelines	178 (86.9)
Where to obtain food from	177 (86.4)
Environmental sustainability (eg food miles, locally sourced food)	170 (83.0)
Where food comes from (food chain)	158 (77.1)
Animal welfare	113 (55.1)
<i>For adolescents to be able to do:</i>	
Prepare and cook food from basic/available ingredients	203 (99.0)
Use common kitchen equipment, utensils and appliances	202 (98.5)
Store food appropriately and safely	201(98.0)
Follow and adapt recipes based on available foods	199 (97.1)
Select and prepare food in accordance with dietary guidelines	185 (90.2)
Plan and manage a budget for food	182 (88.8)
Identify and critically analyze food related information	182 (88.8)
Plan and manage time for food shopping	154 (75.1)
Gather food from different sources (eg supermarkets, markets)	148 (72.2)
<i>For adolescents to have:</i>	
Positive attitude towards cooking and healthy eating	201 (98.0)
Confidence in skills related to sourcing, preparing and cooking food	200 (97.6)
Creativity and ability to improvise with ingredients	175 (85.4)
Regular social eating experiences	167 (81.5)

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### **Schools food environments**

**Physical food environment.** Most of the teachers indicated their school had a kitchen for teaching adolescents food preparation skills (98%, N=201) and have enough space to store food (87.8%, N=180). However, more than half of the teachers indicated that schools are in close geographical proximity to fast-food outlets (65.4%, N=134), and school canteens do not have adequate healthy food options (53.7%, N=110). Only half of the teachers agreed that their school facilitates sufficient food literacy education training for teachers and sufficient food literacy activities for students. HETs with up to five years of experience were more likely than more experienced teachers to report that they have enough food literacy enhancing activities at their schools for example cooking classes, food interest group, school vegetable garden ( $p<.05$ ). Also, teachers from independent schools are more likely than teachers from other school sectors such as public, private or catholic to report they have sufficient food literacy education training ( $p<.05$ ).

***Economic food environment.*** Half of the HETs agreed that healthy food options in their schools are relatively expensive (56.1%, N=115) and schools do not have sufficient funding for nutrition-related programs (54.1%, N=111). More than half of the respondents disagreed that schools' canteens compete with other off- and on-campus food providers. Teachers from independent schools were more likely than teachers from other types of school to report that healthy food in their canteen is relatively expensive ( $p<.05$ ). Moreover, teachers working in private schools were more likely to state that their schools have sufficient funding for nutrition-related programs ( $p<.05$ ).

***Political food environment.*** One third of HETs (31.7%) indicated that their schools follow the National Healthy School Canteen guidelines and only 4.9% stated that their schools have a policy about healthy lunch box choices. However, 91.7% of HETs indicated that they teach food literacy based on the Australian Guide to Healthy Eating for children and adolescents. Teachers from independent schools were more likely than teachers from other types of schools to indicate that their school has a policy about healthy lunch box choices ( $p<.001$ ).

***Sociocultural food environment.*** More than half of the schools have staff that are supportive of food literacy activities, but only 25.8% of respondents agreed that their school staff are role models for their students for healthy dietary intake. Interestingly, teachers from private schools were more likely to report that they have supportive staff in regard to food literacy activities ( $p<.001$ ). Moreover, 37.5% of HETs agreed that students at their schools feel peer pressure when it comes to what they eat.

## **5.6 Discussion**

The results indicate that HETs recognize most aspects of food literacy as very important for adolescents to learn. Similar results were found in an international study by Pendergast and Dewhurst where home economics professionals were approached to select from a predefined list of aspects of food literacy they believed should be part of food literacy curriculum (21). In the Pendergast and Dewhurst study, participants ranked food preparation and cooking activities, safe and hygiene practices, and nutrition knowledge and application as the top three curriculum priorities. Animal welfare as an aspect of food literacy in the curricula for adolescents to learn was ranked low, a finding consistent with the present study. Interestingly, home economics professionals internationally ranked consumer budgeting and costing skills (95.5%) slightly higher than HETs working at secondary schools in Australia (88.7%).



In the present study, HETs identified ‘ability to plan and manage time for shopping’ as a less important aspect of food literacy compared to other aspects. This rating may reflect the increasing adoption of time saving behaviors in relation to daily food purchases and consumption such as a greater reliance on convenience food which is found to be associated with poorer diet quality (27-29). It may also be linked to the perception that this aspect has less relevance to adolescents as they are not likely to be the primary household food shopper. Nevertheless, as the education provided at school is about setting up the adolescent for independent adult life, it is important for adolescents to learn how to plan and manage time for food shopping.

Other aspects of food literacy that could arguably receive greater attention are animal welfare and environmental sustainability (30). It is important to teach adolescents about environmental sustainability as currently adolescents’ dietary intake exceeds dietary guidelines for the consumption for saturated fats, sugar and sodium (6, 7). Such dietary choices are associated with increased consumption of food resources and negative environmental outcomes such as climate change (30). Making this connection is an important aspect of food literacy.

The results suggest that HETs are emphasizing the hands-on aspects of food literacy. Food skills are developed through practical experiences to perform specific tasks such as planning, selecting and preparing foods (22, 31). By encouraging such food skills, adolescents are empowered to make their own healthy meals and/or to make healthier food choices possibly including increased consumption of fruit and vegetables instead of relying on convenience foods (31, 32). Furthermore, food skills have been identified as essential practical skills that young people require for independent adult life (33). It has been established that food and nutrition knowledge is also an important step in the process of behavior change (34). Food and nutrition knowledge includes understanding about nutrition and food in order to meet healthy dietary recommendations. According to HETs, food literacy could be integrated into other learning areas such as health and physical education; these other learning areas could focus primarily on food and nutrition knowledge rather than application of food skills. Therefore, it could be that HETs focus more on food skills and leave the theory to other learning areas due to time constraints, discipline boundaries or other reasons. These findings indicate that more comprehensive food literacy education and collaboration between different learning areas within a school is needed to achieve the potential of food literacy education and achieve positive adolescent dietary behavior outcomes. Further research that aims to explore in more depth

how food literacy is taught and to identify the barriers and facilitators of teaching food literacy at secondary schools in Australia would complement these findings.

HETs indicated that food literacy education may lead to many improvements in adolescents such as increased food safety and hygiene practices, food and nutrition knowledge and participation in food preparation activities. These findings align with two recent systematic reviews which examined the relationship between food literacy and adolescents' dietary intake. A recent systematic review concluded that food literacy may positively influence adolescents' dietary intake (20). Moreover, another systematic review which assessed the evidence on the impact of childhood cooking programs on food-related preferences, attitudes and behaviors concluded that food preparation programs may positively influence children's food-related preferences, attitudes and behaviours (35). Therefore, it seems that food literacy education could positively influence adolescents' dietary intake. However, further research is needed to explore adolescents' perceptions regarding food literacy and how it influences their food choices within the school setting.

A number of studies have indicated that teacher's self-efficacy beliefs influence children's cognitive achievements and success at school (36). Furthermore, teacher's perceived self-efficacy has been found to be associated with increased student motivation, self-esteem, and more positive attitudes (36, 37). Teachers with high self-efficacy were found to be more proactive and innovative in the classroom (36). Our results indicate that HETs are very confident in teaching food literacy to adolescents including accessing and understanding the latest research-based food and nutrition information and applying this knowledge in practice. Moreover, HETs have a very positive attitude towards the importance of food literacy for adolescents. These results suggest the HETs positive attitudes together with confidence in performing food literacy activities provide a strong basis to influence adolescents' food knowledge, behaviors and capacity including activities such as meal planning, budgeting, food preparation and cooking. However, adolescent food literacy outcomes can also be influenced by the school's food environment including teaching facilities and resources, food policy and guidelines, school's budget and social support.

An Australian study showed that food environments have the capacity to influence children's dietary habits (38). There are two major food environments that are likely to affect dietary intake of adolescents- the family food environment and the school food environment (38). Tysoe stated that the food facilities in the childcare setting, the behavior of staff and the rules by which food access is governed, are likely to have an

impact on children's eating behaviours (38). Tysoe's study suggested the 'childcare food environment' has the capacity to influence dietary intake of children more than the family environment (37). According to HETs, most of the secondary schools are well equipped to teach adolescents food skills such as food preparation and cooking with kitchen and food storage facilities. Moreover, teachers teach food literacy in accordance with the Australian Guide to Healthy Eating for children and adolescents, and school staff are generally supportive of food literacy enhancing activities. However, healthy food access is limited in most of the secondary schools due to being relatively expensive; only a third of school canteens follow the National Healthy School Canteen guidelines; and schools lack policy about healthy lunch box choices. In addition, school staff are not good role models in regard to healthy eating in most of the secondary schools. Lobstein et al. suggested a school setting can contribute to the creation of healthy food environments and therefore to improve dietary intake, healthy body size and indicates that this could be highly cost effective (39). These results suggest that generally schools are well equipped and supportive in regard to food literacy education itself. However, food environments outside of food literacy classes contradict what HETs teach and do not support adolescents in making healthy food choices. For example, healthy food options are relatively expensive in most of the schools, school staff are often not good role models in regard to healthy eating and canteens do not follow the National Healthy School Canteen guidelines.

### **Limitations**

This study has several limitations. First, the results are based on HETs' perceptions and self-reported data, which may influence the reporting of actual food literacy capabilities, food literacy education performance and school food environments by participants. Some participants may have reported more positively than is the case or may have responded in a socially desirable way (40) especially about time spent on each aspect of food literacy, attitudes towards food literacy and the impact of food literacy education on adolescents' dietary intake and food literacy. Second, this study employed a cross-sectional design, therefore, it is not possible to clarify any causal contributions of food literacy education and improvements in adolescents' dietary behavior. However, some dietary intake of adolescents and food literacy related behavior could be observed by HETs. Third, HETs' confidence and attitudes towards food literacy was not measured using validated tools as to the best of our knowledge such tools are not currently available in the literature. However, the items were developed from the published literature and

tested for face validity with experts from the public health, nutrition and dietetics, and education fields.

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## **5.7 Conclusions**

This article has presented HETs' perspectives of the importance, curriculum, self-efficacy and food environments regarding food literacy. HETs recognize food literacy is very important for adolescents. Their focus is more on the micro aspects of food literacy such as cooking skills and use of kitchen equipment and facilities in comparison to macro aspects of food literacy such as animal welfare and environmental sustainability. HETs are very confident in performing food literacy activities and have a positive attitude towards it, which can positively influence adolescents' in changing poor dietary behaviors. Schools' food environments are ideally positioned to shape dietary intake of adolescents but their potential may not be being fully realized to support adolescents in making healthy food choices.

### **Implications for school health**

HETs have the potential and skills to teach food literacy to adolescents and increase their food and nutrition knowledge and skills and, in turn, change dietary habits. The study results have implications for addressing the needs of more comprehensive food literacy education at secondary schools and developing more supportive school food environments regarding healthy dietary intake. To address these needs, it is recommended that secondary schools take steps as follows:

1. Australian curriculum, assessment and reporting authority (ACARA) should assess the Australian school curriculum for teaching food literacy and school principals should develop a school level plan to improve food literacy of adolescents by allowing enough time for teaching of all aspects of food literacy including animal welfare and food environmental sustainability.
2. School curriculum leaders should strengthen the collaboration between different learning areas which aim to improve adolescents' food literacy. This will provide a comprehensive integrated food literacy education at secondary schools in Australia.

3. School curriculum leaders should facilitate more food literacy training for teachers and sufficient food literacy enhancing activities for adolescents. For example, develop cooking classes, school vegetable garden or/and establish food interest group. Teachers will receive up-to-date information regarding food literacy and adolescents will have an opportunity to advance their food literacy and consequently improve their dietary intake.

4. Governmental agencies should be established to assess and ensure that school's food providers such as the school canteen are responsive and accountable for following the guidelines and policies supporting and promoting healthy dietary intake and ensure that healthy foods are available and accessible for adolescents and staff. This will encourage adolescents and school staff to make healthier food choices.

A comprehensive approach that incorporates food literacy education and school food environmental strategies to address poor dietary intake of adolescents in the school setting is needed in order to reduce the prevalence of diet related conditions (41). This is consistent with the findings of the Australian National children's nutrition and physical activity survey of 2007 and the extensive literature linking overweight and obesity with negative health outcomes (41, 42). Such an approach is consistent with the 'health promoting schools' initiative which recommends to enable adolescents to build capacity in life skills and provide a health promoting environment at school setting (10, 12). By addressing those needs and recommendations, secondary schools will improve adolescents' food literacy and healthy dietary intake and as a result reduce the prevalence of diet related conditions such as overweight and obesity.

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## Chapter 6 Environmental Factors of Food Literacy Education

### 6.1 Study 2- A cross-sectional survey (Manuscript 3)

#### Reader's Note:

The information in this section has been published as an original research paper in a peer-reviewed journal:

**Ronto R**, Ball L, Pendergast D, Harris N. (2016). Environmental factors of food literacy in Australian high schools: views of home economics teachers. *International Journal of Consumer Studies*, 41(1), 19-27. DOI: 10.1111/ijcs.12309

The co-authors of this publication confirm that the research candidate has made the following contributions to this manuscript:

- Developed the study design;
- Completed the human research ethics application;
- Conducted data collection;
- Performed data analysis;
- Prepared manuscript for submission to the journal.

Signed:



Date: 17/11/2016

Signed:



Date: 29/11/2016

Signed:



Date: 2/12/2016

## 6.2 Abstract

This study set out to examine environmental factors impacting upon the food literacy of adolescents. It utilised data from a nation-wide survey of home economics teachers regarding their experience of food literacy education in Australian high schools. Content analysis and the ANGELO framework were applied to analyse free-text comments from 78 of the respondents that were collected as part of a more extensive dataset. The analysis of environmental factors revealed three enablers and ten barriers that could influence food literacy education delivered by high schools in Australia. High schools are well positioned to improve adolescents' food literacy through a comprehensive, hands-on approach in home economics. However, many environmental barriers were reported that could influence food literacy education in Australian high schools such as: lack of teaching materials and facilities, and human resources; the perceived inadequacy of the Australian school curriculum; non-supportive school canteens; and negative role modelling. This study points to the need to eliminate or reduce these environmental barriers impacting on the capacity for effective food literacy education in high schools in order to help adolescents increase their food literacy and thereby support them in making informed food choices.

**Key words:** food literacy, high school, adolescents, environmental factors, dietary behaviours, home economics

## 6.3 Introduction

The prevalence of adult and childhood overweight and obesity has increased in the last three decades, particularly in highly industrialised countries (Lobstein *et al.*, 2015). It is well understood that dietary behaviours are established during adolescence and continue into adulthood (WHO, 1998; Jackson-Leach and Lobstein, 2006; Kelishadi *et al.*, 2007; Dick and Ferguson, 2015). Healthy dietary behaviours are central to optimal growth, health and well-being of adolescents, with excess energy consumption and low physical activity being key determinants of overweight and obesity (WHO, 1998; Swinburn *et al.*, 1999; Dhir and Ryan, 2010). Hence, initiatives that aim to improve adolescents' dietary behaviours are a key focus for public health.

Ecological models can help to conceptualise the interdependence among individuals, their health and their environment (Sallis *et al.*, 1997; Swinburn *et al.*, 1999;

Elder *et al.*, 2007). Egger and Swinburn (1997) acknowledged the importance of creating supportive environments to change unhealthy behaviours such as dietary behaviours and proposed an ecological model for understanding obesity which included biological, behavioural and environmental factors on obesity. The ANGELO framework (analysis grid for environments linked to obesity) is a conceptual and practical framework to identify obesogenic factors in the environment. Swinburn and colleagues (1999) stated that environmental can be broadly categorised into two sizes “macro” and “micro” environments and four different types of environment including physical, economic, political and sociocultural. Identification and modification of environmental factors is central to success in changing unhealthy dietary behaviours (Swinburn *et al.*, 1999). The main settings which can facilitate or hinder adolescents’ dietary behaviours have been identified as school, community and home settings (Sallis *et al.*, 1997; Elder *et al.*, 2007). It is not surprising that high school is an influential setting for adolescents in developing lifestyle habits including dietary behaviours (Hawkes *et al.*, 2015).

High schools are well positioned to provide opportunities to deliver food and nutrition information, practice healthy dietary behaviours and develop competencies related to food safety (Mikkelsen, 2014; Hawkes *et al.*, 2015). Numerous studies highlight the importance of educational settings for influencing students’ dietary behaviours (Van Der Horst *et al.*, 2007; Tysoe and Wilson, 2010). A recent study conducted in Australia suggested that providing nutrition education to children and creating a positive food environment may support healthy dietary behaviours (Tysoe and Wilson, 2010). Similarly, a systematic review conducted by van der Horst and colleagues (2007) found that school food environments may have an impact on adolescents’ dietary behaviours. However, the review reported only a few studies have examined associations between environmental factors and dietary behaviours in the school setting. According to the WHO (1998), schools are responsible for enhancing adolescents’ food and nutrition knowledge and skills under qualified guidance and food skills are acquired through practical classes in schools involving food preparation and cooking, such as in home economics classes (Benn, 2014). In some schools other nomenclature is used, such as food studies and food technology, however, for the purpose of this study, all associated subjects in schools have been captured under the broad umbrella term ‘home economics’.

In Australian schools, home economics is one of the few learning areas of the curriculum where adolescents acquire food and nutrition knowledge and apply this knowledge in practice (Slater, 2013; Colatruglio and Slater, 2014). Young people learn

about food, how it is produced, meal preparation techniques, as well as how to plan meals to achieve a balanced diet (Smith, 2009; Benn, 2014). Food and nutrition education is considered more effective when it aims to stimulate learning, literacy, skills, and action, rather than providing only theory (Hawkes *et al.*, 2015). It has been argued that most initiatives targeting obesity have had limited success because they fail to connect food and nutrition knowledge, skills, and critical decision making (Pendergast *et al.*, 2011). Yet, increasing evidence shows that fundamental food and nutrition knowledge and skills can have a positive influence on adolescents' dietary intake, food-related preferences, attitudes, behaviours and consequently on health and well-being (Gracey *et al.*, 1996; Pirouznia, 2001; Larson *et al.*, 2006; Venter and Winterbach, 2010; Leal *et al.*, 2011; Caraher *et al.*, 2013; Colatruglio and Slater, 2014; Hersch, 2014). Collectively, food and nutrition knowledge and food skills may be captured in the increasingly used term 'food literacy'.

Food literacy is an emerging concept, derived partly from an understanding of 'literacy' and 'health literacy' (Pendergast and Dewhurst, 2012; Pendergast, 2013). Still a relatively contested term, Home Economics Victoria describes food literacy as "having the knowledge, skills and the capacity to source, prepare, cook and share food in a sustainable manner to promote a healthy and balanced lifestyle. Food literacy is also about individuals understanding the role that food plays in communities and cultures" (Home Economics Victoria, 2015). A recent systematic review concluded that greater food literacy is associated with healthier dietary behaviours amongst adolescents, warranting further attention to this concept (Vaitkeviciute *et al.*, 2015). Food literacy is included in the Australian high school curriculum and home economics has been identified as a learning area where food literacy can be taught comprehensively.

It is in this context that this study aimed to gain a better understanding of the environmental factors impacting adolescents' food literacy in the high school setting, as reported by home economics teachers (HET).

## **6.4 Methods**

### ***Materials***

The survey used in this study was designed to examine home economics teachers' (HET) understanding and their perceived importance of aspects of food literacy, time teachers spend on aspects of food literacy, HETs' self-efficacy and attitudes towards food literacy and school food environments. The survey comprised two components: the first was a 20-item quantitative component and the second an open-ended component. This paper focuses on the data generated from the open-ended component. The methodology and findings of the quantitative component are reported elsewhere (Ronto *et al.*, 2016). The survey was online and self-administered. For the open-ended component of the survey, participants were invited to offer their views in a free-text response box in relation to food literacy education at high schools in Australia. Ethical approval of the research was granted through the Griffith University Human Research Ethics Committee under protocol number MED/23/14/HREC.

### ***Participants***

The target population comprised individuals who self-identified as a HET working at a high school in Australia. An introductory email to complete an online survey was sent to potential participants on behalf of the research team via the membership of two major home economics professional associations: the Home Economics Institute of Australia (HEIA) and Home Economics Victoria (HEV). In addition, the link to the online survey was posted on the HEIA website home page. The survey was designed for online completion using LimeSurvey, with consent to participate indicated by completion of the survey. Of 264 HETs approached, 205 (77.7%) completed the survey. 80 out of 205 survey participants provided a free-text comment regarding food literacy education in high schools in Australia. These comments are of interest on this paper.

### ***Data analysis***

Content analysis was applied to group the free-text comments into categories and subcategories. Content analysis is considered appropriate for under-researched topics which often benefit from a rich description of the whole dataset (Fade and Swift, 2011), a characteristic of relevance to this study. In addition, the ANGELO framework was adopted for analysing open-ended data (Swinburn *et al.*, 1999). Although this framework was developed to identify obesogenic environmental factors, it is a useful framework to identify key environmental factors as food literacy can influence adolescents' dietary behaviours. It comprises two sizes of environment (micro and macro) and four types of environment (physical, economic, political and sociocultural). For the purpose of this

study, the school setting as a micro environment was analysed. Within this setting physical environment refers to ‘what is/is not available?’. In terms of food literacy education, the physical environment refers to availability of facilities such as kitchen and/or garden where adolescents would be able to develop food skills such as cooking and less tangible factors such as availability of training opportunities, opportunity for participation in food literacy activities, and/or nutrition expertise and information. Economic refers to ‘what are the financial factors?’ including the cost of food and/or funding for food literacy related activities. Political refers to ‘what are the rules?’ and includes food-related laws, policy and regulations. Sociocultural refers to ‘what are the attitudes, beliefs, perceptions and values?’ and includes high schools staff’s attitudes, beliefs, values and role-modelling related to food literacy education and healthy dietary behaviours (Swinburn *et al.*, 1999).

An investigator triangulation technique was adopted to validate qualitative data and its interpretation (Giacomini *et al.*, 2000). The research team consisted of four professionals from different disciplines, including home economics, nutrition and dietetics, and public health. Triangulation helped to prevent the personal or disciplinary biases of a single investigator from excessively influencing the findings (Giacomini *et al.*, 2000). Five stages of data analysis were performed. First, free-text data were read and re-read by all investigators to gain familiarity with the data. One comment which reads as only the word ‘no’ and one comment which directly related to a feedback on the quantitative component of the survey were removed from the data analysis as they did not add any information to the study. The final sample thus was reduced to 78 free-text comments. The word count varied from 14 to 521 words per free-text comment. Second, investigators coded data using open coding manually according to content analysis procedures (Miles and Huberman, 1994; Swinburn *et al.*, 1999; Neuman, 2005; Braun and Clarke, 2006). Third, assigned initial codes were located to condense the data into subcategories (Neuman, 2005). Fourth, investigators compared the subcategories systematically and clustered into categories in accordance with four types of environment (physical, economic, political and sociocultural) outlined in the ANGELO framework. Finally, investigators identified potential key physical, economic, political and sociocultural environmental determinants from free-text data regarding food literacy education in high schools in Australia (Table 6.2).

## 6.5 Results

Of 78 HETs who provided a free-text comment regarding food literacy at high schools in Australia, 77 (99%) were females and 50 (64%) were teachers with over 20 years of teaching experience (Table 6.1). More than half of HETs (56%) resided in Victoria, with the remaining in New South Wales (17%), Queensland (13%) and other states (14%). Table 1 presents an overview of the key environmental factors identified from free-text data. Each type of environment included information on the perceived current status of high schools, including enablers and barriers regarding food literacy and suggestions provided by HETs on strategies to improve food literacy in high schools in Australia. Findings are evidenced with direct quotes from HETs' free-text written comments. In addition, each quote includes information on the respondent's gender and years of experience working as a HET.

**Table 6.1** Demographic characteristics of the sample

	<b>Home Economics Teachers N=78 Number (%)</b>
<i>Gender</i>	
Female	77 (99)
Male	1 (1)
<i>Years of experience</i>	
Student teacher	1 (1)
1-5 years	8 (10)
6-10 years	9 (12)
11-15 years	7 (9)
16-20 years	3 (4)
Over 20 years	50 (64)
<i>State/territory</i>	
Australian Capital Territory	1 (1)
New South Wales	13 (17)
Queensland	10 (13)
South Australia	6 (8)
Tasmania	0 (0)
Victoria	44 (56)
Western Australia	4 (5)



**Table 6.2** List of potential environmental enablers and barriers of food literacy in the high school setting, separated by environment type, identified through free-text data

Type of environment		Identified potential factors in the high school setting	Direct quotes from ‘free-text’ data
<b>Physical</b>	<i>Enabler</i>	Holistic and hands-on approach in home economics (N=18)	<i>“I (...) frequently involve all of my students in food product development. It encompasses all of the areas and represents a unit of work where students culminate their knowledge of nutritional food choices, sourcing healthy food choices, hygienic handling, storage and presentation of food, and, above all, recognition and respect of the environment as far as sourcing and waste disposal”</i> (female, over 20 years of experience)
		Professional development opportunities in food literacy (N=2)	<i>“As an educator try and keep up to date on current trends in regards to food education and we have now been focusing on food literacy for at least two years as an item of high priority”</i> (female, over 20 years of experience)
	<i>Barrier</i>	Lack of teaching materials (N=14)	<i>“We need current or the latest resources to be able to impart food literacy”</i> (female, over 20 years of experience) <i>“It would be great if there were more resources available online”</i> (female, 11-15 years of experience)
		Lack of human resources trained in teaching food literacy (N=7)	<i>“My school is VERY isolated and has not had a Home Economics trained teacher for many years. The education of food literacy is almost non-existent”</i> (female, student teacher) <i>“Personally, it is a concern to me that there are few courses for training teachers of Food and Technology and that many teachers of the subject are not specifically qualified to do so”</i> (female, over 20 years of experience)
<b>Political</b>	<i>Enabler</i>	-	
	<i>Barrier</i>	Insufficient food literacy content in the Australian curriculum (N=22)	<i>“The National Curriculum does not appear to allow for much of the practical side to food literacy”</i> (female, over 20 years of experience) <i>“Time and curriculum constraints impact on the depth at which we can teach the full extent of food literacy”</i> (female, over 20 years of experience)
		No adherence to <i>National Healthy School Canteen</i> guidelines (N=3)	<i>“School Canteens need auditing/ inspections to ensure they adhere to national standards in both food safety and Healthy canteen policy”</i> (female, over 20 years of experience)

<b>Economic</b>	<i>Enabler</i>	-	
	<i>Barrier</i>	Inadequate funding for food literacy (N=6)	<i>“School home economics kitchens are often hamstrung in attempting to teach and demonstrate this sort of thing as organics/free-range and foodstuffs that are produced in sustainable ways is often out of their budget range”</i> (female, 6-10 years of experience)
		Fundraising using unhealthy foods (N=2)	<i>“Student fundraisers still involve a bake sale &amp; fairy floss has been a feature of a school celebration day which is rather horrifying”</i> (Female, over 20 years of experience)
		School canteen profit orientated (N=5)	<i>“Our canteen used to strictly follow the right bite program, but due to it running as a business it could not compete with the shopping complex and fast food outlets next door and so have added back some unhealthy food options”</i> (female, 11-15 years of experience) <i>“Students also find the prices at the canteen very expensive, and so do the staff so we don't tend to buy from the canteen either”</i> (female, 11-15 years of experience)
<b>Sociocultural</b>	<i>Enabler</i>	Adolescents' positive attitude towards food literacy (N=1)	<i>“Many students have stated that Food and Technology classes are among the most practical for learning essential life skills”</i> (female, over 20 years of experience)
	<i>Barrier</i>	Undervalued (home economics, HETs and food literacy) (N=19)	<i>“If a subject time allowance is to be cut it is always done to the practical classes never in the English or Maths areas”</i> (female, over 20 years of experience)
		Unsupportive canteen (N=7)	<i>“My school canteen is disgusting and does not promote healthy eating at all. We have soft drink, lollie, chips, pies and sausage rolls”</i> (female, 1-5 years of experience)
		Negative role modelling (N=5)	<i>“Role modelling by the teacher is also important. It concerns me that some of our Home Economics teachers are somewhat overweight/obese”</i> (female, over 20 years of experience)

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## Physical environment

Two enablers in the physical environment supporting food literacy were identified as (i) a holistic and hands-on approach to food literacy in home economics; and (ii) constant seeking of professional development opportunities in food literacy. According to HETs, food literacy is mostly taught in home economics but it could be taught in other learning areas such as Health and Physical Education, Nutrition, Health and Human Development, Food and Technology. However, teachers believed that in home economics food literacy is taught comprehensively because it incorporates a practical component where students are able to put theory into practice. A practical component was seen to be crucial part of successful learning. HETs stated that other learning areas do not provide a holistic picture of food literacy and the focus is only theoretical such as nutrition knowledge, as evident in the following text:

*“[S]ince the PE [Physical Education] department took over teaching health education, there is an increasing emphasis on the physical aspects of healthy eating as opposed to the socio-economic aspects which are crucial for understanding of food literacy”* (female, over 20 years of experience).

HETs in general stated that a hands-on approach is most suitable and effective to teach food literacy to adolescents. They explained that adolescents learn better when teaching content and assessments have practical components. They stated that some students might struggle with the theoretical components but be very successful in practical tasks. Most high schools have compulsory food literacy education in either Year 7 or 8 and then it is offered as an elective subject depending on the number of students who are interested. Therefore, some HETs encouraged their colleagues to be strategic in their teaching of food literacy such as making a subject more *“interesting”*, *“grab their attention”*, *“fun”* and most importantly to use a hands-on approach as students enjoy more practical rather than theory-based classes. Teachers stated that in this way, students would choose home economics when it is offered as an elective subject and teachers would have an opportunity to teach macro aspects of food literacy such as environmental sustainability and animal welfare. The following is typical of this type of comment:

*“(…) the most important thing is to grab their attention and interest by making food tech fun - they will learn skills and knowledge as they make dishes that are relevant to them. Once they are confident and interested they will want to choose food tech as an elective and will be more mature and able to understand the*

*concepts of sustainable eating, the properties of the food they prepare and home economics” (female, 6-10 years of experience).*

HETs highlighted the importance of school setting for teaching food literacy. They observed that adolescents are coming to home economics with little exposure to food and do not have basic food skills. Teachers stated that they need to start from scratch in terms of teaching food skills with some suggesting basics such as “*even teaching them how to wash-up correctly is important as many don't have a clue*”. Some of the HETs indicated that parents do not give an opportunity for adolescents to develop food skills due to time or other constraints and due to their own limited food skills. Teachers reported that it was essential to increase adolescents’ food literacy in order to help them to make informed food choices later in life. Such a belief is evident in the following comment:

*“[W]e need to be proactive in pushing for more practical skills as working mothers are not passing skills to next generation and time is being eroded in secondary schools from this area” (female, over 20 years of experience).*

Two barriers in physical environments that prevent optimal food literacy education were identified as (i) lack of teaching materials and facilities, and (ii) lack of human resources trained in teaching food literacy, which could limit teaching and learning experience. HETs indicated that some schools did not have kitchen gardens which are beneficial in teaching some of the aspects of food literacy such as where food comes from and environmental sustainability. Teachers pointed out that some teaching resources are outdated and suggested that up-to-date and online resources would be beneficial and helpful for them to teach food literacy to adolescents. Not having a school canteen was seen as a barrier in some schools as teachers and students were not able to purchase healthy foods. However, having a school canteen could also be seen as a barrier as some respondents noted that canteens do not offer enough healthy food options.

A shortage of HETs was identified as a barrier to teaching food literacy in high schools. HETs noted that in order to teach food literacy to its full potential schools must employ qualified HETs but currently due to shortages, teachers from other learning areas who are not qualified in home economics are allowed to teach food literacy. Furthermore, the respondents were concerned that there were insufficient higher education programs for teacher education in home economics in Australia, such as the following comment:

*“[I]’m concerned that a number of Food Tech teachers are insufficiently trained in food literacy as well as general skills (e.g. when I went on study leave, my old school put the art teacher into the kitchen as my replacement as ‘she is good at prac classes!’ [sic]” (female, over 20 years of experience).*

### **Political environment**

Two barriers in the political environment regarding food literacy were identified as (i) insufficient food literacy content in the Australian curriculum and (ii) no adherence to *National Healthy School Canteen* guidelines. Time constraints for teaching food literacy, home economics as a subject being an elective and narrow scope and depth of food literacy program were identified as the main issues related to the Australian curriculum. In addition, teachers emphasised that home economics as a learning area does not have a clear place in the high school curriculum, as evident in the following comment:

*“ACARA [Australian Curriculum, Assessment and Reporting Authority] need to have a look at where Home Economics actually fits in the curriculum and not stating that ‘Home Economics can be taught under this ...’” (male, 6-10 years of experience).*

Most HETs suggested that food literacy should be a compulsory subject delivered by HETs in Years 7 to 10. Some teachers noted that in other countries, such as the UK, food literacy is acknowledged as an important subject and is a compulsory subject in high schools. Two such comments follow:

*“I strongly support the aspect of teaching food literacy as a mandatory course from Yr. 7 – 10” (female, 16-20 years of experience);*

and

*“I believe that there should be mandatory food literacy in secondary schools taught by currently delivering home economics staff” (female, over 20 years of experience).*

Some of the HETs highlighted the important role that school canteens have in food literacy education and stated that food literacy should be supported by school canteens. Teachers added that school canteens should be accountable and inspections must be performed to make sure it adheres to *National Healthy School Canteen*

guidelines. Some teachers reported that they do not have a school canteen or their school canteen does not follow the guidelines, for example:

*“[W]e did have a healthy school eating policy. Now with a new principal that has gone out the window”* (female, over 20 years of experience).

### **Economic environment**

Three barriers in the economic environment reported by respondents were identified: (i) inadequate funding for food literacy, (ii) fundraising using unhealthy foods and (iii) school canteen profit orientated. Teachers stated that some high schools were not able to include a practical component when teaching macro aspects of food literacy such as environmental sustainability or/and animal welfare due to the lack of funding from the school budget. Also, some schools could not afford to employ sufficient HETs or kitchen assistants for the size of the class, even though students were interested in food literacy, for example:

*“[C]ooking classes usually need to be smaller than 28 students due to WHS [Work Health and Safety] requirements. Schools are not funded for this ratio. Admin are happy to offer cooking classes if there is funding for appropriate student/teacher ratio”* (female, over 20 years of experience).

School canteen and fundraising were other important economic factors regarding food literacy in high schools. Teachers indicated that fundraising and other school celebrations mostly involve unhealthy foods such as *“a bake sale and fairy floss”*. It was also felt that school canteens were driven by a profit goal in most cases achieved by selling unhealthy foods that have a favourable margin between cost and sale price. Some teachers were trying to increase the range of healthier food options by working with students to prepare healthy lunch choices as catering opportunities. However, at the school level this may be viewed as a negative undertaking as it could erode canteen profits. Some HETs stated that although school canteens may wish to serve healthier foods, funding prevents this change due to essential kitchen renovation or other related costs that could make other off-campus food providers comparatively more affordable.

### **Sociocultural environment**

One enabler and three barriers in the sociocultural environment regarding food literacy were identified: (i) adolescents' positive attitude towards food literacy, (ii) undervalued home economics, HETs and food literacy, (iii) unsupportive canteen and (iv)

negative role modelling. HETs reported that adolescents were interested in learning about food and nutrition with most interested in food preparation such as cooking. However, teachers stated that home economics, healthy eating and food literacy are undervalued within the Australian curriculum, by school staff and by the canteen. Teachers indicated that other learning areas such as English, maths and physical education were more valued with higher priority in terms of time, budget and material resources, compared to home economics. Teachers reported that home economics should be valued equally to other learning areas. They stated that some school staff do not value home economics as a subject and see it as “*cooking, home science, old fashioned and not really important*”. Also, teachers pointed out that there is an attitude within schools that a qualification is not necessary to teach food literacy. A comment typical of this is:

*“[Q]ualifications are important in this area - in my school they think anyone can take food literacy classes if they can cook or BBQ!”* (female, over 20 years of experience).

Some HETs indicated that school canteens are not supportive of healthy eating and food literacy. They reported that in some schools there is no collaboration between school canteen and HETs. Even though school canteens have the potential to influence the dietary behaviours of adolescents, HETs indicated school canteens do not share the same values when it comes to healthy eating. There is a contradiction to what HETs teach to adolescents regarding food literacy and what foods school canteens are offering for students and staff.

Some respondents noted that positive role modelling by school staff is very important with concern that some teachers including home economics teachers were overweight or obese. They also stated that some other school staff are food illiterate and do not support or encourage healthy dietary behaviours as for example some teachers use discretionary foods as a reward in their classes.

## **6.6 Discussion**

This study set out to develop a greater understanding of the environmental factors shaping food literacy within the high school setting, from the perspective of home economics teachers, who are recognised as crucial food literacy educators in the high school setting. The study led to the identification of three environmental enablers and ten environmental barriers through analysis of the free-text comments provided by 78

educators involved in food literacy education in high schools in Australia. It has been identified that food literacy and schools' food environments can influence adolescents' dietary behaviours (Vaitkeviciute *et al.*, 2015). Therefore, it is important to enhance enablers and address barriers regarding food literacy to help adolescents to increase their food literacy and change obesogenic food environments at high schools.

The subject home economics has been identified as the most important enabler in the physical environment to promote food literacy at high schools. HETs believed that home economics is the logical and most favourable place where food literacy could be taught comprehensively because it incorporates a theoretical and most importantly practical component which allows adolescents to develop food skills which aligns with findings of other studies (Benn, 2014; Slater, 2013; Colatruglio and Slater, 2014). It is important more than ever to build adolescents' food skills as many are experiencing reduced exposure to food skills within the home environment associated with increased consumption of convenience foods and parents having low levels of food literacy (Robson *et al.*, 2016). HETs observed that many adolescents undertaking home economics classes have little knowledge of food, food preparation and food-related hygiene practices. These findings align with other studies that have reported declining food skills among adults (Lang *et al.*, 1999, Slater, 2013). Although, home economics is ideally positioned to increase food literacy of adolescents, there are many physical, political, economic and sociocultural barriers that can influence food literacy education in high schools.

A lack of resources can have a significant impact on teaching adolescents food literacy comprehensively. A lack of facilities or teaching materials such as well-equipped kitchens, vegetable gardens or up-to-date teaching resources is limiting learning experience of theoretical and practical components of food literacy. A shortage of HETs is observed in some high schools in Australia, particularly in rural or remote areas. It was stated that a lack of teaching materials and human resources could be due to low school budget, a reduction of home economics training programs and/or a perception that professional training in home economics is not needed to teach food literacy. A similar situation is observed in other countries, such as Canada, where there is estimated to be a shortage in HETs due to the closure of tertiary education programs (Colatruglio and Slater, 2014). A continuing lack of teaching materials and specialist HETs will significantly impact food literacy education in high schools and, in turn, the development of food skills in adolescents.



The Australian high school curriculum was seen as a major barrier in political environment related to food literacy in that there is not sufficient time allocated to teach adolescents all aspects of food literacy identified by the Home Economics Victoria (Home Economics Victoria, 2015). Currently, home economics is compulsory only in Year 7 or 8 in Australian high schools which is not enough for developing sustainable food skills such as food preparation. Australian adolescents have been reported as recognising the importance of developing food preparation skills through home economics and indicated that high school curriculum should provide them with this opportunity (Stephens *et al.*, 2015). A study by Tysoe and Wilson (2010) concluded that nutrition education and positive food environment may support healthy dietary behaviours of adolescents. Home economics could be reinstated in high schools as a compulsory component of the curriculum through all years to help to combat declining food skills and poor food literacy among adolescents. It has been established in other studies that home economics can bring long-lasting learning as the association between home economics and higher levels of adults' food knowledge (Worsley *et al.*, 2015).

The school canteen has been identified as a very important barrier in political, economic and sociocultural environments. Hawkes (2015) indicated that with more food environments promoting healthy behaviours around adolescents, there is a greater likelihood that improved dietary behaviours will occur. Only one third of HETs in this study indicated that school canteens adhere to *National School Canteen* guidelines (Ronto *et al.*, 2016). The main reasons for not following the guidelines included competition with other off-campus food providers and canteens being profit oriented, these findings are consistent with a recent study (Faber *et al.*, 2014). Mostly, food that was sold in school canteens was defined as unhealthy, expensive and contradicting what is being taught in food literacy classes. Australian adolescents have suggested that the elimination of unhealthy foods from school canteens and increased accessibility of nutritious meals and snacks at a low cost could help them to make healthier food choices (Stephens *et al.*, 2015). There is often a battle between healthy and unhealthy foods within the school setting (Mikkelsen, 2014). A substantial amount of unhealthy foods and beverages were brought into school for classroom rewards, celebrations and fundraising which aligns with other studies (Slater, 2013; Caparosa *et al.*, 2014). This demonstrates the importance of educational settings in influencing students' dietary behaviours (Van Der Horst *et al.*, 2007; Tysoe and Wilson, 2010). Governmental agencies should be established to ensure

school canteens adhere to *National School Canteen* guidelines to promote healthy dietary behaviours to adolescents (Lobstein *et al.*, 2015).

From this study it appears that home economics and food literacy education are undervalued in Australian high schools. This phenomenon was identified as one of the main barriers in the sociocultural environment with respect to achieving food literacy. A similar situation is reported in the United States and Canada where there has been a decrease in home economics food and nutrition education with the subject often undervalued in comparison to other subjects such as Maths or English (Lichtenstein and Ludwig, 2010; Slater, 2013). Reportedly, curriculum leaders perceive food literacy as comparatively less important than other subjects within high schools in Australia. This, in turn, affects how much time, if any, is specified to teach food literacy as part of the high school curriculum. Students might obtain food and nutrition knowledge from other learning areas but they will miss the practical component of food literacy which is crucial for developing food skills and capacities, this aligns with other studies that have recognised the importance of the practical component (Hawkes, *et al.*, 2015; Slater, 2013; Colatruglio and Slater, 2014). It is apparent that there is a need to change attitudes of school leaders and staff towards the importance of food literacy education particularly in home economics subjects at high schools in Australia in order to support a holistic and comprehensive teaching approach to food literacy (Pendergast and Dewhurst, 2012).

The negative role modelling by school staff including some HETs regarding dietary behaviours was identified as another important barrier in the sociocultural environment. This finding complements the quantitative component of the survey which found that according to HETs only 25.8% of school staff were role models for their students in regard to healthy dietary behaviours (Ronto *et al.*, 2016). Some survey respondents were concerned that some HETs and school staff were overweight or obese and they did not present a good example for adolescents regarding healthy dietary behaviours while on school premises. According to Tysoe and Wilson (2010), the behaviour of school staff is likely to have an impact on students' dietary behaviours through role modelling. Australian adolescents indicated that positive role modelling of school staff regarding healthy dietary behaviours could encourage them to eat healthy (Stephens *et al.*, 2015). As the school environment could influence adolescents' dietary behaviours (Tysoe and Wilson, 2010), it is very important to have a healthy food environment at school including school canteen and other food providers as well as positive role modelling by school staff.

While this study has contributed to better understanding environmental enablers and barriers to effective food literacy education for adolescents in high schools, the study has a number of limitations that need to be considered in the interpretation of the findings. First, the results are based on HETs' views alone, making the comments reflect only the collective wisdom of this group of educators, along with their biases. Nevertheless, the views of HETs are very important as food literacy is only taught comprehensively in home economics subjects in school. Second, this study provided insight into HETs' views on environmental factors regarding food literacy in high schools utilising an open-ended survey design. This study design did not allow investigators to explore the understanding of some concepts expressed in the written comments such as environmental sustainability and/or sustainable diet. A more interactive approach could provide further opportunity to explore identified issues in greater depth. Therefore, interviews with HETs aiming to explore the enablers and barriers in more depth that HETs face in teaching food literacy to adolescents in Australian high schools would be beneficial. Third, only one researcher (RR) categorised the data, so a potential bias in identification of enablers and barriers may exist. To minimise this, the co-authors met on a regular basis to review and categorise the enablers and barriers into four types of environment (physical, political, economic and sociocultural) outlined in the ANGELO framework.

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## **6.7 Conclusions**

This paper has provided insight into home economics teachers' views on environmental factors that serve as barriers and enablers influencing food literacy education for adolescents in Australian high schools. It is evident that high schools are well positioned to increase adolescents' food literacy through a comprehensive hands-on approach delivered in home economics classrooms. Yet, a complexity of environmental barriers such as lack of teaching materials and human resources, unsupportive school environment towards food literacy education and healthy dietary behaviours, and negative role modelling currently influence food literacy education and, in turn,

adolescents' dietary behaviours. More support from school leaders and staff, from school canteens and the curriculum is needed within the high school setting in Australia in order to increase adolescents' food literacy and thereby underpin healthy dietary behaviours in adulthood. A more interactive approach in the future would be beneficial to investigate enablers and barriers in more depth in the high school setting including perceptions of other school staff who could teach food literacy and adolescents.

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## Chapter 7 The Role of HETs in Food Literacy Education

### 7.1 Study 3- A qualitative study (Manuscript 4)

#### Reader's Note:

The information in this section has been published as an original research paper in a peer-reviewed journal:

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The co-authors of this publication confirm that the research candidate has made the following contributions to this manuscript:

- Developed the study design;
- Completed the human research ethics application;
- Developed questions and pilot tested;
- Conducted data collection;
- Performed data analysis;
- Prepared manuscript for submission to the journal.

Signed:



Date: 17/11/2016

Signed:



Date: 29/11/2016

Signed:



Date: 2/12/2016



## 7.2 Abstract

Food literacy education is a potential public health strategy to support adolescents to have healthy dietary behaviours. In most high schools in Australia home economics teachers are well positioned to teach food literacy. However, there is limited understanding of the contribution of home economics teachers towards educating adolescents to develop food literacy and healthy dietary behaviours. This study explored high school home economics teachers' understanding of food literacy and their role in developing adolescents' food literacy and healthy dietary behaviours. Qualitative study design was used. Semi-structured interviews were conducted with 22 high school home economics teachers in Australia. The interview questions focused on the teachers' understanding of food literacy, their background in food literacy, and their role in enhancing adolescents' food literacy and healthy dietary behaviours. Data were analysed using the thematic data analysis method. Overall, home economics teachers displayed an understanding of food literacy that broadly consisted of food and nutrition knowledge and food skills. They discussed two levels of food literacy: basic food skills and macro topics such as environmental sustainability. Many home economics teachers recognised the potential impact of food literacy on food choices and health outcomes. Finally, the teachers also described their responsibility and that of other teachers to be positive role models to further impact on the food literacy and healthy dietary behaviours of adolescents.

**Keywords:** Food literacy, adolescents, high school, home economics, food educators

## 7.3 Introduction

Over one quarter of Australian adolescents are overweight or obese (Australian Bureau of Statistics, 2015). Excess weight is a significant risk factor for type 2 diabetes, cardiovascular disease, hypertension, osteoarthritis and some cancers (Dhir & Ryan, 2010). Furthermore, excess weight can reduce adolescents' self-esteem, induce social isolation and discrimination, and hinder academic performance (Dhir & Ryan, 2010; Kalra, De Sousa, Sonavane, & Shah, 2012). Unhealthy dietary behaviours are one of the main causes of overweight and obesity (Rennie, Johnson, & Jebb, 2005). Dietary behaviours of adolescents in developed countries have evolved over the last decade, with increased consumption of takeaway and highly processed foods that are associated with poorer diet quality (Colatruglio & Slater, 2014; Kramer, Coutinho, Vaeth, Christiansen,

Suratkar, & Gittelsohn, 2012; Lai-Yeung, 2007; Van Der Horst, Brunner, & Siegrist, 2011; Australian Bureau of Statistics, 2014). A lack of food and nutrition knowledge and skills has been identified as a potential contributor to increased consumption of unhealthy foods and consequently development of overweight and obesity (Jaffe & Gertler, 2006; Lichtenstein & Ludwig, 2010; Scrinis, 2007). Recently, the concept of food literacy has emerged as a promising approach to help support initiatives that reduce overweight and obesity among adolescents (Colatruglio & Slater, 2014; Howard & Brichta, 2013).

Food literacy is described as, ‘the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake’ (Vidgen & Gallegos, 2014, p. 54). The Australian school curriculum provides an opportunity for food literacy education for students from foundation to Year 10 (Australian Curriculum, Assessment and Reporting Authority, 2015). This is important due to the association between increased adolescent food literacy including food and nutrition knowledge (Da Rocha Leal, Paz Mendes de Oliveira, & Pereira Rodrigues, 2011; Pirouznia, 2001; Tsartsali, Thompson, & Jago, 2009; Venter & Winterbach, 2010) and food skills (Caraher, Seeley, Wu, & Lloyd, 2013; Hersch, Perdue, Ambroz, & Boucher, 2014; Larson, Perry, Story, & Neumark-Sztainer, 2006) and healthier dietary behaviours (Vaitkeviciute, Ball, & Harris, 2015). In Australian secondary schools that have a home economics department, the responsibility to increase adolescents’ food literacy is typically within the area of home economics. However, in some schools, the health and physical education department may also contribute to this.

The International Federation for Home Economics *Position statement—Home Economics in the 21<sup>st</sup> century* indicates that home economics, ‘facilitates students to discover and further develop their own resources and capabilities to be used in their personal life, by directing their professional decisions and actions or preparing them for life’ (International Federation for Home Economics, 2008). A comprehensive home economics curriculum supports the dissemination of food and nutrition knowledge and skills (Pendergast & Dewhurst, 2012; Worsley, Wang, Yeatman, Byrne, & Wijayaratne, 2015), which provides an opportunity for adolescents to develop capabilities and enhance personal empowerment to act in the daily context of food and nutrition (Colatruglio & Slater, 2014; Lichtenstein & Ludwig, 2010; Pendergast, Garvis, & Kanasa, 2013). As noted by Fordyce-Voorham (2011), home economics teachers have a significant role to

play in adolescents' lifelong learning about healthy dietary behaviours. They have the nutritional background and pedagogical expertise to provide food literacy education to adolescents, including a background in practical food preparation skills, which makes them well placed to enhance adolescents' food literacy (Fordyce-Voorham, 2011; Pendergast & Dewhurst, 2012).

An Australian study has explored the perceptions of community members regarding the inclusion of food preparation skills in the high school curriculum (Pendergast, Garvis, & Kanasa, 2011). The study revealed that the wider community might not realise the potential of home economics in supporting adolescents to develop food literacy. A more global study has shown that home economists are in agreement about the need for food literacy in the school curriculum (Pendergast et al., 2013). For decades home economics teachers have been responsible for providing food and nutrition knowledge and skills to adolescents in school settings. However, the concept of food literacy only recently emerged. Therefore, it is important to explore home economics teachers' understanding of food literacy and their role in providing food literacy education to adolescents. A better understanding of these teachers' perceptions of providing food literacy education at high schools is subsequently needed to clarify the ideal role they have in supporting healthy dietary behaviours of adolescents. This understanding will help to clarify the conjecture in the literature, and identify areas to better support this important area of learning. It is in this context that this study explored home economics teachers' understanding of food literacy and their role in enhancing adolescents' food literacy and healthy dietary behaviours at high schools in Australia.

## **7.4 Methods**

### ***Participants***

This study utilised a semi-structured interview approach to collect data. An introductory email was sent to home economics teachers (n=60) using a randomised selection who had participated in a survey on food literacy in schools (Ronto, Ball, Pendergast, & Harris, 2016) and provided consent to be contacted again (n=91). Twenty-seven teachers responded to the email sent by the research team. An information sheet and a consent form were then emailed to potential participants. Twenty-two home economics teachers subsequently scheduled interviews.

### ***Instrumentation***

Data were collected via semi-structured face-to-face (n=2) and telephone (n=20) interviews with home economics teachers across Australia. Interview questions were developed to explore key areas of investigation and participants were encouraged to expand on those key areas (Table 7.1). The key questions focused on:

- participants' background and interest in food literacy
- participants' understanding of food literacy
- participants' role in enhancing adolescents' food literacy levels and healthy dietary behaviours.

**Table 7.1** Interview questions for the participants (HETs)

<b>Inquiry logic</b>	<b>Interview questions</b>
Explore home economics teachers' background and interest in food literacy	'Please tell me about your teaching background, including the reason you became a home economics teacher'.
Explore home economics teachers' understanding of food literacy	'What is your understanding of food literacy?'
Explore home economics teachers' role in enhancing adolescents' food literacy and healthy dietary behaviours	'What role does home economics education have in teaching food literacy in your school?'
	'Thinking about your teaching on food literacy, to what extent do you feel this influences the dietary behaviours of your students?'
	'Do you think there are any consequences of not having food literacy education?'
Provide opportunity for open expression of views by home economics teachers	'Is there anything else you would like to add?'

### ***Procedure***

Semi-structured interview questions were piloted with two home economics teachers using face-to-face interviews. Minimal modifications to wording were made and no questions were removed or added. Pilot data were included in the present analysis. Data were collected between January and February 2015. Teachers were informed that the interviews would be audio-recorded and that the information provided would remain confidential. All interviews were conducted by a single interviewer. Each interview lasted between 15 and 30 minutes.

Ethical approval was granted from the Griffith University, Human Research Ethics Committee (Reference number MED/57/14/HREC). All participants provided informed consent to participate in the study.

### ***Data analysis***

Theoretical saturation was reached at Interview 18, after which no new data or constructs of interest emerged (Draper & Swift, 2011). However, the researcher interviewed all participants who consented and scheduled time to participate in the interview (n=22). Interview recordings were professionally transcribed and one researcher reviewed the transcripts for accuracy against the original audio recordings (Braun & Clarke, 2006). Participants' names were removed from the transcripts and the numbers of the interviews were substituted to ensure confidentiality (e.g., '11').

Thematic data analysis was applied for identifying, analysing, interpreting and reporting themes within the data (Braun & Clarke, 2006). The investigators followed five phases of thematic data analysis suggested by Braun and Clarke (2006). First, interview transcripts were read and re-read to gain data familiarisation. Second, one investigator coded interview transcripts systematically across the entire data set. Third, the research team, comprising four professionals from different disciplines, including home economics, nutrition and dietetics and public health, met on a regular basis to review the codes and to identify and review themes. In the regular meetings, investigators discussed any differences in coding and theme identification until the final agreement was reached. Investigator triangulation helped to prevent the personal or disciplinary biases of a single investigator from excessively influencing the findings (Giacomini & Cook, 2000). Fourth, the research team refined each theme and extracted quotes from the data set to support each theme.

## **7.5 Results**

Four key themes emerged regarding home economics teachers enhancing adolescents' food literacy and healthy dietary behaviours:

1. Home economics teachers have varying degrees of understanding of food literacy and its importance, but broadly have a good understanding of the concept.
2. Some home economics teachers have interests and/or skills related to those of dietitians and chefs.
3. Home economics teachers build competent citizens.
4. Home economics teachers believe that they should act as role models.

### ***Understanding and importance of food literacy***

Home economics teachers described the concept of food literacy as ‘*evolving*’, ‘*fairly broad*’, and ‘*multi-faceted*’. Some respondents were more familiar than others with the existing definition of food literacy, with some indicating that food literacy was a fairly new concept to them. Understanding of the meaning of food literacy varied among teachers, with most stating that it consisted of two components:

- food and nutrition knowledge
- food skills.

These two components were seen as being equally important, as being related to each other, or one being superior to the other. However, some teachers stated that food literacy is largely a cognitive skill, which refers to only knowledge and understanding, for example:

*“I see food literacy as more of a declarative skill. I see food literacy more as the preoperational skills before the hands-on preparation and cooking of food” (I1).*

and

*“[P]robably looking at people having both the knowledge, skills and ability to be able to make healthy food choices. But it is more than just knowing what to eat. It’s actually having the skills and ability to go and find healthy food and prepare it” (I11).*

The teachers indicated that they believed that food literacy consists of many aspects, including food and nutrition knowledge and skills required for planning, selecting and preparing food; eating food in social ways; and cleaning up. More specifically, aspects of food and nutrition knowledge consisted of understanding and being aware of healthy and unhealthy foods, nutritional value of food, nutrients, origins of food, hygiene and safety practices, food labels, recipes and environmental sustainability. They perceived that food skills encompassed the application of food and nutrition knowledge. Also, many teachers indicated that in order to be food literate, a higher level food literacy involving critical thinking is very important, including questioning societal norms, nutrition information in the media and marketing strategies, as evident in the following comment:

*“I’d like to think that after teaching students, they can walk into a supermarket and be completely confident that there are marketing strategies and tactics that are used in relation to trying to get them to buy particular products. I’d like them to be able to go in and recognise that there are particular marketing trends that are attempting to get them*

*persuaded towards a particular product. But they can obviously critically analyse that and be able to put that into perspective in a realistic and educated manner” (I7).*

The home economics teachers recognised the impact of food literacy on food choices and health outcomes. They indicated that food literacy increases food and nutrition knowledge, which helps people to:

- make informed food choices
- enhance or maintain good health
- maintain weight
- avoid diet-related diseases such as overweight and obesity, type 2 diabetes and high blood pressure.

Food literacy was thought to build confidence, leading to improved food preparation behaviours, which can have long-lasting effects. In line with this, the home economics teachers reported that low food literacy levels of adolescents could lead to poor dietary behaviours, including consumption of takeaway, fast and prepacked food. For example:

*“I listen to a lot of students when they come back for their old scholars’ dinners and that. Yes, it’s interesting listening to them—and I guess it might be because I’m there as their home economics teacher—saying, ‘I’m glad that I did cooking’, or, ‘I have remembered some things from cooking and I can cook’, or, ‘My wife thinks it’s great that I can cook’” (I6).*

### ***Interests and/or skills related to dietitians and chefs***

Many respondents reported being personally interested in food and good health, expressing a desire to teach others about food, nutrition and cooking. This was evidently one of the main drivers to becoming home economics teachers. Some teachers had a very close relationship with the hospitality industry—for example, having been a chef before starting a career as a teacher. Many home economics teachers also associated their passion for cooking with their careers as a home economics teacher, with the following comment an example of this:

*“I came to home economics because I was very much interested in food and enjoying food and taking on home economics, it was something that I could teach people how to cook as well as enjoying it myself” (I1).*

Some teachers were more interested in food and nutrition rather than practical components of food literacy such as cooking or teaching others food preparation skills. Some chose home economics as an alternative to the nutrition and dietetics professions—for example, Interviewee 3 stated, *“I actually wanted to do dietetics but I wasn’t that great at chemistry, so I looked at other alternatives”*.

### ***Building competent citizens***

#### **Food skills**

The home economics teachers emphasised the importance of adolescents developing basic food skills that equip them for independent lives. The development of basic food skills referred to:

- transferable skills that adolescents could use at home
- time-saving skills that would enable adolescents to prepare meals in 30 minutes
- food skills that would enable adolescents to adapt recipes and prepare meals with available ingredients including improvising with ingredients.

The teachers were strategic in their teaching of food literacy; they adapted familiar recipes that are culturally acceptable to adolescents, such as spaghetti bolognese or stir fry, so that they became healthier; as Interviewee 1 stated *“[B]ecause we compete against other subjects in the school, we need to work smarter and work efficiently and be strategic in being able to cover the essential skills and develop and include recipes that build in these food literacy and food skill components”*.

Many emphasised the importance of teaching adolescents food skills required to accommodate people with different food-related health issues such as food intolerances or allergies. Food-borne health issues related to food hygiene and safety were seen as learning priorities for adolescents.

Adolescents’ gender was seen as an influential factor in food preparation. Males and females were regarded as having different nutrient requirements and interests. Some teachers stated that female adolescents were more interested than male adolescents in food and nutrition knowledge, whereas male adolescents were more interested than female adolescents in practical components of food literacy such as food preparation skills. Therefore, the home economics teachers stated that they should tailor classes appropriately in order to enhance the learning experience of students.



## **Social experiences**

Teachers also emphasised social eating experiences to be an essential part of food literacy. Such skills include knowledge on how to behave in social events, such as learning social etiquette and table manners, and participating in social eating experiences. The teachers believed that such social interactions are currently lost in some families. This concept was explained by Interviewee 7:

*“[W]e also prioritise social etiquette as well and table manners. So they’ll literally prepare the meal, set the table, learn how to set a table properly. Then we give them a few basic etiquette tips and then we get them to sit in groups of four and five and they have to eat the meal with each other every time they cook, which I think is a really good thing, promoting that social etiquette [because family time is decreasing] in terms of sitting in front of the television and not really enjoying family time during dinner or whatever”.*

## **Critical thinking**

Many teachers stated that having basic food and nutrition knowledge and skills is insufficient to be an informed consumer. Critical thinking and knowledge about macro aspects of food literacy were deemed to be essential, such as awareness of environmental sustainability concepts, including food wastage, food deserts, recycling and degradation, and animal welfare; and economic aspects such as dollar-wise decisions. This was explained by the following interviewee:

*“[I]t also includes some of the consumer decisions regarding environmental sustainability, as we were saying before, making decisions about choosing a vegetarian diet, using resources, such as the Internet, accessing meatless Monday websites to choose recipes, looking at complementary protein sources. Children make very moral decisions about, say, choosing between free-range eggs and caged eggs and what’s that all about” (I1).*

Furthermore, critical analysis of media messages and marketing techniques regarding food and nutrition was seen to be an important skill to learn in order to be a knowledgeable consumer. Many teachers believed they were ideally placed to provide adolescents with accurate information in order to correct many misconceptions in the media regarding food products and diets, as Interviewee 5 explained: *“[W]e try to incorporate really a good discussion about the sort of myths around how things are packaged and how things that*

*are low fat can sometimes be high sugar and just trying to teach those critical thinking skills in people”.*

### ***Home economics teachers as role models***

Many of the respondents were convinced that to have credibility teachers should be positive role models for adolescents with regards to healthy dietary behaviours. As one teacher stated: “[I]f you’re going to be a teacher or an educator of these things, you have to practise what you preach and actually be a positive role model for those kids” (I7). However, some were concerned that other teachers, including fellow home economics teachers, were overweight or obese and/or promoting unhealthy dietary behaviours.

Many respondents explained that the teaching approach of food literacy depends on the teachers’ personal attitudes towards healthy dietary behaviours and teachers’ ability to adapt to new teaching techniques. They believed that home economics teachers influence the food preparation skills developed and the foods that are prepared in home economics classes and in some cases it could be unhealthy options. As one teacher explained “[W]ell, my friend’s children go to [xxx] school and I think it depends very much on the home economics teacher, very much, because what they cook in their home economics classes, I would never cook in my classes” (I2).

Some of the interviewees stated that some home economics teachers have ‘*an old-fashioned*’ approach in teaching adolescents food literacy. They reported that this approach involved unhealthy food preparation behaviours such as baking cakes and biscuits. As one teacher stated: “[P]eople have old-fashioned ways of teaching. I’m not young, but there are certainly plenty of people out there who are just teaching cakes all the time in their home economics classes” (I11).

## **7.6 Discussion**

The aim of this study was to explore home economics teachers’ understanding of food literacy and their role in enhancing adolescents’ food literacy and healthy dietary behaviours at high schools in Australia.

### ***Home economics teachers’ background and interest in food literacy***

In this study, home economics teachers reported that they were personally interested in food, nutrition and cooking. Some had an extensive history of using the

practical components of food literacy, such as working in the hospitality industry as a chef before becoming a home economics teacher. A combination of the roles of a chef and nutrition educator is very useful in order to successfully translate nutrition knowledge and healthy food preparation skills into sustainable dietary behaviours of adolescents (Condrasky & Hegler, 2010). Some studies that have involved a chef and dietitian collaborating to deliver an educational program have shown positive outcomes in terms of cooking confidence, intention to change dietary behaviours, gains in food skills, asking for healthy ingredients to be purchased at home, increased preparation and consumption of fruit and vegetables, and increased awareness of healthy dietary guidelines (Caraher et al., 2013; Condrasky, Griffin, Catalano, & Clark, 2010). Nutrition knowledge can bring a change in dietary behaviours but it has also been suggested to include experiential knowledge of food and food skills to bring about behaviour change (Worsley, 2002). Food skills on their own can improve cooking confidence but this will not necessarily translate into healthy cooking (Condrasky & Hegler, 2010). Therefore, both food and nutrition knowledge and food skills are needed in order to increase the food literacy of adolescents.

### ***Home economics teachers' understanding of food literacy***

The home economics teachers' understanding of food literacy aligned with current definitions of food literacy, indicating that the concept consists of mainly food and nutrition knowledge and food skills required to have healthy dietary behaviours (Cullen, Hatch, Martin, Higgins, & Sheppard, 2015; Desjardins & Hailburton, 2013; Kolasa, Peery, Harris, & Shovelin, 2001; Vidgen & Gallegos, 2014). Teachers identified many different aspects of food literacy required to plan, select and prepare food, and to eat food in social ways and clean up, which aligns with other studies (Fordyce-Voorham, 2011; Fordyce-Voorham, 2015; Pendergast & Dewhurst, 2012; Vidgen & Gallegos, 2014). This comprehensive understanding of food literacy is important in order for home economics teachers, as health educators, to deliver effective food literacy education within the home economics learning area at high schools in Australia.

### ***Home economics teachers' role in building competent citizens***

The home economics teachers reported a relationship between food literacy and health outcomes. They stated that lack of adolescent food literacy was linked to inadequate food and nutrition knowledge and food skills that consequently influenced dietary behaviours and contributed to the development of overweight and obesity. Few studies have indicated that food literacy may have an impact on dietary behaviours

(Larson, Story, Eisenberg, & Neumark-Sztainer, 2006; Laska, Larson, Neumark-Sztainer, & Story, 2012; Utter, Denny, Lucassen, & Dyson, 2016; Vaitkeviciute et al., 2015), including food-related preferences and attitudes (Hersch et al., 2014), family connections and mental health (Utter et al., 2016). Therefore, it is possible that food literacy education could be an important strategy to combat childhood obesity by increasing adolescents' knowledge and skills of healthy dietary behaviours, which would help them to make informed food choices.

The home economics teachers in this study emphasised two levels of food literacy that are required in order to be food literate:

- basic food skills
- higher-order thinking.

### **Food skills**

Food skills were viewed as necessary for day-to-day living. The teachers focused on:

- basic food preparation techniques such as cooking with available ingredients, adapting recipes and improvising with ingredients
- time-saving skills such as preparing meals in 30 minutes
- food safety and hygiene practices
- social eating experiences.

This finding aligns with another study involving home economics teachers where the researcher perceived basic food skills as being the most important for students to make healthy meals and snacks (Fordyce-Voorham, 2016). The practices of home economics teachers in this study align with those in other studies:

- The perception of time required to prepare family meals has been recognised as the main reason for the consumption of away-from-home meals (Fulkerson et al., 2011; Robson, Crosby, & Stark, 2016).
- Some studies have shown that parents would prefer to have interventions that focus on the development of food skills using quick, inexpensive and healthy recipes and facilitate time management techniques in regard to food preparation

(Fulkerson et al., 2011; Robson, Crosby, & Stark, 2016; Worsley, Wang, Ismail, & Ridley, 2014).

- A systematic review found that family meals have been positively associated with healthier dietary behaviours, normal body mass index and increased family connectedness (Hammons & Fiese, 2011; Robson, Stough, & Stark, 2016).

### **Higher-order thinking**

Although basic food skills are crucial for day-to-day living, the home economics teachers stated that these are not enough in order to be food literate. The second level of food literacy reported by the home economics teachers referred to higher-order skills beyond basic food skills. This topic included macro aspects of food literacy such as environmental sustainability, animal welfare, food deserts, food wastage, recycling and degradation. The teachers reported that these skills are required in order to develop knowledgeable and competent consumers. This finding aligns with Fordyce-Voorham's (2016) study.

This level of food literacy uses an inquiry approach and includes interpretative learning and critical thinking about contemporary food issues, and questioning the information behind food and nutrition messages within the media. This level of food literacy has been described as important to have a deeper understanding of the food issues and increases adolescents' motivation and enthusiasm (Pendergast & Dewhurst, 2012; Fordyce-Voorham, 2015; Renwick, 2013). Subsequently, food literacy levels and dietary behaviours of adolescents could be also influenced by school environment, with this aspect warranting further investigation (Lobstein et al., 2015).

### ***Home economics teachers as role models***

The home economics teachers in this study believed that school staff should be positive role models and have positive attitudes towards healthy dietary behaviours, as adolescents learn by observing others. Australian adolescents have previously stated that positive role modelling of healthy dietary behaviours could help them to make informed food choices and to consume healthier foods (Stephens, McNaughton, Crawford, & Ball, 2015). However, interviewees were concerned that some teachers, including fellow home economics teachers, were not providing positive role models. A recent Australian study concurs with this finding, revealing that only 26% of home economics teachers agreed that school staff are good role models in regard to healthy dietary behaviours (Ronto et al., 2016). Therefore, it is essential to create a healthy school environment with teachers

as effective role models for adolescents in order to encourage them to make healthy food decisions.

### **Limitations**

A number of study limitations should be acknowledged. First, participation bias may have occurred as the findings are based on self-reported data and the home economics teachers may have provided socially desirable responses (Brener, Billy, & Grady, 2003). However, given that participants openly discussed negative role modelling, this suggests that desirable responses were minimised. Second, the study interviewer used a telephone interview method, which could have disadvantages such as a lack of visual cues; for example, facial expressions and changes in body language. However, phone interviews were necessary as participants were recruited from across Australia. Also, interviews took place at times convenient for participants, allowing participants to plan in advance and minimise distractions. Third, only one researcher coded the data, so a potential bias in identification of codes may exist. To minimise this, the co-authors met on the regular basis to identify and interpret emerging themes.

### **Acknowledgements**

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## **7.7 Conclusions**

Home economics teachers have a good understanding of food literacy that broadly consists of food and nutrition knowledge and food skills. They also have expertise and backgrounds in nutrition, food knowledge and cooking, which position them well to develop adolescent food literacy. Teachers indicated there are two levels of food literacy:

- basic food skills, which are very important for adolescents to develop for independent life
- higher-order skills—home economics teachers argue for a complex, higher level of food literacy that includes critical thinking about contemporary food issues in order to develop knowledgeable and competent consumers.

They also indicated the importance of teachers being role models to adolescents' food literacy and healthy dietary behaviours. However, they also stated that some high school teachers, including some home economics teachers, are not positive role models for healthy eating.

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## Chapter 8 The Status of Food Literacy Education in High Schools

### 8.1 Study 3- A qualitative study (Manuscript 5)

#### Reader's Note:

The information in this section has been published as an original research paper in a peer-reviewed journal:

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The co-authors of this publication confirm that the research candidate has made the following contributions to this manuscript:

- Developed the study design;
- Completed the human research ethics application;
- Developed questions and pilot tested;
- Conducted data collection;
- Performed data analysis;
- Prepared manuscript for submission to journal.

Signed:



Date: 17/11/2016

Signed:



Date: 29/11/2016

Signed:



Date: 2/12/2016

## 8.2 Abstract

The high school setting has been identified as an ideal setting to teach adolescents about healthy dietary behaviours. This study explored home economics teachers' (HETs) views on the role of high schools in enhancing adolescents' food literacy and promoting healthy dietary behaviours. Semi-structured interviews with 22 HETs were conducted. The interview questions focused on the perceived strengths/opportunities and the limitations/barriers in enhancing adolescents' food literacy and healthy dietary behaviours in Australian high schools. Thematic data analysis was used to identify five key themes from the interview transcripts: (1) the standing of food-related life skills; (2) food literacy in the Australian school curriculum; (3) emphasis on resources; (4) learning through school canteens; and (5) building a school to home and community nexus. Overall, HETs reported that home economics was regarded by parents and other school staff to be less important than Maths or English for adolescents to learn in Australian high schools. Some teachers indicated that their schools offered one year compulsory teaching of food related studies which is typically delivered in the leaning areas of Technologies or Health and Physical Education (HPE). However, HETs stated that the time was insufficient to develop sustainable food-related life skills and introduce broader concepts of food literacy such as environmental sustainability. The lack of financial resources and non-supportive school food environments, including school canteens, were reportedly major factors that prevented food literacy education and healthy dietary behaviours of adolescents. Increasing the status of food literacy education in schools would support adolescents to develop food-related life skills and mobilise them as agents of dietary behaviour change in the home setting.

**Keywords:** food literacy, high school, adolescent, dietary behaviours

## 8.3 Introduction

Unhealthy dietary behaviours have individual health consequences which, in turn, can have serious implications for population health (WHO, 2014). Adolescence is a life-stage of growing capacity, including increasing food and nutrition knowledge and skills required for developing healthy dietary behaviours (WHO, 2014). Unhealthy dietary behaviours during adolescence are an identified risk factor for non-communicable diseases such as overweight and obesity (The Lancet, 2012). Over one quarter of Australian adolescents are overweight or obese (ABS, 2015). The Health Promoting

Schools framework encourages health enhancing school environment and supports adolescents to develop personal skills for developing healthy behaviours including food and nutrition (WHO, 2014).

High schools have a vital role in delivering food and nutrition education for adolescents and creating an environment that promotes healthy dietary behaviours (Bonell et al., 2013; Fulkerson et al., 2011). Food and nutrition education is most effective when it aims to stimulate learning, literacy, skills and action (Contento, 2008; Hawkes et al., 2015). The concept of food literacy has recently emerged which broadly consists of food and nutrition knowledge, skills and capacity, which are collectively required to make informed food choices and improve dietary behaviours (Hawkes et al., 2015; Vidgen & Gallegos, 2014). Food literacy is described as *“the scaffolding that empowers individuals, households, communities or nations to protect diet quality through change and strengthen dietary resilience over time. It is composed of a collection of inter-related knowledge, skills and behaviours required to plan, manage, select, prepare and eat food to meet needs and determine intake”* (Vidgen & Gallegos, 2014). Adolescents who possess sufficient nutrition knowledge and skills are more likely to adopt and sustain healthy dietary behaviours during schooling and throughout the rest of their lives (WHO, 2003). In line with this, it has been proposed that increased food literacy underpins increased food and nutrition knowledge (Tsartsali, Thompson, & Jago, 2009; Venter & Winterbach, 2010); food skills (Caraher, Seeley, Wu, & Lloyd, 2013) including self-efficacy for cooking, food preparation techniques and frequency (Santarossa, Ciccone, & Woodruff, 2015). Also, food literacy has the potential to modify adolescents’ dietary behaviours (Larson, Perry, Story, & Neumark-Sztainer, 2006; Vaitkeviciute, Ball, & Harris, 2015), including increased consumption of fruit and vegetables (Burrows, Lucas, Morgan, Bray, & Collins, 2015; Utter, Denny, Lucassen, & Dyson, 2016), healthy food-related preferences, attitudes and behaviours (Hersch, Perdue, Ambroz, & Boucher, 2014).

Environmental factors strongly influence adolescents’ dietary behaviours (Contento, 2008; Hawkes et al., 2015). Programmes that improve high school food environments have been recognised as a promising approach for improving dietary behaviours during adolescence (Viner et al., 2012) as they spend a significant amount of time in school and consume a large proportion of total daily energy in this setting (Story, Neumark-Sztainer & French, 2002). Although improving adolescents’ food and nutrition knowledge and skills are important, these alone are unlikely to improve adolescents’ dietary behaviours (Dick & Ferguson, 2015). A systematic review of the literature found that adolescents who had positive perceptions regarding school environment were more

likely to engage in health promoting behaviours (Jamal et al., 2013). Australian adolescents have previously indicated that high schools should provide them with an opportunity to develop food skills, for example through cooking lessons, and also be a health-supportive environment (Stephens, McNaughton, Crawford, & Ball, 2015). All high schools are therefore recommended to create a healthy preference-learning environment, such as through repeated and sustained exposure to healthy foods (eliminate unhealthy foods) and comprehensive food literacy education for students, teachers and catering staff (Hawkes et al., 2015; Stephens et al., 2015).

The Australian national curriculum sets a framework for all Australian students that should be taught through foundation to Year 10 (ACARA, 2015). However, the implementation of the Australian national curriculum is flexible and varies between states and territories, and between sectors, that is public, independent and Catholic education sectors. Each school also develops tailored local curricula that meet the needs of their students, hence, the subjects offered could vary between schools, sectors, states, territories. Food related topics are mostly covered in the learning areas of Health and Physical Education (HPE), Technologies and Science (ACARA, 2015). A focus on food and nutrition supports adolescents in developing food and nutrition knowledge and food skills to make informed food choices and explore the contextual factors that influence dietary behaviours (ACARA, 2015).

Home economics is a subject offered in some states and territories where food and nutrition is taught comprehensively and provides opportunities for adolescents to gain theoretical knowledge and understanding of food and to develop food skills through practical activities (Pendergast & Dewhurst, 2012; Ronto, Ball, Pendergast, & Harris, 2016a). Some schools use different nomenclature for subjects where adolescents could increase their food literacy, however, for the purpose of this study, all associated subjects have been captured under the broad umbrella term 'home economics'. Home economics teachers (HETs) have a significant role to play in enhancing adolescents' food literacy as they have nutritional background and pedagogical expertise to provide food literacy education to adolescents. To date, one Australian study has explored HETs' views on the environmental factors of food literacy in high schools (Ronto et al., 2016a). A more interactive approach was needed to explore the role of high schools in enhancing adolescents' food literacy and providing a healthy food environment. This understanding would help to develop more comprehensive public health initiatives for adolescents that could support them in making informed food choices and increase consumption of healthy foods such as fruit and vegetables. It is in this context that this study aimed to explore

HETs' perceptions on the role of high schools in enhancing adolescents' food literacy and healthy dietary behaviours.

## **8.4 Methods**

### ***Participants***

This study applied a semi-structured interview approach to explore the perceptions of HETs on the role of Australian high schools in enhancing adolescents' food literacy and healthy dietary behaviours. An introductory email was sent to a randomised selection of HETs (n=60/91) who had participated in a survey-based research project on food literacy in high schools in Australia (Ronto, Ball, Pendergast, & Harris, 2016b) and provided consent to be contacted for future research opportunities. Twenty seven HETs replied to the email sent by the research team. An information sheet and a consent form were emailed to potential participants. 22 HETs scheduled an interview.

### ***Procedure***

Data were collected via semi-structured face-to-face (n=2) and telephone (n=20) interviews with HETs across Australia during January-February, 2015. Semi-structured interview questions were piloted with the first two HETs (face-to-face). Very minor modifications to wording were made and no removal or addition of questions occurred. For this reason, pilot data were included in the present analysis. Interview questions were developed to cover key areas of investigation, and participants were encouraged to expand on those key areas. First, participants were asked their understanding of the concept of food literacy in order to establish their understanding of this concept. Then, participants were asked questions that focused on the following areas: (i) identification of strengths and opportunities in enhancing adolescents' food literacy and healthy dietary behaviours in high schools in Australia (e.g. What opportunities does your school have in improving adolescents' food literacy?); and (ii) identification of limitations and barriers in enhancing adolescents' food literacy and healthy dietary behaviours in high schools in Australia (e.g. What are the barriers you are facing in teaching food literacy to adolescents?).

Teachers were informed that the interviews would be audio-recorded and the information provided would remain confidential. All interviews were conducted by a single interviewer (RR). Each interview lasted between 15 to 30 minutes. The interviewer took notes during the interview to facilitate data analysis. Ethical approval was granted



from the Griffith University, Human Research Ethics Committee (Reference number MED/57/14/HREC).

### ***Data analysis***

Theoretical saturation was reached at interview 18 where no new data or construct of interest emerged (Draper & Swift, 2011). However, the researcher interviewed all participants who consented and scheduled time to participate in the interview (n=22) in order to substantiate findings. Interview recordings were professionally transcribed and one researcher (RR) reviewed randomly selected transcripts (n=5) for accuracy against the original audio recordings (Braun & Clarke, 2006). A unique identification number was assigned to each interview transcription to ensure confidentiality (e.g. I1, I2, I3).

Thematic data analysis was applied for identifying, analysing, interpreting and reporting themes within the data (Braun & Clarke, 2006). The researchers followed five phases of thematic data analysis suggested by Braun and Clarke (Braun & Clarke, 2006). First, interview transcripts were read and re-read and audio-recordings were replayed to gain data familiarisation. Second, one researcher (RR) manually coded interview transcripts and interviewer's reflective notes. Third, the research team who consisted of four professionals from different disciplines, including home economics, nutrition and dietetics, and public health met on a regular basis to review codes, search, identify and review themes. Investigator triangulation helped prevent the personal or disciplinary biases of a single researcher from influencing the findings (Giacomini, Cook, & for the Evidence-Based Medicine Working Group, 2000). Fourth, the research team refined each theme and extracted quotes from the data set to support each theme.

## **8.5 Results**

Nearly all participants were females (N= 21, 95.5%). Two thirds of participants resided in Victoria (N= 14, 64%), 14% in South Australia (N= 3), 9% in Queensland (N= 2), with the remainder residing in Tasmania (N= 1, 4.5%), New South Wales (N= 1, 4.5%), and Western Australia (N= 1, 4.5%). Five key themes emerged regarding the role of high schools in enhancing adolescents' food literacy and healthy dietary behaviours in Australia: (1) standing of food-related life skills; (2) food literacy in the Australian school curriculum; (3) emphasis on resources; (4) learning through high school canteens; and (5) building school to home and community nexus.

### ***Standing of food-related life skills***

Most HETs indicated that food-related life-skills were seen as ‘*non-academic*’, ‘*undervalued*’, ‘*just cooking*’ or ‘*marginalised*’ by other teachers, school principals and parents. Participants indicated that home economics often competed with other ‘more academic’ subjects in terms of time. Subjects such as maths and science were perceived to be more important than food-related life skills by school staff. The main reason for this was the perception that home economics only encompasses basic food preparation such as “*baking cakes and biscuits*”. HETs indicated that high schools didn’t see the scope of home economics, as explained by the following participant:

*“I think there’s a view that they [other school staff and parents] see it [home economics] as just cooking and don’t see the health component behind it, the healthy community component behind it” (I18).*

HETs reported that most high schools focused only on academic achievements of adolescents and this trend was seen even in high schools that include opportunities for students to orient on less academic subjects leading to employment in manual work in a particular trade or craft. On the positive side, some teachers felt that their subject was valued at their schools and school staff including school principals, were supportive of home economics. Interestingly, teachers reported that in some high schools this was due to personal relationships or previous experience in home economics as explained by the following comment:

*“[W]e’re actually quite lucky because our principal is very supportive of home economics because his wife is actually a home economics teacher. So that has helped, especially when you hear other schools were trying to reduce it and that because other subjects looking like they needed more time” (I6).*

Parents’ negative attitude towards the importance of food-related life-skills was seen to be a major barrier that influenced home economics education in Australian high schools. HETs reported that staff felt pressure from parents as they perceived food-related life-skills were not an important subject for adolescents to learn in high schools in particular female only private schools. Teachers stated that adolescents felt pressure from their parents to focus on more academic subjects rather than “*cooking*”. HETs explained that this perception could be due to parents’ experience in home economics where the focus was on food preparation only and not understanding the current scope of home economics in increasing adolescents’ food literacy.

### *Food literacy in the Australian school curriculum*

Most HETs explained that adolescents could increase their food literacy mainly through two learning areas: HPE and/or the Technologies. HETs were sceptical about the capacity of HPE teachers to effectively teach food literacy to adolescents given nutrition is an addition to the scope of the HPE learning area and perceived different attitudes towards food literacy and healthy dietary behaviours compared to HETs. In addition, HETs reported that home economics and HPE compete with each other regarding time allocations. Most HETs indicated that their schools offered one year compulsory teaching of food and nutrition delivered in HPE or home economics in Years 7 or 8. However, some high schools did not offer a practical component of food literacy and some schools wanted to remove home economics from the school curriculum, in particular those schools which focused on perceived more academic subjects, as illustrated in the following comment:

*“I can’t really understand any principal – there’s a school somewhere in Melbourne where was a proposal to remove food technology from the curriculum, along with physical education as well. I don’t really understand the thinking behind that. Even if you want a strong academic school, you’ve got to make sure that your students are well fed and well looked after” (I3).*

HETs reported that there were opportunities in high schools where adolescents were able to gain food and nutrition knowledge (theoretical component of food literacy) and develop food skills (practical component of food literacy). Teachers stated that in home economics, adolescents learn about both components of food literacy- theory and practice- making it a comprehensive approach. In that way, teachers reported that adolescents were able to apply theory into practice through food preparation. HETs indicated that in other subjects, such as HPE, adolescents were able to increase their food literacy but the scope of this was described as narrow without attention to the linkages between knowledge and application. According to HETs, knowledge was not enough to translate into sustainable healthy dietary behaviours of adolescents. As one participant stated:

*“[It could be taught in] HPE classes, but certainly not to the level of depth and breadth that we have in home economics. And certainly no application or opportunity to have those hands-on skills” (I1).*

HETs explained that in order to gain a maximum benefit of food and nutrition education to increase food literacy, theoretical and practical components of food literacy should be present, meaning that theory should be linked with practice. Teachers reported that other subjects did not cover the broader aspects of food literacy such as environmental sustainability, social aspects of food literacy, contemporary food issues, and the linkage between food literacy and overall wellbeing. HETs believed that it would be more beneficial for adolescents if all subjects that helps to increase food literacy would collaborate with each other, with the following comment an example of this:

*“[Y]ou could look at nutrition in science and you could look at some of the uses of food related in HPE, but you won’t get a chance to actually do the practical skills. And we found that that’s one of the ways that the kids actually take some of it in and think about it, when you actually cook up a meal after you’ve talked about the ingredients in it and what it’s used for and stuff like that” (I6).*

HETs from schools that offered a compulsory year of teaching food and nutrition related subjects stated that the focus was on developing basic food skills. The reasons for that focus was due to time constraints, whereby teachers want to equip adolescents with food skills as they will not have any other curriculum based opportunity to build these essential life skills. Teachers revealed that they considered what adolescents were interested in learning during the compulsory year as this was a predictor of students choosing home economics as an elective in senior years. In the senior years, HETs introduced the theoretical broader concepts of food literacy such as food and economics, contemporary food issues, and environmental sustainability. They reported that a lot of adolescents missed the opportunity to develop a good understanding of food literacy due to home economics being an elective subject in senior years. HETs stated that to develop a good understanding and confidence in food literacy it takes more than one year, as one teacher stated:

*“[W]hat we’ve been trying to do lately, is to try and use the limited time in a more effective way. Rather than looking at more time, we’re looking at ways that we can use what we have. But then we’re trying to look at, even though we have to cover a particular area, how can we do that it’s going to interest our students, because what we want is for them to come back in year 9 and year 10, and keep doing it” (I4).*

HETs stated that human, material and financial resources had a considerable impact on teaching food literacy in high schools. Budget was mentioned by nearly all HETs as the main factor limiting food literacy education particularly the practical component. Teachers indicated that the materials required for food literacy related activities require higher budgets in comparison to other subjects due to high food prices, establishment or renovation of facilities such as kitchens as evidenced in the following comment:

*“[I]t’s a costly subject because of the price of the food and the home economics facilities, the physical facilities themselves” (I1).*

The budget for food literacy related activities varied between types of high schools, most teachers from public high schools stated they had very small or no budgets compared to private high schools, described as ‘*well-resourced schools*’. Paradoxically, teachers reported that some private schools did not offer the practical component of food literacy due to the focus being on subjects that are perceived as more academic. HETs stated they needed greater financial support for updating teaching materials, to buy or replace kitchen equipment. Some stated that they had enough funding for the essentials but not to buy high quality produce such as organic and/or meat products, as one teacher stated “[*W*]e get a small budget but it’s nowhere near enough to buy healthy ingredients” (I10). Teachers indicated that most of the time there was no budget for professional development and they were paying for it themselves, with the following comment an example of this:

*“I’m given a \$2000 a year budget. Out of that \$2000 I am expected to buy resources for the school and to support myself to go and get professional training. To get professional training, I pay for it myself. Any books or resources that I make of healthy pyramids or this – all the little trinkets and treats that I’ve got around the room, I have paid for myself. That money barely covers the cost of the food” (I20).*

HETs implemented strategies to address some of the budget issues: some schools had a levy to cover the ingredients for the practical component of food literacy which parents needed to pay; some schools asked children to bring ingredients on the day of food preparation. Teachers stated that the problem with this approach was that adolescents often forgot to bring ingredients for the class. Also, HETs were thinking about the opportunities to save or bring more money into high schools budgets such as to develop

kitchen gardens and use the produce in the classes; and applying for grants outside of schools. In addition, HETs stated that some high schools were encouraging increased budgets for food literacy by selling food prepared by students through school events for example “Pancake Day”. Teachers revealed that high schools tried to save money or were financially constrained to employ qualified teachers to teach food literacy and instead employed unqualified people such as the gardener, kitchen hand and/or parents to teach food literacy for the programs such as kitchen gardens and Stephanie Alexander Kitchen Garden (for primary school children only) as this was cheaper for a school than employing a professional teacher more qualified in food literacy, with the following quote as an example of this:

*“[W]hat happens is the actual classroom teacher does a component but they employ a garden person and a kitchen person, but it’s not necessarily a teacher. One of the reasons for that is that we’re expensive. That’s the thing, to employ – we’re expensive compared to, you know, they get someone for \$25 an hour or something who might have worked in a vegetarian cafe or something” (I11).*

### ***Learning through high school canteens***

Nearly all HETs indicated that high school canteens had an influence on adolescents’ dietary behaviours. Teachers emphasised that school canteens should promote and encourage adolescents in making healthy dietary behaviours. The selection and healthiness of food in school canteens varied between high schools with most stating that school canteens offered mostly unhealthy foods. Also, there were differences in food selection in regard to school type; and school canteens being a part of the high school or running as private businesses in some cases as delivery services. They stated that public high school canteens tended to follow healthy canteen guidelines and consequently offered healthier foods. However, school canteens which were running as private businesses did not follow healthy canteen guidelines. Teachers indicated traffic light guidelines to be mostly followed in high schools, as one teacher stated:

*“[S]o we use the traffic light system or something like that, the red, green and orange selections. So there’s a good number of green, a fair bit of orange and one or two red items” (I6).*

The price of food was stated by HETs to be one of the main factors that influenced adolescents’ food choices. Teachers indicated that fresh and healthier produce were more

expensive therefore healthier foods that were offered at school canteens were relatively more expensive compared to less healthy foods. Also, school canteens were concerned about wastage issues. Most teachers stated that school canteens were interested in making a profit, therefore selling foods that they know adolescents would like such as chicken nuggets, burgers, pizza, and soft drinks, as explained by the following interviewee:

*“[T]hey are beholden to the school in terms of making money, they know that the things that are going to make the money are the chicken nuggets and those sorts of foods” (I14).*

### ***Building a school to home and community nexus***

HETs stated that home environments could influence adolescents’ food literacy and dietary behaviours. Teachers indicated that home environments did not always promote healthy dietary behaviours due to parents and other family members having low food literacy. They noted that a lot of adolescents were having processed and prepacked food in their lunchboxes. Participants emphasised the responsibility of high schools to teach adolescents about food and provide an opportunity to increase their food literacy through high school. HETs indicated that then adolescents would be able to help parents with food preparation and bring home the information regarding healthy diet. As one participant stated:

*“[T]here’s a whole generation of parents who can’t cook. So if I can get kids to learn to cook, then their literacy or their ability to cook can be taught to their parents. And in fact, that big reverse thing of kids teaching parents” (I12).*

HETs reported that high schools offered an opportunity for adolescents to increase their food literacy through home economics. Adolescents were able to take food that they prepared in the class home so that parents could see that their children were capable of preparing nutritious meals. Teachers were hoping that when parents saw what adolescents were capable of producing they might encourage food preparation more often which would help adolescents to develop their food preparation skills and confidence. Also, some teachers reported that adolescents sometimes were preparing food for school events such as end of the year celebrations and this was a great opportunity for them to show their capabilities in food preparation. They stated that some parents didn’t know that adolescents could do that, as evidenced in the following comment:

*“[I]t [assessment] was originally designed as an opportunity for them to show their parents and their teachers what they've learnt. And most of the parents had no idea of the skills they had, both in the kitchen and as serving staff. So this is their opportunity to show off to their parents, for their parents to be proud” (I12).*

HETs observed that many adolescents did not have basic food skills prior to home economics classes. Participants identified several reasons that influenced adolescents' food literacy including parents lacking deep knowledge in food literacy therefore not teaching adolescents about food preparation; due to time constraints, parents did not let adolescents help them in the kitchens due to possible mess; and technology in the households such as dishwasher. Teachers reported concern that adolescents did not have many opportunities to increase their food literacy and develop food skills outside of high schools. Most HETs stated that they need to start teaching food literacy from basic fundamental food skills such as food safety and hygiene practices, as one teacher stated:

*“[T]he years 7s come in with very little practical skills of cooking in what I call real food. They can all cook cakes and biscuits, but most of them can't even hold a potato peeler any more. They don't know how to peel a potato or a carrot or anything like that” (I2).*

HETs indicated that the scope of food literacy was beyond food preparation and cooking. They stated that food literacy could help adolescents to develop a sense of community, communication skills and experiences in social eating. Some were concerned that few adolescents were having regular social eating experiences with the whole family. Some high schools were involved in helping their community through food preparation. Adolescents were preparing food for the vulnerable populations such as nursing home residents and disadvantaged families. Some high schools donated the produce from the kitchen gardens to families in need, as one teacher explained:

*“[W]e have a nursing home next door. So they take Christmas baskets of things that they've created for them and take that over to them to extend out into the community. They are active in doing things. We do soup kitchens for the hungry. Some of the kids do that and they use the facilities here. They use the knowledge that they've gained to be able to make sure that the soup is not just leftovers. It's actually nutritious” (I12).*



## 8.6 Discussion

The aim of this study was to explore HETs' views on the role of high schools in enhancing adolescents' food literacy and promoting healthy dietary behaviours. Five themes emerged from the interview data. The first theme discussed the standing of food-related life skills in Australian high schools, with most HETs indicating that the importance was not acknowledged by some school staff and parents. This could be due to lack of understanding of the scope of home economics in teaching food literacy and in facilitating adolescents to develop food-related life skills and make informed food choices. This aligns with other research (Pendergast, Garvis, & Kanasa, 2013) that stated that home economics has struggled to maintain a positive identity in modern society due to criticism for creating and reinforcing negative stereotypes of women. This situation is more widespread than the Australian setting of this study, for instance, there is a decline in home economics education in USA and Canadian high schools with the subject consistently undervalued in comparison to other subjects (Slater, 2013; Lichtenstein & Ludwig, 2010). However, numerous studies have confirmed the importance of food literacy and suggest there is a link between food literacy education and healthy dietary behaviours (Vaitkeviciute et al., 2015), food knowledge including food environmental matters such as environmental sustainability (Worsley, Wang, Yeatman, Byrne, & Wijayarathne, 2015), purchasing of fresh foods, use of product information when selecting foods, use of planned meals, use of fewer convenience ingredients (Reicks, Trofholz, Stang, & Laska, 2014), higher diet quality (Reid, Worsley, & Mavondo, 2015; Utter et al., 2016), and developing a range of food skills and capabilities (Pendergast et al., 2013). This suggests that food literacy may help to develop positive life-long lasting food-related life skills in adolescents. It is ironic that at the same time, there is a global issue regarding the decreased value of home economics in high schools which limits the opportunities for adolescents to increase their food literacy.

In this Australian study, HETs stated that the high schools focus on more 'academic subjects' such as science or maths which is perceived as an indicator of success prior to university. This could explain why food-related life skills were seen to be less important for adolescents to learn in high schools by some school staff and parents. But the respondents argued that food-related life skills were crucial for adolescents to learn as it prepares them for independent living. Some studies have suggested that food-related life skills are transferable skills and can influence the development of other skills such as coordination and psycho-motor, organisation and management, and analytical skills in

adolescents (Lichtenstein & Ludwig, 2010; Pendergast & Dewhurst, 2012). One study of primary school children indicated that the experiential learning engaged students, as children felt they produced something tangible (Ensaiff, Canavon, Crawford, & Barker, 2015).

There is a debate about who is responsible to develop those food-related life skills. In some European schools, headmasters perceive parents to be those having the responsibility for adolescents' health, including nutrition (Benn & Carlsson, 2014). The HETs in this study believed that increasing food literacy in adolescents is the responsibility of high schools due to the decrease in parents' food literacy, which aligns with views of home economists around the world (Pendergast & Dewhurst, 2012). Adolescents believed that high schools should teach adolescents about healthy dietary behaviours in order to help them to increase the consumption of healthy foods (Kainulainen, Benn, Fjellström, & Palojoki, 2012) and wanted food literacy related activities to feature in the high school curriculum (Stephens et al., 2015). Therefore, it is important to develop strategies to change high schools' curriculum leaders and parents' attitudes and understanding of the potential of food literacy in developing food-related life skills in adolescents.

The second theme discussed where food literacy fits within the frame of the Australian high school curriculum. Food and nutrition education which contributes to increase of adolescents' food literacy is positioned in mainly two learning areas within Australian high school curriculum: Technologies (home economics) and HPE. However, HETs in this study reported that due to limited time devoted to food literacy related activities, it would be more beneficial to teach food literacy in home economics as it provides a comprehensive and holistic approach to food literacy which is needed to sustain healthy dietary behaviours in adolescents. This is the same view expressed in another influential study (Condrasky & Hegler, 2010). Similarly, Lichtenstein and Ludwig (2010), taking a medical model stance, strongly advocated that home economics classes in high schools need to be considered as a core aspect of contemporary curricula in order to promote food and nutrition knowledge and to build confidence in food preparation. This finding suggests that in order to reach the full potential of food literacy, theoretical and practical components of food literacy should go hand in hand.

Most HETs in this study stated that their schools offered one year compulsory teaching of food and nutrition education delivered through HPE or home economics which in most schools it is taught in Years 7 or 8. Participants of the study stated that there was no time or adolescents were not old enough to critically analyse contemporary

and ethical food issues, for example food deserts, environmental sustainability and animal welfare as the focus is on the development of basic food skills. Pendergast and Dewhurst (2012) emphasised the importance of higher order skills of food literacy which includes interpretive and deep learning. Further authors stated that it brings together interconnecting elements such as food skills, food culture and global food systems, health related behaviours and environmental sustainability. Bellotti (2010) observed that adults are lacking understanding of broader aspects of food literacy such as ethical considerations when purchasing food, social development and equity. It seems that many adolescents are missing the opportunity to develop those higher order skills and capacities. Reid and colleagues (2015) argued that government and nongovernment educational bodies need to ensure that adolescents are able to increase their food literacy through well-resourced home economics programs.

The third theme identified how resources could influence food literacy related activities in Australian high schools. HETs stated that the lack of human, teaching materials and financial resources were one of the major factors influencing food literacy education in Australian high schools. The practical component of food literacy which involves food preparation requires greater financial investment and resources than other subjects due to high healthy food prices. Another recent study supports this finding and states that economic constraints related to food preparation and staffing costs were one of the main obstacles to overcome by high schools in order to teach food literacy effectively (Ensaff et al., 2015). Interestingly and in contrast, a study in the US found that the cost of more nutritious food did not differ significantly from that of less nutritious foods (Katz et al., 2011). In this study the HETs reported that they were forced to look for additional resources for food literacy related activities through introducing a levy for parents, establishing kitchen gardens, and applying for external grants. A study in Australia indicated that kitchen gardens can supply seasonal produce to home economics classes for food literacy activities and even school canteens which consequently would reduce expenditure on buying fresh produce (Somerset & Bossard, 2009). In addition, some HETs were expected to make a profit from selling food prepared on school premises through home economics. This could be seen as an appropriate strategy to support the budget for food literacy related activities but mostly this was achieved through selling less healthy foods due to the demand from school staff and students, which indicates the attitude of the high schools' administration on healthy dietary behaviours in school setting.

The fourth theme discussed the influence of high school food providers on adolescents' food literacy and healthy dietary behaviours. Most respondents indicated that high school canteens offered unhealthy food options with less healthy options. Several reasons were identified, including the high price of fresh produce, concern of food wastage and canteens being profit orientated. Some states in Australia, such as Queensland, have mandated healthy canteen guidelines (Queensland Government, 2016) but there are no established independent authorities to evaluate whether the school canteens adhere to the guidelines. Also, there are some flaws in the healthy canteen guidelines, as they encourage canteens to offer healthy foods but at the same time do not discourage unhealthy foods. Some studies have indicated that the reduction in barriers and enhancement of enablers to healthy food choices are an important approach to enhance adolescents healthy food choices (Swinburn et al., 2015), with some indicating that high schools should completely restrict unhealthy foods as adolescents are still exposed to it (Hawkes et al., 2015). These findings suggest that high school canteens are not supportive in helping adolescents to purchase healthy foods.

The HETs stated that high school food environments should align with formal teaching of food and nutrition and it should encourage healthy dietary behaviours outside of the class, this belief aligns with another study (Kainulainen et al., 2012). Teachers also stated that they observed adolescents purchasing less healthy foods and soft drinks from school canteens and other food providers in close proximity to school. This suggests that more support from school food providers is needed, to inform and help adolescents in making healthy food choices. A study in Nordic countries found that 47% of adolescents wanted high schools to make healthy choice an easy choice (Kainulainen et al., 2012). Similarly, Australian adolescents suggested strategies to help them to improve their healthy dietary behaviours in high schools which included the increase of availability of healthy foods and decrease in unhealthy foods, provide information on healthy dietary behaviours and involve them in cooking (Stephens et al., 2015). Implementation of monitoring initiatives and policies for high school canteens and whole school community could be an element of a solution aimed at achieving supportive environments for adolescents to make healthy food choices (Swinburn et al., 2015). Currently, Australian high schools do not have a compulsory policy on food and nutrition and no one is accountable for it. These findings suggest that compulsory guidelines, nutrition policy for school food providers and an establishment of governmental agencies are needed to ensure school food providers are responsive and accountable for following the guidelines.

The fifth theme discussed how adolescents' home environment could influence adolescents' food literacy and dietary behaviours and vice versa. Parents could support adolescents in increasing their food literacy by involving them in family's dinner preparation. A study conducted in Mexican-American families found that adolescents were confident in food preparation as mothers involved them in family's dinner preparation (Smith, Dunton, Pinard, & Yaroch, 2015). However, HETs stated that some parents were not aware of adolescents' capabilities in food preparation and due to time constraints avoided involving adolescents in food preparation in the home setting which aligns with other studies (Benn & Carlsson, 2014; Fulkerson et al., 2011). It would be beneficial for parents to involve adolescents in food preparation as adolescents would increase their confidence in food preparation and parents would save some time for social interactions (Santarossa et al., 2015; Utter et al., 2016). Many studies emphasised the importance of family meals which is valuable in developing social eating experiences and strengthen family connectedness (Hammons & Fiese, 2011; Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000). Therefore, it is important to change parents' attitudes towards adolescents' capabilities in food preparation.

HETs stated that due to the typically reduced occurrence of family meals high schools provide an opportunity for adolescents to develop food skills through home economics. Adolescents could act as agents of change in the home environment by increasing families' food literacy and consequently change their unhealthy dietary behaviours due to parents having low food literacy. Several studies have shown that food literacy improved adolescents' family dinner and food preparation frequency, self-efficacy and enthusiasm for cooking at home environment and this consequently could influence family's dietary behaviours (Ensaiff et al., 2015; Lichtenstein & Ludwig, 2010; Santarossa et al., 2015). It was revealed that in the US the frequency of family meals is decreasing particularly in low socio-economic groups (Neumark-Sztainer, Wall, Fulkerson, & Larson, 2013). It has been reported elsewhere that it could be due to the low food literacy of parents and increased consumption of take-away foods (Jaffe & Gertler, 2006; Lang & Caraher, 2001; Warde, 1999). These findings suggest that adolescents could act as agents of change in home setting as they gain food and nutrition knowledge and develop food skills through high schools that offer home economics. Adolescents could teach food preparation skills to parents who have low food literacy. Food and nutrition education that aims to increase food literacy could be a good strategy to increase food literacy of adolescents and their families.

The present qualitative study provided insights into food and nutrition education under the umbrella of home economics that aims to increase adolescents' food literacy in the Australian high schools. Several limitations should be acknowledged. First, participation bias may exist as the findings are based on self-reported data and HETs may have provided socially desirable responses (Brener, Billy, & Grady, 2003). But, given that HETs openly discussed barriers of food literacy education in the high schools, this suggests that desirable responses were minimised. Second, the respondents in this study were limited to HETs and in some schools food and nutrition education may be delivered by others who do not identify as home economists. This therefore is outside of the scope of this study. However, HETs are most suitable participants for this topic as food literacy is taught comprehensively in home economics and HETs have high interest in food and nutrition compared to other teachers.

In order to improve food and nutrition education that aims to increase adolescents' food literacy in high schools, it is important to address the issues that high schools are facing in providing such education to adolescents. To address these issues, it is recommended that high schools take into consideration the following suggestions:

- Curriculum leaders should develop a school level plan to incorporate food literacy education and allow enough time to teach food literacy comprehensively (theoretical and practical components of food literacy).
- Curriculum leaders and teachers should ensure that food literacy teaching experiences cover broader aspects of food literacy in order to help adolescents develop critical thinking and make informed and healthy food choices.
- School principals, school food providers and teachers should support, encourage and promote the importance of food literacy for improving adolescents' dietary behaviours. In addition, they should provide opportunities for adolescents to increase their food literacy and practice healthy dietary behaviours through school canteen initiatives.
- Schools should allocate sufficient funding for food literacy related activities; this could be achieved by developing sustainable food resources such as establishment of kitchen gardens. Kitchen gardens could also contribute to the increase of consumption of healthy foods such as fruit and vegetables.

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## 8.7 Conclusions

High schools could play a vital role in enhancing adolescents' food literacy and promoting healthy dietary behaviours. According to HETs, home economics is seen as a comparatively less important subject for adolescents in Australian high schools by school curriculum leaders and parents. Although some high schools provide an opportunity for adolescents to increase their food literacy by offering one year compulsory home economics classes, the respondents indicate that this is not enough time to develop higher order skills and understanding of broader aspects of food literacy. Initiatives that support healthy dietary behaviours in school settings and increase financial resources for food literacy related activities in Australian high schools are needed. More support from food providers in close proximity to high schools is needed to assist adolescents to make informed food choices. Food and nutrition education that aims to increase adolescents' food literacy could be a good strategy to increase parents' food literacy by using adolescents as agents of change in the home setting.

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## Chapter 9 Adolescents' Perspectives on Food Literacy

### 9.1 Study 4- A qualitative study with adolescents (Manuscript 6)

#### Reader's Note:

The information in this section has been published as an original research paper in a peer-reviewed journal:

**Ronto R**, Ball L, Pendergast D, Harris N. Adolescents' perspectives on food literacy and its impact on their dietary behaviours. *Appetite*, 107, 549-557. DOI:10.1016/j.appet.2016.09.006

The co-authors of this publication confirm that the research candidate has made the following contributions to this manuscript:

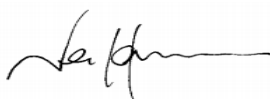
- Developed the study design;
- Completed the human research ethics application;
- Developed activities for focus groups and pilot tested;
- Conducted focus groups;
- Performed data analysis;
- Prepared manuscript for submission to the journal.

Signed:



Date: 17/11/2016

Signed:



Date: 29/11/2016

Signed:



Date: 2/12/2016

## 9.2 Abstract

Food literacy has been identified as a promising approach to support healthy dietary behaviours in adolescents. However, adolescents' perspectives on food literacy and the impact it could have on their dietary behaviours are not well understood. This study explored adolescents' perspectives on the potential for food literacy to influence their dietary behaviours. Fifteen focus groups were conducted with adolescents aged 12-17 years and encompassed quantitative and qualitative questions. Adolescents were asked to rank 22 aspects of food literacy in order of importance and discuss their responses as a group. Overall, adolescents ranked food and nutrition knowledge as more important than food skills and food capacity. Although adolescents stated that food and nutrition knowledge is important for them to eat well, the majority did not apply their knowledge to practice due to low confidence in food skills. Participants demonstrated very limited knowledge about macro aspects of food literacy such as animal welfare or environmental sustainability. Food skills such as planning and managing budgets for food and time for food shopping were ranked as least important due to being presently irrelevant but recognised as important later in life. Adolescents reported being very interested in developing food skills such as food preparation but they had very limited opportunities due to lack of food literacy education in home and high school settings. The high school setting provides an ideal opportunity for adolescents to improve their food literacy in particular food skills through home economics. Future research should develop and measure adolescents' food literacy and its impact on their dietary behaviours.

**Keywords:** food literacy, adolescent, high school, dietary behaviour

## 9.3 Introduction

Dietary habits of adolescents include high consumption of fast-food and sweetened beverages and poor adherence to dietary guidelines (Nelson, Story, Larson, Neumark-Sztainer, & Lytle, 2008; Worsley, 2015). Poor dietary habits have been linked with global overweight and obesity patterns (Dhir & Ryan, 2010). In 2015 the World Health Organization (WHO) estimated that one in every three adolescents worldwide was obese (Dick & Ferguson, 2015). In Australia, one in every four adolescents is estimated to be obese (ABS, 2015). The importance of preventing poor dietary behaviours during adolescence has been recognised due to its impact on long-term health such as the

development of obesity and other non-communicable diseases (Dick & Ferguson, 2015; Lancet, 2012; Worsley, 2015).

A lack of food and nutrition education has been suggested by policy makers and public health professionals as one of the main reasons for poor diet-related health outcomes of adolescents (Kimura, 2011; Silk et al., 2008). Social cognitive theory (SCT) has been widely used in food and nutrition education interventions among children and adolescents to change unhealthy dietary behaviours (Baranowski, Cullen, Nicklas, Thompson, & Baranowski, 2003; Condrasky & Hegler, 2010; Contento, Koch, Lee, & Calabrese-Barton, 2010). However, despite such interventions leading to improved food and nutrition knowledge, translation into healthy dietary behaviours may be limited by an individual's food skills (Worsley, 2015). Therefore, one way to support individuals to improve their dietary behaviours could be through facilitation of food and nutrition knowledge as well as food skills (Worsley, 2015).

The concept of food literacy has emerged as a framework to connect food related knowledge, skills, and capacity (Colatruglio & Slater, 2016). Recent definitions of food literacy incorporate food and nutrition knowledge, food skills and behaviours/capacity (Cullen, Hatch, Martin, Higgins, & Sheppard, 2015; Fordyce-Voorham, 2011; Vidgen & Gallegos, 2014) with some including social, environmental, economic, political, and cultural aspects of food systems (Cullen et al., 2015; Sumner, 2013). Food literacy has been described as *“the ability of an individual to understand food in a way that they develop a positive relationship with it, including food skills and practices across the lifespan in order to navigate, engage, and participate within a complex food system. It's the ability to make decisions to support the achievement of personal health and a sustainable food system considering environmental, social, economic, cultural, and political components”* (Cullen et al., 2015). A recent systematic review indicated that improving food literacy may have a positive influence on adolescents' dietary behaviours (Vaitkeviciute, Ball, & Harris, 2015).

High food literacy is associated with increased consumption of fruit and vegetables (Burrows, Lucas, Morgan, Bray, & Collins, 2015; Utter, Denny, Lucassen, & Dyson, 2016), preference for healthy food (Hersch, Perdue, Ambroz, & Boucher, 2014; Robson, Stough, & Stark, 2016), decreased serving sizes including fast food and reduced frequency of consumption of packaged or processed snacks among adolescents (Contento et al., 2010; Robson et al., 2016). In contrast, low food literacy is associated with a lack of food skills such as cooking and confidence in food preparation which are considered to be barriers to healthy dietary behaviours (Condrasky & Hegler, 2010; Fulkerson et al.,

2011; Nicklas et al., 2013). This evidence suggests that food literacy is an appropriate means to facilitate healthy dietary behaviours of adolescents. How adolescents become food literate remains a challenge and school curriculum could play a vital role in enhancing adolescents' food literacy, particularly given the contemporary decline in food and nutrition knowledge and food skills in the home environment (Brooks & Begley, 2014).

A recent study with 205 home economics teachers (HETs) explored the importance for adolescents to learn various aspects of food literacy (Ronto, Ball, Pendergast, & Harris, 2016c). The study found that teachers predominantly focused on micro aspects of food literacy such as food safety and hygiene practices as well as food preparation skills, with less focus on macro aspects of food literacy such as animal welfare and environmental sustainability. In order to inform and increase the effectiveness of future food literacy programme development, it is important to gain adolescents' perspectives on food literacy, including how it may influence their dietary behaviours. Therefore, this study explored adolescents' perspectives of the importance of food literacy on their dietary behaviours.

## **9.4 Methods**

### *Study design and participants*

Focus groups were used to explore adolescents' views and understanding of the importance of food literacy in relation to their dietary behaviours. Focus groups were chosen due to their interactive format and suitability to explore under-researched topics. For this study, participants could build upon what others in the forum say and suggest, discuss emerging issues with each other and explain their views (Neuman, 2011; Swift & Tischler, 2010).

An introductory email was sent to the HETs at 16 schools in South East Queensland after previously providing consent to be contacted for research on food literacy (Ronto et al., 2016c). Three co-educational schools agreed to participate including one Catholic college, one independent (Christian) college and one public high school with enrolments  $\geq 800$ ,  $\geq 400$ ,  $\geq 2000$  students respectively. The study was approved by Griffith University, Human Research Ethics Committee (Reference number MED/23/15/HREC).



### ***Focus group procedure***

Adolescents enrolled in years 7 to 12 at each school (aged 12-17 years) were invited to participate. An information sheet for potential participants and their parents/guardians was distributed through HETs and informed consent was obtained prior to the commencement of focus groups. A total of 15 focus groups with 6 to 10 participants in each group (total N=131) were conducted between June 2015 and February 2016 (see Table 9.1). Focus groups were gender and age stratified to facilitate free discussion (Krueger & Casey, 2014) and took place on high school grounds during home economics classes. All focus groups were facilitated by one investigator (RR) and supported by a research assistant. Focus groups were audio-recorded and lasted between 30 to 60 minutes (average 50 minutes).

Focus groups consisted of quantitative and qualitative components. First, students were presented with a list of 22 aspects of food literacy which were drawn from previously published literature (Table 9.2) (Desjardins & Azevedo, 2013; Fordyce-Voorham, 2011; Smith, 2009; Vaitkeviciute et al., 2015; Vidgen & Gallegos, 2014). Students were able to ask questions about any aspect of food literacy they did not understand. Partial nominal group technique (NGT) was used to rank the aspects of food literacy according to the importance to adolescents (Gallagher, Hares, Spencer, Bradshaw, & Webb, 1993; McMillan, et al., 2014). Participants were asked to choose six aspects of food literacy that they thought were the most important for them in order to eat healthy and rank them from 1 to 6, with 1 being the most important aspect of food literacy (Table 9.2). According to NGT, the number of aspects for participants to choose from the list can vary from 5, 8, 10 or more (McMillan, et al., 2014). Although 10 aspects are commonly used in NGT, adults from an Australian study indicated that it was too difficult to choose 10 aspects (McMillan, et al., 2014). Therefore, it was decided that six is the appropriate number of aspects for adolescents to consider in this study. It was explained that there is no right or wrong answer. Then, adolescents were asked to choose six aspects of food literacy from the list provided that they thought were the least important for them in order to eat healthy, no ranking was asked for the least important aspects (Table 9.3). Each participant was asked to put their answers on an individual answer sheet first and then to transfer these answers on to an A0 sized answer sheet that was positioned in front of the class on a whiteboard. Different colour dot stickers were used for the two categories: yellow colour stickers for the most important aspects and red colour stickers for the least important aspects of food literacy. Then, one investigator (RR) led a group discussion on students' views about the aspects of food literacy. The coloured stickers of

group members placed against each aspect of food literacy were visible to all which allowed the investigator to lead discussion in timely manner. Based on the number of stickers, participants were asked why various aspects of food literacy were the most or least important for them to eat healthy with this setting up opportunities to probe the group views. In exercise two, adolescents were asked to choose six aspects of food literacy from the same list as in exercise one that they (i) knew the most about; (ii) they knew the least about; and (iii) they wanted to know more about in order to be food literate. Participants were asked to record their answers on a fresh A0 answer sheet positioned in front of the class on a whiteboard by applying different colour stickers for each of the three questions. Finally, one investigator (RR) led a group discussion to better understand participants' knowledge about aspects of food literacy. The investigator asked various questions to explore why they knew, didn't know or wanted to know about various aspects of food literacy.

### ***Data analysis***

Quantitative data analysis was performed using SPSS v22. First, descriptive statistics were used to describe the data. Means and frequencies were calculated for continuous and categorical variables, respectively. Two individual answer sheets were removed from the most important and 13 answer sheets from the least important aspects of food literacy as they were mostly incomplete. The most important aspects of food literacy were reverse scored and summed so that if participants ranked an aspect as 'one', it got a score of 6; if they ranked as their number 'two', it got a score of 5 and so forth. If participants did not choose an aspect it got a score of 0. This variable was analysed as a continuous variable. The least important aspects of food literacy were not ranked, so all aspects of food literacy identified as least important got a score of 1 and it was analysed as a categorical variable. As the data were not normally distributed, Mann-Whitney U tests were used to investigate possible associations in answers based on students' gender and year levels. The data of least important aspects of food literacy were presented as frequencies and percentages. Chi-square tests were used to reflect possible differences between gender and year levels among adolescents. Year levels were recoded into two groups: middle (7 to 9) and senior (10 to 12) years. The level of statistical significance for all analyses was set at  $p \leq .05$ .

A content data analysis approach was applied to analyse the qualitative data. Content analysis is considered appropriate for under-researched topics which often benefit from a rich description of the whole dataset and for explaining quantitative results

(Fade & Swift, 2011). Theoretical saturation was reached at focus group seven where no new data or constructs of interest emerged (Draper & Swift, 2011). However, due to the quantitative component of the focus groups, researchers conducted 15 focus groups. Focus group recordings were professionally transcribed and one investigator (RR) reviewed transcripts for accuracy against the original audio recordings (Braun & Clarke, 2006). Audio-recordings and transcripts were read and re-read to build familiarity with the data. One investigator (RR) coded data using open coding manually according to content analysis procedures (Miles & Huberman, 1994; Neuman, 2005). Assigned initial codes were collated to condense the data into subcategories and categories (Neuman, 2005). All investigators met on a regular basis to review codes, subcategories and categories in order to increase the trustworthiness of the findings (Elo et al., 2014). Investigators clustered subcategories into categories in accordance with three major components of food literacy: food and nutrition knowledge; food skills; and capacity. Illustrative quotes from adolescents were selected to demonstrate responses which were common, contrasting or representing a summary of a topic, and are provided with focus group number, adolescents' gender and year level.

## 9.5 Results

The demographic characteristics of participants are summarised in Table 9.1. Two thirds of participants were female, 69.5% were enrolled in senior years (aged 15 to 17 years), and 57.2% of participants were attending a public high school with the remainder attending either a Catholic or Independent school.

**Table 9.1** Demographic characteristics of the sample

	<b>Adolescents N=131 Number (%)</b>
<i>Gender</i>	
Female	90 (68.7)
Male	41 (31.3)
<i>Years</i>	
Middle (7-9)	40 (30.5)
Senior (10-12)	91 (69.5)
<i>Type of school</i>	
Public	75 (57.2)
Catholic	31 (23.7)
Independent	25 (19.1)

**Table 9.2** Most Important Aspects of Food Literacy (separated by Gender and Year)

Aspects of food literacy	Females (N=90) M (SD)	Males (N=41) M (SD)	p value	Middle Years (N=40) M (SD)	Senior Years (N=91) M (SD)	p value	Total (N=131) M (SD)
<b>Food and Nutrition Knowledge</b>							
Food safety and hygiene practices	<b>2.7 (2.7)</b>	<b>2.9 (3.0)</b>	.70	<b>3.6 (2.8)</b>	<b>2.5 (2.7)</b>	.06	<b>2.8 (2.8)</b>
Healthy and unhealthy foods	<b>2.8 (2.6)</b>	<b>2.0 (2.4)</b>	.12	<b>2.2 (2.5)</b>	<b>2.7 (2.6)</b>	.35	<b>2.5 (2.6)</b>
Where to find food and nutrition information	0.8 (1.7)	0.5 (1.2)	.46	0.4 (1.0)	0.8 (1.7)	.45	0.7 (1.6)
Appropriate portion sizes for different foods	<b>2.1 (2.2)</b>	0.7 (1.7)	≤.05	<b>1.4 (2.1)</b>	<b>1.8 (2.1)</b>	.24	<b>1.7 (2.1)</b>
Dietary guidelines	<b>1.7 (2.1)</b>	<b>1.4 (2.0)</b>	.42	0.9 (1.6)	<b>1.9 (2.2)</b>	≤.05	<b>1.6 (2.0)</b>
Where to obtain food from	0.3 (1.1)	0.8 (1.7)	.12	0.8 (1.6)	0.4 (1.2)	≤.05	0.5 (1.3)
Environmental sustainability (eg food miles, locally sourced food)	0.8 (1.6)	0.8 (1.4)	.56	0.5 (1.2)	0.9 (1.7)	.29	0.8 (1.5)
Where food comes from (food chain)	0.5 (1.3)	<b>1.9 (2.4)</b>	≤.05	<b>1.5 (2.3)</b>	0.7 (1.5)	.09	0.9 (1.8)
Animal welfare	<b>1.4 (2.0)</b>	<b>2.0 (2.1)</b>	.10	<b>1.8 (2.2)</b>	<b>1.4 (2.0)</b>	.33	<b>1.6 (2.0)</b>
<b>Food Skills</b>							
Prepare and cook food from basic/available ingredients	0.9 (1.7)	1.3 (2.0)	.39	1.2 (1.9)	1.0 (1.7)	.81	1.1 (1.8)
Use common kitchen equipment, utensils and appliances	0.1 (0.6)	0.1 (0.5)	.88	0.2 (0.5)	0.1 (0.6)	.36	0.1 (0.6)
Store food appropriately and safely	1.2 (1.7)	1.2 (2.0)	.91	1.3 (2.0)	1.2 (1.7)	.74	1.2 (1.8)
Follow and adapt recipes based on available foods	0.2 (0.8)	0.3 (0.9)	.41	0.3 (0.8)	0.2 (0.8)	.41	0.2 (0.8)
Select and prepare food in accordance with dietary guidelines	1.0 (1.7)	0.3 (0.8)	≤.05	0.4 (1.1)	0.9 (1.6)	.10	0.8 (1.5)
Plan and manage a budget for food	0.5 (1.1)	1.0 (1.8)	.12	0.6 (1.4)	0.6 (1.4)	.77	0.6 (1.4)
Identify and critically analyze food related information	0.1 (0.5)	0.1 (0.3)	.94	0.1 (0.3)	0.1 (0.5)	.91	0.1 (0.4)
Plan and manage time for food shopping	0.2 (0.9)	0.4 (0.9)	≤.05	0.4 (0.9)	0.2 (0.9)	.17	0.3 (0.9)
Gather food from different sources (eg supermarkets, markets)	0.3 (1.0)	0.5 (1.1)	.05	0.7 (1.3)	0.2 (0.9)	≤.05	0.4 (1.1)
<b>Capacity</b>							
Positive attitude towards cooking and healthy eating	<b>2.5 (2.1)</b>	<b>1.9 (2.0)</b>	.14	<b>2.1 (2.0)</b>	<b>2.4 (2.1)</b>	.52	<b>2.3 (2.1)</b>
Confidence in skills related to sourcing, preparing and cooking food	0.3 (1.0)	0.1 (0.6)	.39	0.2 (0.6)	0.3 (1.0)	.42	0.3 (0.9)
Creativity and ability to improvise with ingredients	0.4 (1.1)	0.4 (0.9)	.96	0.3 (0.9)	0.4 (1.1)	.43	0.4 (1.0)
Regular social eating experiences	0.1 (0.6)	0.3 (0.9)	.39	0.4 (0.9)	0.1 (0.6)	≤.05	0.2 (0.7)

\*N- number of participants, M- mean, SD- standard deviation.

**Table 9.3** Least Important Aspects of Food Literacy (separated by Gender and Year)

Aspects of food literacy	Females (N=80) N (%)	Males (N=38) N (%)	p value	Middle Years (N=35) N (%)	Senior Years (N=83) N (%)	p value	Total (N=118) N (%)
<b>Food and Nutrition Knowledge</b>							
Food safety and hygiene practices	8 (10.0)	0 (0)	≤.05	0 (0)	8 (9.6)	.06	8 (6.8)
Healthy and unhealthy foods	3 (3.8)	4 (10.5)	.15	3 (8.6)	4 (4.8)	.43	7 (5.9)
Where to find food and nutrition information	10 (12.5)	8 (21.1)	.23	4 (11.4)	14 (16.9)	.45	18 (15.3)
Appropriate portion sizes for different foods	8 (10.0)	<b>14 (36.8)</b>	≤.05	12 (34.3)	10 (12.0)	≤.05	22 (18.6)
Dietary guidelines	4 (5.0)	5 (13.2)	.12	6 (17.1)	3 (3.6)	≤.05	9 (7.6)
Where to obtain food from	26 (32.5)	<b>16 (42.1)</b>	.31	14 (40.0)	28 (33.7)	.52	42 (35.6)
Environmental sustainability (eg food miles, locally sourced food)	21 (26.3)	3 (7.9)	≤.05	6 (17.1)	18 (21.7)	.58	24 (20.3)
Where food comes from (food chain)	16 (20.0)	13 (34.2)	.09	11 (31.4)	18 (21.7)	.26	29 (24.6)
Animal welfare	6 (7.5)	4 (10.5)	.58	5 (14.3)	5 (6.0)	.14	10 (8.5)
<b>Food Skills</b>							
Prepare and cook food from basic/available ingredients	27 (33.8)	9 (23.7)	.27	11 (31.4)	25 (30.1)	.89	36 (30.5)
Use common kitchen equipment, utensils and appliances	<b>45 (56.3)</b>	<b>21 (55.3)</b>	.92	<b>17 (48.6)</b>	<b>49 (59.0)</b>	.30	<b>66 (55.9)</b>
Store food appropriately and safely	7 (8.8)	5 (13.2)	.46	5 (14.3)	7 (8.4)	.34	12 (10.1)
Follow and adapt recipes based on available foods	<b>29 (36.3)</b>	<b>14 (36.8)</b>	.95	<b>15 (42.9)</b>	<b>28 (33.7)</b>	.35	<b>43 (36.4)</b>
Select and prepare food in accordance with dietary guidelines	10 (12.5)	9 (23.7)	.12	7 (20.0)	12 (14.5)	.45	19 (16.1)
Plan and manage a budget for food	<b>33 (41.3)</b>	13 (34.2)	.46	<b>16 (45.7)</b>	<b>30 (36.1)</b>	.33	<b>46 (39.0)</b>
Identify and critically analyze food related information	20 (25.0)	11 (28.9)	.65	6 (17.1)	25 (30.1)	.14	31 (26.3)
Plan and manage time for food shopping	<b>56 (70.0)</b>	<b>14 (36.8)</b>	≤.05	<b>15 (42.9)</b>	<b>55 (66.3)</b>	≤.05	<b>70 (59.3)</b>
Gather food from different sources (eg supermarkets, markets)	<b>38 (47.5)</b>	<b>18 (47.4)</b>	.99	10 (28.6)	<b>46 (55.4)</b>	≤.05	<b>56 (47.5)</b>
<b>Capacity</b>							
Positive attitude towards cooking and healthy eating	4 (5.0)	3 (7.9)	.53	3 (8.6)	4 (4.8)	.43	7 (5.9)
Confidence in skills related to sourcing, preparing and cooking food	28 (35.0)	<b>15 (39.5)</b>	.64	<b>15 (42.9)</b>	<b>28 (33.7)</b>	.35	<b>43 (36.4)</b>
Creativity and ability to improvise with ingredients	24 (30.0)	8 (21.1)	.31	10 (28.6)	22 (26.5)	.82	32 (27.1)
Regular social eating experiences	<b>57 (71.3)</b>	<b>21 (55.3)</b>	.09	<b>19 (54.3)</b>	<b>59 (71.1)</b>	.08	<b>78 (66.1)</b>

\*N- number of participants, %- percentage

### ***Understanding of Food Literacy***

Most adolescents did not know what the concept ‘food literacy’ meant, with some stating it is “*information about food*”, “*something about nutrition or food*” or “*specialised language in food*”. Participants had variable understanding of some aspects of food literacy. For example, most adolescents understood animal welfare as being “*vegetarian*” with a minority questioning or having a better understanding such as “[I]s that like the caged thing, non-caged chicken?” (Focus Group (hereafter FG) 9, female, Year 11), “[A]nimal welfare is like treating animals the way they should be treated and not having pig farms and caged eggs” (FG 15, male, Year 7). The investigator explained and/or clarified the following aspects of food literacy before the exercises took place: animal welfare, regular social eating experiences and environmental sustainability.

### ***Important Aspects of Food Literacy***

In general, adolescents ranked aspects of food and nutrition knowledge as most important for them in order to eat healthy (Table 2). The table displays the rankings for all aspects of food literacy with the top 6 ranked most important by gender and years groupings highlighted with bolded text. In contrast, participants displayed an interest in gaining competence in all components of food literacy but they felt that they had more knowledge in food and nutrition. The majority of participants stated that food and nutrition knowledge is more important than having food skills in order for them to eat healthy, with some indicating that both were important.

“*You know what to eat and what not to eat and skills are just how you cook*” (FG 14, male, Year 7);

“*If you have skills, then you know knowledge. If you can chop with a knife faster, then you’ve got the knowledge of knowing how to do knifing*” (FG 7, male, Year 9)

### ***Food and nutrition knowledge***

Five of the six most important aspects of food literacy related to food and nutrition knowledge; including knowledge about food safety and hygiene practices, healthy and unhealthy foods, appropriate portion sizes for different foods, dietary guidelines and animal welfare (Table 2). Adolescents stated that knowledge about food safety and hygiene practices and healthy and unhealthy foods was very important for them so they knew which foods were healthy to consume and to stay healthy.

“*So you know what - you eat the healthy ones*” (FG 4, female, Year 11).

*“You could have something that’s really healthy and then if it’s stored not properly, it could go off and you could still eat it and get sick and everything”* (FG 5, female, Year 11).

Adolescents indicated that they had a sufficient amount of knowledge about these two aspects gained mostly through home economics and other food-related classes, as well as parents.

*“From hospitality and home economics. Occasionally from parents”* (FG 4, females, Year 11).

The importance of some aspects of food literacy varied between genders and year levels. Although the difference was not statistically significant, females and students from senior years ranked knowledge about appropriate portion sizes for different foods and dietary guidelines as the most important aspects for them in order to eat healthy. In contrast, males and adolescents from middle years ranked knowledge about where food comes from and animal welfare as most important aspects (Table 2). Adolescents from senior years ( $M = 1.9$ ,  $SD = 2.2$ ) ranked dietary guidelines as significantly more important aspect of food literacy than middle year students ( $M = 0.9$ ,  $SD = 1.6$ ) ( $p \leq .05$ ) (Table 2). Adolescents indicated that it is very important to know and follow dietary guidelines for several reasons: *“follow healthier lifestyle”*, *“to make informed decisions”*, *“keep in shape”* and/or *“not to get fat”*. Most adolescents gained knowledge about dietary guidelines from school, but did not apply this knowledge on a daily basis due to beliefs that it was hard to apply and remember all guidelines; it was suitable only for people who want to follow a ‘strict’ diet; and it was not suitable for a *“growing body”* such as in adolescence.

The majority of students reported that knowledge about appropriate portion sizes for different foods was very important as it helped them not to over or under eat different foods. They specified that portion sizes did not matter for healthy foods but it was definitely important when it came to unhealthy foods. Females ranked this aspect as significantly more important than males ( $p < .05$ ) (Table 2). Some participants, in particular males, indicated that they did not care about portion sizes at all and stated they ate until they felt full, as one adolescent stated: *“[J]ust eat until you get full, pretty much”* (FG 12, male, Year 12).

Many adolescents referred to vegetarianism when they discussed animal welfare. They reported that they wanted to know more about how animals were handled before consumption.

*“So we know a lot more about what’s happening to animals and stuff like that before we eat it. How they’re being treated before we eat them”* (FG 8, female, Year 12).

Also, they indicated that it was important for them to know what meat producers used to feed animals, for example *“hormones”, “steroids”, “pills to grow animals fatter or breasts bigger”, “inject stuff”*. However, some students were not interested in these issues at all and some were influenced by other family members.

*“I get free range eggs because my mum does. She tells me to, “Go get free range eggs”.”* (FG 7, male, Year 9).

*“Because it doesn’t really affect us directly. Like, animal welfare, we don’t see it, we don’t know about it. If we don’t see it, it doesn’t happen”* (FG 5, female, Year 11).

Most adolescents referred to food miles or locally grown produce when discussing the importance of where food comes from. Some students had very limited understanding of this aspect of food literacy as one student stated: *“[I]t just all comes from Woolies [Woolworths, a National supermarket chain]”* (FG 4, female, Year 11). Males ranked this aspect of food literacy as significantly more important in order for them to eat healthy than females ( $p \leq .05$ ) (Table 2).

### ***Food skills***

None of the aspects of food literacy listed in food skills were selected by adolescents in their top 6 of the most important aspects in order for them to eat healthy (Table 2). However, adolescents selected five aspects listed in food skills as the least important aspects for them to eat healthy including: using common kitchen equipment, utensils and appliances; follow and adapt recipes based on available foods; planning and managing a budget for food; planning and managing time for food shopping; and gathering food from different sources (Table 3).

The majority of students indicated that to be able to use common kitchen equipment, utensils and appliances were not important for them as either they were confident in using kitchen equipment; did not believe it had an influence on their dietary behaviours; or they improvised and used the equipment that they were familiar with when needed. Adolescents indicated that being able to prepare and cook food from basic/available ingredients was important mainly due to avoiding take-away and pre-packed foods. Some reported that food preparation skills such as cooking were not the most important aspect for them to eat healthy as they could buy healthy foods and/or they



believed that it was sufficient to have food and nutrition knowledge to be able to prepare and cook food. However, the majority of students indicated that they wanted to be able to cook as those skills will be needed in the future.

*“So you can prepare for yourself and for your children and wife and cook dinners”* (FG 2, males, Year 7).

Most students indicated that they did not prepare or cook food at home as it was mainly the responsibility of parents and/or parents did not want to involve them in family meal preparation as one adolescent stated: *“[M]um gets angry if I stuff something up, just to get out of the kitchen”* (FG 4, female, Year 11). Some adolescents stated that their parents taught them how to cook and were happy when adolescents cooked their family’s dinner. Most adolescents reported that they ate or prepared food after school that was quick and easy to make, namely muesli bars, fruit, yoghurt, crackers, reheated foods such as pizza or last night’s dinner, spaghetti bolognaise, fried rice, toast, sandwiches, two-minute noodles, *“things that can’t go wrong, like, something that can’t explode or something like that”* (FG 15, male, Year 7), *“something not advanced, something basic”* (FG 4, female, Year 11). Adolescents believed that it was schools’ and parents’ responsibility to teach them food preparation and cooking skills. They stated that they gained some cooking experience through home economics classes, parents and/or some popular TV shows such as *Everyday Gourmet* with Justine Schofield, *Bad Chef* and *MasterChef*. Although these TV shows increased their interest in cooking, very few had cooked the same recipes seen on TV because the recipes were too complicated or involved ingredients that were not available at home.

*“If they use common kitchen equipment, like, I can do that too. If they use an ingredient that I’ve never heard of or it’s hard to get, I won’t. Sometimes you can improvise it, but sometimes it’s hard to improvise with certain foods that they use”* (FG 5, female, Year 11).

Many students did not review or critically analyse food related information. They identified several resources where they could access food related information when needed, namely the internet and applications, home economics or other teachers for health-related subjects, parents and supermarkets. Most students trusted the information provided by teachers, but only those who taught food or health related subjects.

*“Depends what they teach. Home economics, sport teachers, then yes”* (FG 5, female, Year 11),

*“I wouldn’t trust my maths teacher. Fat teachers”* (FG 5, female, Year 11).

A few adolescents understood that not all information on the internet was reliable. These students only trusted food-related information provided by government agencies. Interestingly, some indicated they trusted supermarkets in terms of nutrition information.

*“I’d trust supermarkets more than teachers. Supermarkets way more. They know what they put on the shelf. They look at their stuff before they put it on the shelves”*  
(FG 2, male, Year 7).

Most adolescents did not read food labels due to not understanding what the information meant, not knowing what information to look for, believing that food labels were only for those who have special dietary requirements, being not interested, and/or being too hungry at the time of purchase. For those adolescents who read food labels they looked for information on sugar, carbohydrates, calories or kilojoules, servings, saturated fats and/or total fat.

Most adolescents reported not selecting or preparing foods in accordance with dietary guidelines due to lack of knowledge on how to apply it. Females ranked this aspect of food literacy as important for them in order to eat healthy significantly higher than males ( $p \leq .05$ ) (Table 2). Some participants indicated they wanted to know how to apply dietary guidelines in food preparation and identified school, the internet and research as the main resources for increasing their knowledge.

The majority of participants stated that aspects of food literacy such as planning and managing a budget for food and planning and managing time for food shopping were not presently very important. This was because they did not have control over the home food budget. However, students indicated that these aspects will be important in the future when they live independently.

*“Because when we have to - like, we go out on our own and we have our own family, we have to pay for it, not mum and dad”* (FG 5, females, Year 11).

Males ranked planning and managing time for food shopping as more important than females did ( $p \leq .05$ ). Most students indicated it was important to manage a budget due to a belief that healthy foods were more expensive than unhealthy foods such as take-away. But, they stated that with good budgeting skills it was possible to buy healthy foods.

*“So you don’t go over your money so you can feed your whole family for under \$10 and stuff like that. And also you can make a good feed with just a limited amount of money”* (FG 13, male, Year 10).

Many students indicated that their families had a budget for food and compared product prices. Some adolescents reported being involved in their family’s food shopping but not many were interested unless they were allowed to choose the foods they wanted.

*“But when you go shopping you can get what you want”* (FG 7, male, Year 9).

### **Capacity**

Having a positive attitude towards cooking and healthy eating was one of the most important aspects of food literacy identified by students (Table 2). Most adolescents stated that having a positive attitude towards healthy eating and cooking was very important as this could lead to healthier dietary behaviours, cooking or cooking more often, and overall health and wellbeing.

*“Because if you have a negative attitude towards it [healthy eating], then you’re never going to do it [eat healthy]. You’re not going to eat healthy if you have a negative attitude towards it”* (FG 4, female, Year 11).

Students reported that negative attitudes towards healthy eating could lead to unhealthy dietary behaviours such as consumption of take-away foods. But, some adolescents believed that positive attitudes were not important for healthy eating: *“[W]ell, I don’t think it matters what attitude you have. You can still eat healthy and not have a positive attitude”* (FG 3, female, year 10).

Regular social eating experiences were ranked as the least important aspect by many adolescents (Table 3). Some adolescents did not know what regular social eating experiences meant and after explanation some changed their opinion and stated that it was an important aspect, as one student stated: *“Now I think it is important. I couldn’t work out what it actually meant”* (FG 1, females, Year 7). Social eating experiences were perceived as influential to adolescents’ dietary behaviours in positive and negative ways.

*“I was eating heaps of unhealthy food then and I’d see people, like, bring in heaps of fruit and then I noticed that I was eating unhealthy, so I changed to their foods”* (FG 1, females, Year 7).

There were mixed experiences in regard to dietary behaviours during family dinner. Some adolescents reported consuming healthier foods when eating with family; some had an influence on what family ate for dinner; and some had no control over food choices during dinner and ate what parents gave them even though they knew it was unhealthy.

*“Sometimes you can, but most of the time you just eat what you’re given”* (FG 5, female, Year 11),

*“[I]f they want to cook a really fattening dish and you want to eat healthy, you can’t really say, “I’m not eating that.” You have to eat what they have to eat”* (FG 6, female, Year 9),

*“I normally make my own meals. I mean, we still eat together but I do something separate”* (FG 12, male, Year 12).

Some adolescents stated they did not have regular family dinners due to different schedules, as one student stated:

*“I’m not really at home, so - but if I was home, then probably, because they do that. It’s hard to get everybody together as well”* (FG 8, female, Year 12).

Most adolescents believed that they were “*sort of*” confident in cooking. Most students indicated they cooked very basic meals when needed. Some stated that confidence in preparing foods was important in order to be able to cook and not to “*burn yourself*”. A few students indicated that low confidence in cooking could lead to unhealthy and take-away food consumption. Most students wanted to gain confidence in food skills as they had low confidence in their skills due to setting too high expectations for themselves, not getting high marks in cooking assignments, belief that they would “*muck it up*” and minimal cooking opportunities at home and school, the following comment as an example of this:

*“[B]elieve in yourself. Complete an excellent dish. Cooking more. Get an A. Set your goals. Except the teacher never gives us As. We’re the best group”* (FG 13, male, Year 10).

## **9.6 Discussion**

This study explored adolescents’ perspectives on the importance of various aspects of food literacy on their dietary behaviours. Nearly all participants had not heard of the concept ‘food literacy’. It is not surprising as the concept is relatively recent with the definition of food literacy still emerging (Vidgen & Gallegos, 2014; Worsley, 2015). However, participants were aware and knew the meaning of most aspects of food literacy. But, they had very limited understanding of macro aspects of food literacy such as animal welfare and environmental sustainability. A study conducted with HETs found that food and nutrition knowledge and basic food skills were the main focus in Australian high schools due to home economics classes being compulsory for only one year and teachers having limited time to introduce macro aspects of food literacy (Ronto, Ball, Pendergast, & Harris, under review; Ronto et al., 2016c). Bellotti (2010) stated that most consumers are passive in their food choices as their food purchasing decisions do not include ethical considerations such as animal welfare. Some adolescents indicated wanting to know about ethical issues and were concerned that some food producers may use unhealthy

substances to make products more appealing for consumers. This aligns with another Australian study which showed a strong level of support from consumers for environmental food policies and food purchasing (Worsley, Wang, & Burton, 2015).

The adolescents stated that food and nutrition knowledge was most important in regard to their dietary behaviours in particular the aspects of food safety and hygiene practices, dietary guidelines and appropriate portion sizes. This finding is consistent with other studies that have indicated the importance of food safety (Ronto et al., 2016c; Worsley et al., 2015). Adolescents emphasised the importance of dietary guidelines to their dietary behaviours with females ranking this aspect significantly more important which aligns with other studies stating that females are more conscious about food-related topics and having higher food and nutrition knowledge (Gracey, Stanley, Burke, Corti, & Beilin, 1996; Mirmiran, Azadbakht, & Azizi, 2007; Pirouznia, 2001). However, many participants did not apply dietary guidelines on a daily basis due to a lack of capabilities and/or beliefs that it is important for adulthood. Worsley (2002) indicated that nutrition knowledge may play a small but pivotal role in the adoption of healthier dietary behaviours but indicated that food skills are important to enable knowledge to be put into practice.

Although adolescents ranked food skills as less important in comparison to the knowledge component of food literacy, they did recognise that food skills will be very important when they live independently which aligns with findings of another study (Colatruglio & Slater, 2016). Several participants stated that food skills were important in order to avoid the consumption of unhealthy foods such as take-away and prepacked foods. They believed that healthy foods cost much more than unhealthy but with good budgeting and cooking skills it was possible to consume healthy diets. A few studies have found that healthier eating habits do not cost more (Katz et al., 2011; Lee, Kane, Ramsey, Good, & Dick, 2016). Several reasons have been identified to explain the less importance of food skills attributed by adolescents.

Many participants indicated having low confidence in food preparation. Their food preparation practices were limited to simple, quick foods prepared mainly in the microwave or toaster which aligns with another study (Sattler et al., 2015). It has been identified that cooking confidence has a significant influence on food preparation practices as well as increased purchasing of fresh foods, increased use of food labels when selecting foods, increased use of planned meals and fewer perceived time constraints (Ensaiff, Canavon, Crawford, & Barker, 2015; Reid, Worsley, & Mavondo, 2015; Utter et al., 2016). However, lower cooking confidence and less food preparation frequency

have been found to be associated with higher BMI (Utter et al., 2016) and poorer diet quality (Sattler et al., 2015). This could be due to adolescents having basic food skills such as baking (Ronto, Ball, Pendergast, & Harris, 2016b) and also preparing foods such as pancakes, cereal and other unhealthy foods rather than preparing nutritious meals (Sattler et al., 2015). Therefore, food and nutrition knowledge about dietary guidelines, adequate portion sizes and developing higher order food skills are important in order to develop healthy dietary behaviours in adolescents.

Many participants stated having not many food-related domestic responsibilities at home such as food purchasing, budgeting and food preparation. In contrast, a Canadian study showed that 63% of adolescents helped with meal preparation and 42% prepared and cooked meals by themselves (Slater & Mudryj, 2016). But it did not specify what 'meal preparation' meant as it could require basic food skills or more complex higher order skills. Many adolescents stated their parents did not involve them in family meal preparation due to time constraints and because of the mess they can make, the same reasons have been identified in other studies (Ensaff et al., 2015; Fulkerson et al., 2011). It has been stated that teaching adolescents food skills such as cooking and/or the importance of helping out in the kitchen can lead to increased self-efficacy in cooking and food preparation frequency and consequently reduced time in the kitchen for parents (Laska, Larson, Neumark-Sztainer, & Story, 2012; Santarossa, Ciccone, & Woodruff, 2015). A fear of failure also discouraged adolescents to prepare food at home which aligns with observations from HETs (Ronto et al., 2016). Therefore, it is important that parents support and encourage adolescents in food preparation (Stephens, McNaughton, Crawford, & Ball, 2015).

A few adolescents critically analysed nutrition related information. But most students recognised that not all food and nutrition related sources are reliable. Adolescents stated they mostly trusted their parents and teachers in regard to nutrition information but only those teachers who taught food and nutrition related subjects. HETs stated that role modelling is very important for adolescents in regard to healthy dietary behaviours (Ronto, Ball, Pendergast, & Harris, 2016a) but only 25.8% of HETs agreed that teachers were role models in Australian high schools (Ronto et al., 2016c). Not many adolescents reported reading food labels with the main reasons being lack of knowledge on what information to look for and food labels being too complicated to understand. It has been found that nutrition knowledge relates to understanding of food labels (Grunert, Wills, & Fernández-Celemín, 2010) and has a strong influence on food label use (Drichoutis, Lazaridis, & Nayga, 2005). A systematic review found a consistent link between the use

of nutrition labels and healthier diets (Campos, Doxey, & Hammond, 2011). Those students who did read food labels focused on information of fat, sugar, calories and serving sizes which aligns with another study indicating this was the main criteria when adolescents judged the healthiness of snacks (Bucher, Collins, Diem, & Siegrist, 2016). Food labels are a highly credible information source available to help adolescents select healthy foods therefore it is important to increase adolescents' knowledge and skills in food label reading and understanding.

Many participants ranked regular social eating experiences as a least important aspect, but they indicated that family and peers influenced their dietary behaviours in both negative and positive ways. Most adolescents reported consuming healthier foods during family meals which aligns with other findings (Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000). It has been found that adolescents who shared family meals at least 3 or more times per week were more likely to have healthier dietary behaviours (Hammons & Fiese, 2011). Family meals have decreased in recent decades in particular among low socioeconomic backgrounds (Neumark-Sztainer, Wall, Fulkerson, & Larson, 2013). However, some adolescents reported that their parents were not encouraging healthy eating. Also, adolescents stated that their peers influenced their dietary behaviours mostly in a negative way. Adolescents indicated that positive attitude towards food preparation and healthy eating was very important in regard to their dietary behaviours. They stated that negative attitudes towards cooking and healthy eating leads to unhealthy dietary behaviours such as consumption of take-away and processed foods which aligns with other research (Colatruglio & Slater, 2016; Ronto et al., 2016c). Public health initiatives should focus more on improving the home food environment including positive role modelling by parents and peers (Reid et al., 2015; Stephens et al., 2015).

The findings showed that the home environment could play an important role in adolescents' dietary behaviours. However, several limitations within this setting have been identified, including an unsupportive environment for developing food skills such as cooking and confidence; some families influence adolescents' dietary behaviours in a negative way; and lack of regular social eating experiences. These results are consistent with existing literature that links a decrease of food literacy education in the home environment and parents becoming "de-skilled" regarding food preparation skills (Colatruglio & Slater, 2016; Larson, Perry, Story, & Neumark-Sztainer, 2006). Schools could play a vital role in filling this gap by 'up-skilling' adolescents (Lichtenstein & Ludwig, 2010). Also, this would enable adolescents to act as agents of change in the home environment (Ensaiff et al., 2015; Hyland, Stacy, Adamson, & Moynihan, 2006).

Adolescents indicated they would like to increase their food literacy through home economics which aligns with other studies (Stephens et al., 2015). Participation in home economics classes or similar has been associated with higher levels of food knowledge in adults suggesting that it could bring lasting learning and application of food literacy (Worsley, Wang, Yeatman, Byrne, & Wijayarathne, 2015).

### **Limitations**

While this qualitative study has contributed to better understanding of adolescents' views on the importance of various aspects of food literacy that could influence their dietary behaviours, the study has some important limitations that should be acknowledged. First, adolescents were presented with 22 aspects of food literacy. There might be more aspects of food literacy that were not included in the present study. However, all investigators conceptualised food literacy to identify food literacy aspects based on current published literature (Fordyce-Voorham, 2011; Ronto et al., 2016c; Vidgen & Gallegos, 2014; Vaitkeviciute et al., 2015; Smith, 2009) and it was tested for face validity with experts from public health, nutrition and dietetics, and education. Second, adolescents were asked to choose only the six most and least important aspects of food literacy that could influence their dietary behaviours. However, a facilitator (RR) discussed most of the aspects in the qualitative component of the focus groups. Third, some aspects of food literacy have been explained to participants such as animal welfare and environmental sustainability. Most adolescents did not know what animal welfare was at the beginning of the focus group, but then they rated this aspect as very important for them in order to eat healthy. Fourth, only one investigator (RR) coded the data, so a potential bias in identification of the codes may exist. To minimise this, the co-authors met on a regular basis to review codes and categories.

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## 9.7 Conclusions

Food literacy education could play a critical role in enhancing adolescents' food literacy which consequently could influence their dietary behaviours and long-term health. Adolescents ranked food and nutrition knowledge aspects and positive attitude towards healthy eating as most important for them in order to eat healthy but most of them did not apply their knowledge due to lack of food skills. They emphasised the importance of food skills later in life when they live independently. Participants reported having limited opportunities to increase their food literacy. Due to lack of support in developing food literacy in particular food skills in the home environment, high schools could fill this gap and provide adolescents with an opportunity to increase their food literacy. Findings suggest that food literacy educators should focus more on application of food and nutrition knowledge. Future research could develop and quantitatively measure adolescents' food literacy and its impact on their dietary behaviours.

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## **Chapter 10 Discussion and Conclusions**

### **10.1 Introduction**

The overall aim of this thesis was to explore the role of food literacy in shaping adolescents' dietary behaviours in Australian high schools. This thesis incorporated five research questions, which were developed to meet the overall aim of the thesis (Chapter 1, Section 1.2). Four research studies were conducted to answer the research questions (Chapter 1, Section 1.2 and Chapter 3, Section 3.3). This thesis contributed an enhanced understanding of the relationship between food literacy and adolescents' dietary behaviours and an understanding of food literacy in Australian high schools to the literature on adolescent dietary behaviour. It identified barriers and enablers of food literacy in Australian high schools and explored adolescents' perspectives on food literacy and its impact on their dietary behaviours.

This final chapter starts with reflections on research process, which is presented in Section 10.2. Then, it offers an overview of the key research findings, which are presented in Section 10.3. The contributions and implications of this thesis for schools, teachers, curriculum leaders, school food providers, and parents/guardians are presented in Section 10.4. Recommendations for each of these stakeholder groups are set out in Section 10.5. Finally, the overall conclusions of this thesis are presented in Section 10.6.

### **10.2 Reflections on research process**

Throughout this program of research a number of insights into the research process have been gleaned. The first study was a systematic review of the literature which investigated the relationship between food literacy and adolescents' dietary behaviours. By commencing the research program with a systematic review of the literature, the candidate gained knowledge and familiarised herself with the food literacy literature which helped identify gaps in the literature and, in turn, develop the overall research design. The findings of the systematic review informed the development of research questions and further studies to address these questions.

Next, the candidate developed and conducted a cross-sectional survey followed by semi-structured interviews with HETs to investigate understanding of food literacy, the perceived importance and time dedicated to various aspects of food literacy and school



food environments in Australian high schools. One of the aims of the interviews was to explore HETs' understanding of food literacy. In hindsight, it could have been beneficial to position the interviews before the questionnaire as some HETs participated in both studies and their understanding of food literacy may have been enhanced through completion of the survey. However, the findings of interviews complemented and built upon the findings of the survey.

While the survey and the interviews with HETs provided insight into the importance of various aspects of food literacy for adolescents to improve their dietary behaviours, there remained a need to explore adolescents' perceptions of food literacy. In particular, it was important to explore their understanding of food literacy and identify which aspects of food literacy they perceived as important to support healthy eating. The candidate used a qualitative approach because there are no validated data collection tools to measure adolescents' food literacy and no published studies that have explored adolescents' understanding of food literacy. Twenty two aspects of food literacy were identified through the literature and tested with HETs, but not with adolescents, therefore the candidate included a quantitative component in the focus groups. Adolescents had very minimal understanding of food literacy, so the quantitative component helped the candidate to facilitate a discussion with adolescents and for adolescents to grasp the scope of food literacy.

This research design provided a comprehensive picture of food literacy education in Australian high schools from teachers' and adolescents' perspectives. However, it could be beneficial to explore parents/guardians' perceptions regarding food literacy, dietary behaviours and food environments in the home setting. Such research would complement the work undertaken to provide a more complete understanding of the food environments within which adolescents' are making food choices.

### **10.3 Overview of research findings**

The findings of the four research studies presented in this thesis have enhanced the understanding of how food literacy shapes adolescents' dietary behaviours in Australian high schools. The main findings of each study are outlined in Table 10.1.

**Table 10.1** Overview of the main findings of each research study of this thesis

<b>Study</b>	<b>Objectives</b>	<b>Research Questions</b>	<b>Main Findings</b>
Study 1	To investigate the relationship between food literacy and adolescents' dietary intake	RQ1	<ol style="list-style-type: none"> <li>1. None of the reviewed studies measured food literacy comprehensively.</li> <li>2. Most studies used a cross-sectional study design to collect data.</li> <li>3. There is no tool to measure food literacy.</li> <li>4. Eight out of thirteen studies found positive associations between various aspects of food literacy and adolescents' dietary behaviours.</li> </ol>
Study 2	<p>(a) To examine HETs' perspectives regarding food literacy education in Australian high schools</p> <p>(b) To gain a better understanding of the environmental factors impacting adolescents' food literacy in the high school setting</p>	<p>RQ2</p> <p>RQ3</p>	<ol style="list-style-type: none"> <li>1. HETs perceived most aspects of food literacy as very important for adolescents to learn.</li> <li>2. HETs spend more time on micro aspects of food literacy and less time on broader aspects of food literacy, such as environmental sustainability, due to curriculum time limitations.</li> <li>3. Most high schools are well equipped to teach food literacy, but there are numerous barriers, such as a lack of human resources, training in food literacy and teaching materials; insufficient food literacy content in the Australian curriculum; inadequate funding for food literacy activities; the topic is undervalued compared to other subjects.</li> <li>4. School food environments do not support adolescents in making healthy food choices due to limited adherence to <i>National Healthy School Canteen</i> guidelines; canteens and food providers being profit orientated; negative role modelling; and fundraising that often involves unhealthy foods.</li> </ol>
Study 3	(a) To explore HETs' understanding of food literacy and their role in enhancing adolescents' food literacy and healthy	RQ4	<ol style="list-style-type: none"> <li>1. HETs are interested and have pedagogical expertise in health, nutrition and cooking.</li> <li>2. HETs focus on teaching adolescents basic food skills as many adolescents have minimal pre-existing knowledge and skills and there is limited time in the Australian curriculum devoted to food literacy.</li> <li>3. HETs emphasise the importance of social eating experiences, critical thinking and broader aspects of food literacy, such as environmental sustainability, in order to develop competent citizens.</li> </ol>

	<p>dietary behaviours in Australian high schools</p> <p>(b) To explore HETs' perceptions on the role of high schools in enhancing adolescents' food literacy and healthy dietary behaviours</p>	RQ3	<ol style="list-style-type: none"> <li>4. A lack of financial resources, negative role modelling of some teachers, including HETs, and largely non-supportive school food environments, including school canteens are major factors influencing food literacy education and dietary behaviours of adolescents.</li> <li>5. Food literacy related education is undervalued and perceived as not important by school curriculum leaders and parents.</li> <li>6. Adolescents with increased food literacy could act as agents of change in home setting.</li> </ol>
Study 4	<p>To explore adolescents' perspectives on the importance of various aspects of food literacy and its impact on their dietary behaviours</p>	RQ5	<ol style="list-style-type: none"> <li>1. Adolescents perceive food and nutrition knowledge as most important for them to eat healthy.</li> <li>2. Most adolescents lack confidence in the application of food and nutrition knowledge.</li> <li>3. Adolescents have limited understanding of broader aspects of food literacy, such as environmental sustainability and animal welfare.</li> <li>4. Adolescents have limited opportunities to develop food skills in home and high school settings.</li> <li>5. Role modelling is important for developing adolescents' dietary behaviours.</li> </ol>

Study 1, a systematic review of the literature, was a cornerstone of the other studies that were undertaken within this program of research. It systematically synthesised the current evidence on the relationship between food literacy and adolescents' dietary behaviours. The most important finding of this study was that none of the selected studies measured food literacy comprehensively. They measured separate components of food literacy, with most measuring food and nutrition knowledge and adolescents' dietary behaviours. This study concluded that in order to establish the relationship or impact of food literacy on adolescents' dietary behaviours, a longitudinal study design was needed (Neuman, 2005). Only one of the selected studies was a longitudinal study, but it measured only one component of food literacy being food preparation behaviours (Laska et al., 2012). However, the systematic review of the literature suggested that food literacy may play a role in shaping adolescents' dietary behaviours, as eight of the thirteen studies found positive associations between various aspects of food literacy and adolescents' dietary behaviours. The findings of this study led to the development of Studies 2, 3 and 4, with the overarching aim to explore how food literacy was taught in Australian high schools.

Studies 2 and 3 explored HETs' perspectives regarding food literacy in Australian high schools. Based on current literature, this research project included twenty-two aspects of food literacy (Desjardins & Azevedo, 2013; Fordyce-Voorham, 2011; Smith, 2009; Vidgen & Gallegos, 2014), which guided data collection and interpretation of the findings. Given that the concept of food literacy is broad and still evolving, it is possible that this research project did not include all potential aspects of food literacy. However, the identified aspects of food literacy covered its main components, such as food and nutrition knowledge, food skills and behaviours/capacity, and were tested for face validity with experts from public health, nutrition and dietetics, and education. HETs ranked most aspects of food literacy as very important for adolescents to learn, but they spent more time teaching adolescents practical components of food literacy, such as food skills. Most participants focused on the development of basic food skills. Several reasons were identified for this approach: (i) no other subject provided an opportunity for adolescents to develop food skills, including confidence in food preparation and cooking; (ii) time constraints of school curriculum devoted to food literacy limited the time available to explore broader aspects of food literacy; (iii) adolescents had minimal pre-existing food and nutrition knowledge and skills due to parents having low food literacy, including little knowledge of food and nutrition. Further, HETs (study 3) stated that in order to develop

informed consumers, the understanding of broader aspects of food literacy, such as environmental sustainability, animal welfare and ethical issues, is needed, but teachers felt that they did not have enough time to explore these topics. This is reflected in Study 4, where findings showed that adolescents had a limited understanding of the broader aspects of food literacy. The findings from Study 2 and Study 3 showed that the main barrier to providing holistic and comprehensive food literacy education to adolescents in high schools is the different priorities within school curriculum.

Studies 2 and 3 identified other barriers that are impacting food and nutrition education aimed at increasing adolescents' food literacy. Most HETs reported that their schools had facilities for teaching the practical component of food literacy. However, there were numerous barriers that influenced activities related to food literacy. One of the most frequently mentioned barriers by HETs was inadequate financial resources for food literacy related activities. HETs stated that food literacy related activities, in particular the practical component, could be costly; therefore, some schools did not offer them. In addition, many HETs stated that they did not have teaching resources to teach food literacy or that these resources were out-dated. Further, some schools lacked human resources, such as teachers who were trained in teaching food literacy. Last, some schools did not offer home economics or related subjects to increase adolescents' food literacy due to the emphasis was on more academic subjects. These findings suggest that home economics or related subjects where adolescents could increase their food literacy are undervalued in school curriculum and do not receive the financial support needed to adequately support adolescents to increase their food literacy. This can dramatically influence adolescents' opportunities in increasing their food literacy in high school setting.

The school food environment and its impact on adolescents' food literacy and their dietary behaviours was explored in Studies 2, 3 and 4. All three studies identified role modelling as being a very important factor influencing adolescents' dietary behaviours. However, HETs stated that most teachers including some HETs and other school staff, were not positive role models in regard to healthy dietary behaviours. Adolescents (Study 4) reported that teachers who showed positive role modelling in terms of food choices had an impact on their dietary behaviours and food literacy. In addition, adolescents stated that they would not trust in the information provided by teachers who appeared to be making unhealthy food choices. Some HETs (Study 3) stated that fundraising was a barrier to making healthy food choices in a high school environment.

Often fundraising activities involve selling unhealthy foods and some teachers use unhealthy food as a reward within the classroom. School canteens were identified as another major factor influencing adolescents' food literacy and dietary behaviours. HETs from studies 2 and 3 stated that most foods sold in school canteens were unhealthy, with not many healthy food options, which made it an unsupportive environment for adolescents to make healthy food choices. Many HETs stated that many school canteens had low adherence to *National Healthy School Canteen* guidelines. These findings suggest that there are many barriers that adolescents confront in high schools that negatively influence their dietary behaviours and reduce the opportunity to increase their food literacy.

In Study 4, adolescents indicated that they had limited opportunities to increase their food literacy in the school and home settings. These findings align with findings in studies 2 and 3, where HETs stated that, although most schools were well-equipped in terms of having required facilities to teach food literacy, there were also many barriers, such as insufficient time devoted to food literacy related activities and a lack of human and teaching resources. HETs (Studies 2 and 3) and adolescents (Study 4) indicated that adolescents did not have opportunities to increase their food literacy in the home setting due to high levels of food illiteracy among parents or lack of opportunity for adolescents to be involved in food related activities. This lack of support in the home environment highlights the importance of the school as a key setting to promote food literacy among adolescents. Indeed, there is the real potential for highly food literate adolescents to act as the agents of change in the home setting in regard to improving family dietary behaviours and food literacy.

The findings from this program of research contribute to the emerging field of food literacy. First, it found that there is a lack of longitudinal studies that measure the impact of food literacy on adolescents' dietary behaviours. Therefore, the causal relationship between food literacy and dietary behaviours remains unclear. Second, this research identified the barriers and enablers of food literacy education at Australian high schools by applying the ANGELO framework. Third, this research identified aspects of food literacy which HETs and adolescents perceive as the most important aspects in order to eat healthy.

## **10.4 Implications of the research**

The findings of this research have important implications for educational practice and theory.

### **10.4.1 Implications for educational practice**

The findings support the suggestion that food literacy plays an important role in shaping adolescents' dietary behaviours. However, the findings from three studies (study 2, 3 and 4) clearly indicate that schools do not offer enough food literacy related activities. This suggests that school principals and curriculum leaders do not prioritise this type of education in high schools and do not see the potential of food literacy in helping adolescents to make informed food choices. Despite these findings, high schools remain an important setting in providing food and nutrition education aiming to increase adolescents' food literacy and consequently improve dietary behaviours. Australia has a national curriculum, which is used as a framework from foundation to Year 10 to inform what all Australian school students should be taught (ACARA, 2015). However, the implementation of the Australian national curriculum is flexible and varies between states and territories, and between sectors, such as public, independent and Catholic education. Schools develop their own school plan in accordance with the Australian national curriculum that meets the needs of their students. This means that food and nutrition education that aims to increase adolescents' food literacy also varies between states and territories, and between sectors. This has implications for adolescents across Australia, because food and nutrition education depends on schools' priorities and it creates variability in the opportunities for adolescents to increase their food literacy.

McCloat and Caraher (2016) stated that home economics is a sustainable and effective food education strategy which is an established subject in school curriculum of the Republic of Ireland. They stated that the Irish National Council for Curriculum and Assessment has recognised the importance of home economics education in increasing food literacy and achieving healthy and sustainable living for individuals, families and society. The subject of home economics where students can increase their food literacy is taught to primary and high school students. In an international investigation, Stitt (1996) stated that food skills are taught as core or compulsory modules in the curriculum in countries such as Iceland and Finland. In these countries home economics is seen as a high-status subject in the National Curriculum. Consequently the food knowledge and

food skills adolescents, and in turn their diets, are far healthier in these countries when compared to similar countries in the developed world (Stitt, 1996). Such diets contain fewer high-fat and high-sugar foods and fewer in-between-meals snacks. These investigations provide evidence that compulsory approaches to food literacy education in high schools lead to healthy dietary practices.

This research identified several enablers and many barriers that impact food literacy related activities in Australian high schools. The findings from this research showed that home economics could be an ideal subject where both the theoretical and practical components of food literacy could be taught. Also, HETs have pedagogical expertise in health, food and nutrition. However, there is ongoing decline in home economics in high schools as the priority is given to other academic subjects, such as science. This research showed the need for a practical component of food literacy to be taught, as adolescents reported having low confidence in food and nutrition knowledge application and limited understanding of broader concepts of food literacy. HETs believed that curriculum leaders and parents/guardians do not acknowledge the importance of this subject or implications it may have across the lifespan, beyond high school or university requirements. There is a need for change in school level plans to incorporate a comprehensive food and nutrition education to increase adolescents' food literacy. It is important that high schools recognise the merits of each subject and treat them as equally important. Further investigation is needed to explore parents' perceptions on the importance of food literacy education to adolescents' dietary behaviours.

This research identified numerous barriers that impact adolescents' food literacy and dietary behaviours. This information can inform strategies aimed at curriculum leaders, teachers, school food providers and parents/guardians. These barriers must be addressed in order to improve adolescents' food literacy and consequently their dietary behaviours in high schools and home settings. The major barriers that impact adolescents' dietary behaviours and food literacy included financial constraints; negative role modelling of school staff and parents; unsupportive school food environments, such as school canteens; and parents' lack of food literacy or knowledge of food and nutrition. HETs stated that financial resources limited food literacy related activities in high schools due to a lack of funding for up-to-date teaching resources; the high costs of healthy foods; and a lack of funding for human resources, such as teachers who are trained in food literacy. A recent study supports this finding and states that economic constraints related to food preparation and staffing costs were one of the main obstacles that need to be



overcome in the high school setting in order to teach food literacy effectively (Ensaff, Canavon, Crawford, & Barker, 2015). It is clear that further research is needed to identify solutions or effective compromises so that food literacy can be taught in a comprehensive way and offers the benefits associated with practical food literacy activities.

HETs and adolescents emphasised the importance of role modelling and identified it as a very important factor influencing adolescents' food literacy and dietary behaviours. HETs and adolescents stated that some teachers, including some HETs were not positive role models regarding healthy dietary behaviours. In addition, HETs and adolescents reported that most teachers or other school staff used unhealthy foods in fundraising and as a reward for good behaviour or achievements. A previous study indicated that Australian adolescents felt that positive role modelling of healthy dietary behaviours could help them to make informed choices and consume healthier foods (Stephens et al., 2015). This finding suggests that unhealthy foods are prioritised in high schools compared to healthy foods and adolescents may adopt unhealthy dietary behaviours that are demonstrated by school staff. In the UK, the *school food plan* was introduced as an action plan by the national government that school and related authorities should take to change an unhealthy school food culture (Dimpleby & Vincent, 2013). The vast majority of school principals in the UK believed that good food is vital to their students, but many felt they lack the knowledge and experience to improve their school's food culture (Dimpleby & Vincent, 2013). It could be that Australian high school teachers have low food literacy themselves; therefore not being positive role models in healthy dietary behaviours. Therefore, further investigation is needed to explore the reasons why teachers and other staff are not positive role models in regard to healthy eating and identify possible strategies to change Australian high school food culture.

HETs reported that school canteens had a low level of adherence to the *National Healthy School Canteen* guidelines. Although some Australian states, such as Queensland, have mandated healthy canteen guidelines (Queensland Government, 2016), there are no established independent authorities to evaluate whether school canteens adhere to those guidelines. Several studies have identified the relationship between school food environments and adolescents' dietary behaviours and stated that school food environments may have a large impact on their food choices (Jenkins & Horner, 2005; Story et al., 2002; Van Der Horst et al., 2007). Unsurprisingly, it would be difficult for most adolescents to make healthy food choices if these are not readily available. This finding warrants further investigation, with a focus on the availability, accessibility and

affordability of healthy foods in high school canteens. A few recommendations could be drawn from this finding: (i) school food providers should ensure that healthy foods are available, accessible and affordable for adolescents and school staff; (ii) some level of government support should be established or high schools should appoint staff member to ensure school canteens adhere to *National Healthy School Canteen* guidelines.

Adolescents stated that they did not have many opportunities to engage in food literacy related activities at home. Many adolescents stated that their parents did not involve them in family meal preparation due to time constraints, which echo the reasons that have been identified in other studies (Ensaff et al., 2015; Fulkerson et al., 2011). It has been stated that helping adolescents learn food skills, such as cooking and/or the importance of helping out in the kitchen, can lead to increased self-efficacy in cooking and food preparation frequency (Laska et al., 2012; Santarossa, Ciccone, & Woodruff, 2015). However, if not many adolescents have the opportunity to increase their food literacy in the home setting, this mean that high schools are the main source of information and opportunity regarding food literacy. The interplay between the impacts of the home environment and school setting on adolescents' food literacy and dietary behaviours warrants further investigation.

HETs emphasised the importance of social eating experiences in shaping adolescents' dietary behaviours. However, not many adolescents stated that they had regular family dinners at home due to their family's busy schedules. Also, there were mixed findings regarding the impact of family dinners on adolescents' dietary behaviours, with some reporting that they consumed healthier foods during family meals, which aligns with some studies (Hammons & Fiese, 2011; Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000); and other adolescents reporting that their parents were not positive role models for healthy dietary behaviours. Despite these mixed findings, adolescents indicated that a positive attitude towards food preparation and healthy dietary behaviours had an impact on their food choices and practices. Further investigation is needed to pinpoint the factors that moderate or mediate the relationship between social eating experiences, such as having regular family dinners, and adolescents' dietary behaviours. A few recommendations could be drawn from this finding: (i) parents/guardians should be aware of the impact that their food attitudes have on their child's dietary behaviours; and (ii) parents/guardians should promote and make time for positive social eating experiences, such as having regular family dinners.

HETs believed that adolescents had minimal pre-existing food and nutrition knowledge and skills due to parents having low food literacy, including little knowledge of food and nutrition. This finding aligns with findings of other studies (Jaffe & Gertler, 2006; Lang & Caraher, 2001; Warde, 1999). Although schools can play a vital role in increasing adolescents' food literacy, the home environment including parental behaviours is also very important in influencing adolescents' food literacy and dietary behaviours (Hammons & Fiese, 2011; Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2000). There is a need to develop outreach programs targeting parents as a strategy to increase their food literacy and, in turn, their children's food literacy and thereby food choices.

#### **10.4.2 Implications for food literacy theory**

It is important to note that the concept of food literacy is relatively new and evolving (Cullen et al., 2015; Worsley, 2015). The concept of food literacy emerged about five years ago and explicitly focuses on skills in a food context to enable individuals to navigate in food systems and make informed consumer decisions based on nutrition recommendations (Velardo, 2015; Vidgen & Gallegos, 2014). Due to the multifaceted definition of food literacy, a food literacy definition matrix was developed to guide this research project and individual four studies (Chapter 2, section 2.4.2). Twenty-two aspects of food literacy were identified from the literature (Desjardins & Azevedo, 2013; Fordyce-Voorham, 2011; Vidgen & Gallegos, 2014) and applied in two studies (studies 2 and 4) with HETs and adolescents. These studies identified which aspects of food literacy HETs and adolescents perceive as the most important in order to eat healthy. These findings have implications for theory and practice as it can inform teachers, curriculum leaders and developers about which aspects of food literacy they should focus on and include in their teaching practice. In addition, due to limited research on the impact of food literacy on dietary behaviours, there is a need for further research in this area. In summary, this thesis contributes to the body of knowledge by enhancing our understanding of food literacy and its impact on adolescents' dietary behaviours, especially in the context of Australian high school setting. The recommendations drawn from this research relates to schools, parents/guardians and future research endeavours, which are outlined and discussed in the next section.

## 10.5 Recommendations

The recommendations for (i) schools including teachers, curriculum leaders, government authorities and school food providers; (ii) parents; and (iii) future research stem from findings of the four research studies that comprise this thesis. In addition, some recommendations from each study have been detailed within the individual chapters (Chapters 4-9).

### **Teachers, curriculum leaders, government authorities and school food providers:**

1. *Curriculum leaders should develop a school level plan to incorporate comprehensive food and nutrition education and provide enough time for adolescents to increase their food literacy, in particular to develop food skills, confidence in food preparation, to develop critical thinking in order to make informed food choices. Curriculum leaders should make food related subject as core or compulsory throughout primary and high school education.*

This research revealed that high schools probably do not offer enough time, if any, to food and nutrition education that aims to increase adolescents' food literacy. In addition, HETs often focus on developing basic food skills due to adolescents lacking those skills and therefore not having enough time for teaching the broader aspects of food literacy. This is reflected in Study 4, where adolescents showed very limited understanding of those aspects of food literacy.

2. *School principals and curriculum leaders should support and promote positive attitudes about the importance of food literacy and its impact on adolescents' dietary behaviours. Public Health Association of Australia and Home Economics Institute of Australia could develop educational materials to inform school staff and advocate about the positive outcomes of food literacy education to adolescents' dietary behaviours and overall health.*

This study revealed that home economics is a subject in which food literacy could be taught comprehensively, but is undervalued in high schools compared to other subjects. Curriculum leaders and teachers should promote positive attitudes towards food and nutrition related subjects and value it in the same as other more "academic" subjects such as science. There are different career pathways that adolescents may choose to follow and high schools should provide equal opportunities.

3. *Schools should provide sufficient funding for food literacy related activities or to develop sustainable food resources, such as kitchen gardens, to employ qualified teachers to teach food literacy or provide access for up-to-date food literacy teaching resources.*

Financial constraints were identified as one of the major challenges in providing food literacy related education. Some schools did not have up-to-date teaching resources or were not able to provide practical components of food literacy, such as cooking due to high food costs. The development of sustainable food resources, such as the establishment of kitchen gardens could overcome the financial constraints regarding food costs. A study in Australia indicated that kitchen gardens can supply seasonal produce to home economics classes for food literacy activities and even school canteens, which consequently would reduce expenditure on buying fresh produce (Somerset & Bossard, 2009).

4. *Government agencies should be established or schools should appoint a staff member to ensure that school food providers adhere to National Healthy School Canteen guidelines. School food providers should ensure that healthy foods are available, accessible and affordable for adolescents and school staff.*

HETs reported that school canteens had a low level of adherence to *National Healthy School Canteen* guidelines and indicated that, in most schools, healthy foods were relatively more expensive compared to unhealthy foods. High schools should take responsibility regarding foods sold in school canteens. Swinburn and colleagues (2015) indicated that for successful implementation of policy there is a need to move from responsibility to accountability, which is more solution-orientated (Swinburn et al., 2015). Accountability would enhance action, such as adherence to guidelines, and consequently improve food environments and adolescents' dietary behaviours (Swinburn et al., 2015).

5. *All school staff should encourage, support and promote healthy dietary behaviours to adolescents. Public Health Association of Australia and Home Economics Institute of Australia need to combine their forces to advocate for healthy school food culture and environment by developing healthy school plan.*

This research revealed that role modelling is a very important factor influencing adolescents' dietary behaviours and food literacy. It showed that adolescents learn by observing others, in particular teachers and parents/guardians. Therefore, it is important for teachers and parents/guardians to set a good example and be a positive role model regarding healthy eating.

## **Parents/guardians**

1. *Parents/guardians should involve and engage adolescents in food literacy related activities in the home setting, with a particular focus on helping them to develop confidence in food skills. The support of the development of outreach programs for parents by government bodies is need to help parents to increase their food literacy which consequently would lead to better health of the society.*

This research revealed that adolescents did not have many opportunities to engage in food literacy related activities in the home setting. Due to time limitations, parents/guardians do not often involve adolescents in activities that could increase their food literacy levels, such as their confidence in cooking, budgeting and food selection. As adolescents have limited opportunities or time to increase their food literacy in school settings, it is recommended that parents/guardians support, encourage and involve adolescents in food literacy related activities at home.

2. *Parents/guardians should promote and encourage social eating experiences in the home setting such as having regular family dinners; and they should be positive role models regarding healthy dietary behaviours.*

This research showed that a minority of adolescents had regular social eating experiences at home due to their family's busy schedules. Some adolescents stated that they consumed healthier foods, such as fruits and vegetables, while eating with their families, which aligns with previous research which found that adolescents are more likely to engage in healthier dietary behaviours if they had regular family dinners (Hammons & Fiese, 2011). However, some adolescents stated that their parents/guardians were not positive role models in healthy dietary behaviours. Therefore, it is important that parents/guardians encourage, promote and have regular social eating experiences and also be positive role models to adolescents regarding dietary behaviours. In addition, further research is needed in investigating family dynamics that prevent social eating on the home setting.

## **Future research**

Future research recommendations have arisen throughout this research, some due to limitations relating to the design of this research, and others as a result of the findings that stemmed from the four studies. It is recommended that future research endeavours:

1. *Develop and undertake a longitudinal study to measure the impact of food literacy on dietary behaviours from adolescence into adulthood.*

Study 1 and Study 4 identified the need to develop a tool to measure food literacy comprehensively and to conduct a longitudinal study to measure the impact of food literacy on adolescents' dietary behaviours over time. A systematic review of the literature (Study 1) found that existing studies on food literacy did not measure the concept comprehensively and frequently focused only one or two components of food literacy. Although, the review showed that food literacy may have impact on adolescents' dietary behaviours, it is important to confirm the relationship between food literacy and dietary behaviours by measuring all components of food literacy.

2. *Develop a tool to comprehensively measure food literacy.*

Study 4 explored adolescents' perceptions regarding the importance of various aspects of food literacy; however, it did not measure their level of food literacy. Food literacy has been identified as a potential strategy to facilitate healthy dietary behaviours in order to decrease the prevalence of NCDs, including overweight and obesity (Colatruglio & Slater, 2014; Lichtenstein & Ludwig, 2010). Currently, there is no tool to measure an individual's food literacy. Therefore, it is important to develop a tool to comprehensively measure food literacy and to evaluate its impact on adolescents' dietary behaviours over time.

3. *Develop teaching resources for food literacy that incorporate broader aspects of food literacy.*

HETs in Study 2 identified some barriers to teaching food literacy to adolescents, such as teaching resources. Therefore, there is a need to develop teaching resources that incorporate broader aspects of food literacy, such as environmental sustainability, animal welfare and ethical issues, in order to increase adolescents' understanding and application of those concepts.

4. *Evaluate healthy food accessibility and affordability in school canteens and its impact on adolescents' dietary behaviours.*

HETs (Studies 2 and 3) stated that school canteens had a low levels of adherence to the *National Healthy School Canteen* guidelines and that this had an impact on

adolescents' food choices as it resulted in canteens selling mostly unhealthy foods. School canteens impact on adolescents' food literacy and dietary behaviours emerged as a theme in Study 2 (qualitative component) and Study 3, which both used a qualitative study design. Therefore, it would be beneficial to further investigate healthy food accessibility and affordability in school canteens by conducting an observational study and measure its impact on adolescents' dietary behaviours, potentially through adolescents' perspectives.

5. *Measure parents' food literacy levels and its impact on family's dietary behaviours; and to investigate adolescents' role in food related activities in the home setting and the associated impact on their family's dietary behaviours.*

HETs in Study 3 stated that adolescents had minimal pre-existing food and nutrition knowledge and food skills prior to home economics or related classes. A number of reasons for this phenomenon were identified. First, HETs stated that parents did not engage adolescents in food literacy related activities at home. Second, parents themselves may have poor food literacy levels or little food knowledge. These findings are consistent with existing literature that links a decrease of food literacy education in the home environment with parents becoming "de-skilled" regarding food preparation skills (Colatruglio & Slater, 2016; Larson, Perry, et al., 2006). There is limited research that has measured parents' food literacy and its impact on families' dietary behaviours. In addition, there is limited research investigating adolescents' role in food literacy related activities in the home setting and their impact on their family's dietary behaviours, which warrants further investigation.

6. *Investigate how social eating experiences impact adolescents' dietary behaviours within school and home settings.*

This research highlighted the importance of social eating experiences and its impact on adolescents' dietary behaviours. There were mixed findings in Study 4, in which some adolescents indicated that they consumed healthier foods during family meals, while others indicating that their parents/guardians did not model positive healthy dietary behaviours. Therefore, it would be beneficial to explore the role of social eating experiences on adolescents' dietary behaviours.



## **10.6 Conclusions**

Food literacy has been introduced as a concept to guide the understanding of dietary behaviours that can prevent overweight and obesity and other NCDs and to improve overall diet quality and health outcomes (Pendergast et al., 2011). This thesis explored the role of food literacy in shaping adolescents' dietary behaviours. It identified opportunities and barriers that exist for adolescents in relation to enhancing their food literacy in Australian high schools. The findings of this research showed that high schools play a vital role in enhancing adolescents' food literacy, which in turn, underpins their healthy dietary behaviours. However, numerous barriers within the high school setting that could impact on adolescents' food literacy and dietary behaviours were identified, such as school curricula not providing enough time for food literacy related activities, financial constraints, unsupportive school food environments and negative role modelling. Adolescents reported a low level of confidence in the application of food and nutrition knowledge due to minimal opportunities to increase their food literacy in home and school settings. Food and nutrition education to increase adolescents' food literacy could be a central strategy to increase not just adolescents' food literacy but also to enable adolescents to act as agents of food behaviour change in the home setting. The findings from this research can inform school principals, curriculum leaders, teachers, school food providers and parents/guardians of the importance of food literacy in shaping to adolescents' dietary behaviours and can provides recommendations for further action and research to improve adolescents' food literacy.

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## Appendices

### Appendix 1: An introductory email sent to HETs to participate in a cross-sectional survey



Griffith University  
School of Medicine  
Griffith Health Institute  
Gold Coast Campus  
Queensland, 4222

Dear home economics teacher,

We are conducting research which explores home economics teachers' perceptions regarding food literacy education at secondary schools in Australia.

We invite you to take part in a short online survey which should take approximately 10-15 minutes. It will involve answering questions about your understanding of food literacy, how it is taught in your school and your confidence and attitude around food literacy. Survey answers will remain anonymous. Finally, you are invited to enter a prize draw to win one of five **\$50 Coles/Myer gift** vouchers by completing this survey.

**To take part in this study, you will need to click on the survey link:**

<https://prodsurvey.rcs.griffith.edu.au/foodliteracy>

**Alternatively, you may paste the above link (url) in a web browser.**

For further information or to speak to a member of the research team, please contact Rimante Vaitkeviciute on the contact details provided below. This research is being conducted as a part of the student's doctoral studies.

Your participation will be highly appreciated!

Kind Regards,

Rimante Vaitkeviciute, PhD Candidate  
*Student Researcher*  
School of Medicine  
Gold Coast campus  
Griffith University QLD 4222  
Australia  
Ph: (07) 555 27903  
E-mail: rimante.vaitkeviciute@griffithuni.edu.au

Neil Harris, A/Prof  
*Chief Investigator*  
School of Medicine  
Gold Coast campus  
Griffith University QLD 4222  
Australia  
Ph: (07) 555 27879  
E-mail: n.harris@griffith.edu.au

## Appendix 2: An information sheet for HETs to participate in a cross-sectional survey



### Food literacy at secondary schools INFORMATION SHEET

#### Who is conducting the research?

Chief Investigator 1: Neil Harris, PhD, A/Prof, School of Medicine, Ph (61-7) 555 27879, [n.harris@griffith.edu.au](mailto:n.harris@griffith.edu.au)

Chief Investigator 2: Lauren Ball, PhD, School of Allied Health Sciences, Ph (61-7) 567 8 7342, [l.ball@griffith.edu.au](mailto:l.ball@griffith.edu.au)

Chief Investigator 3: Donna Pendergast, PhD, Prof, School of Education and Professional studies, Ph (61-7) 3735 1082, [d.pendergast@griffith.edu.au](mailto:d.pendergast@griffith.edu.au)

Student Researcher: Rimante Vaitkeviciute, PhD candidate, School of Medicine, Ph (61-7) 555 27903, [rimante.vaitkeviciute@griffithuni.edu.au](mailto:rimante.vaitkeviciute@griffithuni.edu.au)

This research is being conducted as a part of the student's doctoral studies.

#### Why is the research being conducted?

The aim of this study is to explore the perceptions of high school home economics teachers regarding food literacy education at secondary schools in Australia. These views are valuable in informing the development of effective food literacy enhancing interventions for adolescents. Food literacy enhancing interventions may contribute to the prevention and management of overweight and obesity, which is one of the most significant public health challenges of the 21<sup>st</sup> century.

#### What you will be asked to do

You will be asked to complete an anonymous 10-15 minute survey. At the end of the survey, you will also be invited to take part in another food literacy study, where you and your students will have an opportunity to express your opinions in more depth by taking part in an individual interview. Also, you are invited to enter a prize draw to win a \$50 gift voucher (Myer or Coles).

#### The expected benefits of the research

Your involvement in this study will contribute to a better understanding of food literacy education at secondary schools, informing health promotion programs and interventions targeting adolescent overweight and obesity.

#### Risks to you

There are no risks to you associated with participation in this study. Participation is voluntary and you may withdraw at any time.

#### Your confidentiality

All data collected will be de-identified and stored in a secure electronic storage system for 5 years. The computerised information will be protected by password. You will not be identifiable in any publication or report resulting from this research.

#### Your participation is voluntary

Your participation is voluntary and you are not under any obligation to consent to participate in this research. You may withdraw from the study during completion at any time. Please note that once you have submitted the completed questionnaire it will not be feasible to withdraw your consent as it will not be possible to identify which responses are yours.

#### Terms and conditions of Prize Draw Entry

1. When you enter the competition, you accept these terms and conditions of entry.
2. Employees of Griffith University and their immediate families are ineligible to enter.
3. Entry into the competition is by:
  - Giving a completed questionnaire to the researcher;
  - Giving the completed sheet with your contact details at the end of the survey
4. 5 random drawn entries will receive a Myer/Coles gift voucher valued at \$50
5. The decision of the University is final.

6. The winner releases the University from any and all causes of action, losses, liability, damage, expense (including legal expenses) cost or charge suffered, sustained or in any way incurred by the winner as a result of any loss or damage to any physical property of the winner, or any injury to or death of any person arising out of, or related to or in any way connected with the University or the prize.
7. Any winner drawn for the prize who is unable to fulfil all these terms and conditions will forfeit the prize and another winner will be drawn.
8. The winner will be notified by e-mail or phone by no later than 1<sup>st</sup> of October 2014.
9. The competition opens to entries on 1<sup>st</sup> of June 2014 and the competition closes on 1<sup>st</sup> of October 2014. The competition is drawn on 1<sup>st</sup> of October 2014. You do not have to be present at the draw to win.
10. The gift voucher will be posted soon after the prize draw.

#### **Questions/ further information**

For additional information about the project, please contact Rimante Vaitkeviciute via email: [rimante.vaitkeviciute@griffithuni.edu.au](mailto:rimante.vaitkeviciute@griffithuni.edu.au) or phone (61-7) 555 27903. A short summary of findings will be prepared and made available to participants for further feedback. If you would like to receive a summary of research findings please contact the research team.

#### **The ethical conduct of this research**

Griffith University conducts research in accordance with the *National Statement on Ethical Conduct in Human Research*. If you have any concerns or complaints about the ethical conduct of the research project you should contact the Manager, Research Ethics on 3735 54375 or [research-ethics@griffith.edu.au](mailto:research-ethics@griffith.edu.au).

#### **Privacy statement**

The conduct of this research involves the collection, access and/or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded. For further information consult the University's Privacy Plan at <http://www.griffith.edu.au/about-griffith/plans-publications/griffith-university-privacy-plan> or telephone (07) 3735 4375.

**If you have read the above information and consent to participate in this research please click the 'Next' button at the bottom of the page to proceed to the survey.**

### Appendix 3: A cross-sectional survey



#### Food Literacy at secondary schools in Australia

The survey consists of a number of sections where you will be asked about various food literacy teaching approaches, food literacy and some demographic details about you and your school.

*\*Please note: Adolescence is a transition period between puberty and adulthood, and refers to people aged 10 to 19 years.*

#### Eligibility questions

1. Are you a home economics teacher who works at a secondary school in Australia?
  - Yes, go to question 2
  - No, please discontinue the questionnaire
  
2. Do you currently teach food literacy as part of the curriculum at a secondary school in Australia?
  - Yes, go to question 3
  - No, please discontinue the questionnaire

#### Your Understanding of Food Literacy

3. A recent food literacy definition put forward by *Home Economics Victoria* describes food literacy as:

*“Food literacy means having the knowledge, skills and the capacity to source, prepare, cook and share food in a sustainable manner to promote a healthy and balanced lifestyle. Food literacy is also about individuals understanding the role that food plays in communities and cultures”* Home Economics Victoria, 2013

Based on this definition, please rate how important is **to know** the following different aspects of food literacy required to be food literate:

	Not at all important	Slightly important	Moderately important	Very important	Extremely important
Dietary guidelines					
Healthy and unhealthy foods					
Food safety and hygienic practices					
Environmental sustainability (e.g. food miles, locally sourced food)					
Food chain & animal welfare					
Food politics and global markets					
Food labels including instructions					
Appropriate portion sizes					
Different locations/outlets where food can be obtained (e.g. supermarkets, markets)					

Where to find food & nutrition information					
How to use common kitchen equipment, utensils and appliances					
How to follow a recipe or/and adapt it for foods that are available					

Based on this definition, please rate how important is **to be able to do** the following different aspects of food literacy required to be food literate:

	<b>Not at all important</b>	<b>Slightly important</b>	<b>Moderately important</b>	<b>Very important</b>	<b>Extremely important</b>
Prepare and cook food from basic/available ingredients					
Calculate serving size					
Use food preparation facilities, utensils and appliances					
Follow recipes and instructions					
Select and prepare food in accordance with dietary guidelines					
Identify & critically analyse food related information					
Gather food from different sources (e.g. supermarkets, markets)					
Plan & manage a budget for food					
Plan & manage time for food shopping					
Plan meals					
Store food appropriately and safely					

Based on this definition, please rate how important is **to have a capacity to do** the following different aspects of food literacy required to be food literate:

	<b>Not at all important</b>	<b>Slightly important</b>	<b>Moderately important</b>	<b>Very important</b>	<b>Extremely important</b>
Food preparation and cooking activities					
Food & nutrition knowledge acquisition and application					
Respect and value for food traditions, culture					
Social eating experiences					

**Food Literacy education at your school**

4. To your knowledge, is food literacy taught in other learning area/s at your school?
- Yes
  - No, go to question 6



I do not know, go to question 6

5. Please specify in which other learning areas:

- Technology  Science  
 Health and Physical education  Health  
 Other \_\_\_\_\_

6. Thinking about your personal teaching of food literacy, what proportion of time do you spend on trying to increase the following each aspect of food literacy during one school year:

	Not at all	A little bit	A moderate amount	A lot	A great deal
Food and nutrition knowledge (e.g. dietary guidelines, nutrients, healthy/unhealthy foods)					
Food safety and hygienic practices					
Environmental sustainability (e.g. food miles, locally sources food)					
Food chain and animal welfare					
Food politics and global markets					
Interpreting food labels and instructions					
Where to find information					
Food preparation and cooking activities					
Budget planning, management & food costing					
Use of food preparation facilities, utensils and appliances					
Use of recipes and instructions					
Food sourcing and storage					
Values of food traditions, culture					
Social eating experiences					

7. Thinking about the adolescents who take your food literacy class, does their involvement in these classes lead to:

	Strongly Disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Interest in nutrition and health					
Purchase, preparation & cooking a healthy meal for themselves					
Participation in healthy eating and food literacy enhancing activities					
Increased healthy food consumption at the school canteen					
Increased vegetable & fruit consumption					
Decreased off-campus fast-food consumption from fast food outlets					
Healthier lunch box choices					
Increased food & nutrition knowledge					
Reading food labels					
Increased knowledge & practices in food safety and hygiene					

*Self-efficacy and attitudes towards food literacy*

8. Indicate the extent to which you feel confident about performing each of the following activities.

	Not at all confident	Not Very confident	Moderately confident	Very confident	Extremely confident

Prepare and cook healthy, balanced, tasty and affordable meals					
Prepare and cook healthy and nutritious meals from foods that are available					
Access and understand the latest research-based food and nutrition information (e.g. healthy eating, dietary guidelines, nutrients)					
Source and select food in accordance with dietary guidelines					
Prepare food in different food preparation techniques (steaming, sautéing, stir-frying, grilling, poaching, baking, roasting, stewing)					
Interpret food labels and instructions					
Use food preparation facilities, utensils and appliances					
Store food appropriately and safely					

9. Indicate the degree to which you agree with each statement.

	<b>Strongly Disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly Agree</b>
Food literacy is an essential life skill for everyone					
School is an important place to enhance adolescents' food literacy					
Food literate people are empowered to make healthier food choices					
Food and nutrition knowledge on its own is enough to make healthy food choices					
Food literacy should be mandatory in secondary schools through all years					
Adolescents are food literate in my school					
The school environment is food literacy enhancing					

**School environment**

10. Indicate the degree to which you agree with each statement about the physical environment of food literacy and healthy eating at your school

	<b>Strongly disagree</b>	<b>Disagree</b>	<b>Neither agree or disagree</b>	<b>Agree</b>	<b>Strongly agree</b>
My school's canteen has adequate healthy food options					
My school has close geographical proximity to fast-food outlets					
My school has a kitchen for teaching adolescents food preparation skills					
My school has enough space to store food					
My school has ongoing food literacy education training for teachers					
My school's curriculum includes food and nutrition knowledge					
My school has one/several nutrition related programs					
My school has out-of-school food literacy enhancing activities (e.g. cooking classes, food interest group, school vegetable garden)					

11. Indicate the degree to which you agree with each statement about the economic environment of food literacy and healthy eating at your school

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
Healthy foods options in my school's canteen are expensive					
My school's canteen competes with other off- and on-campus food providers (e.g. vending machines, fast food outlets)					
My school has sufficient funding for nutrition-related programs					
My school has sufficient funding for training teachers in food literacy					

12. Indicate the degree to which you agree with each statement about the political environment of food literacy and healthy eating at your school

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
My school follows the National Healthy School Canteen guidelines					
I teach food literacy based on the Australian Guide to Healthy Eating for children and adolescents					
My school has guidelines for healthy lunch box choices					

13. Indicate the degree to which you agree with each statement about the sociocultural environment of food literacy and healthy eating at your school

	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
My school's staff are supportive in healthy eating activities (e.g. cooking classes, healthy meals, food interest group)					
My school's staff are a role models for healthy eating					
My school's staff value food literacy enhancing activities as an important part of the curriculum					
Students at my school feel peer pressure when it comes to what they eat					

### Demographics

14. What is your age?

- |                                      |   |
|--------------------------------------|---|
| <input type="checkbox"/> 20-24 years | <input type="checkbox"/> 45-49 years        |
| <input type="checkbox"/> 25-29 years | <input type="checkbox"/> 50-54 years        |
| <input type="checkbox"/> 30-34 years | <input type="checkbox"/> 55-59 years        |
| <input type="checkbox"/> 35-39 years | <input type="checkbox"/> 60-64 years        |
| <input type="checkbox"/> 40-44 years | <input type="checkbox"/> 65 years and older |

15. What is your gender?

- Male       Female

16. How many years have you taught food literacy?

- Student teacher    11-15 years

- 1-5 years
- 6-10 years
- 16-20 years
- over 20 years

17. What year/s do you currently teach food literacy?

- 7       8
- 9       10
- 11      12

18. What state/territory do you live in?

- New South Wales
- Queensland
- Western Australia
- Northern Territory
- Victoria
- South Australia
- Tasmania
- Australian Capital Territory

19. In what type of school do you teach?

- Public               Independent
- Private               Catholic
- Other, specify \_\_\_\_\_

20. What is your school's postcode and suburb?

Postcode:

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**Please provide your views, opinion, experiences regarding food literacy education in high schools in the box below:**

**Thank you!**

**Appendix 4:** An introductory email sent to HETs to participate in a semi-structured interview



Griffith University  
School of Medicine  
Griffith Health Institute  
Gold Coast Campus  
Queensland, 4222

Dear home economics teacher,

Thank you for completing online survey “Food literacy at secondary schools in Australia”. We are conducting a second phase of research which includes individual interviews with home economics teachers. This research aims to better understand high school home economics teachers’ current role in enhancing adolescents’ food literacy and healthy dietary behaviours.

As you indicated in the online survey you would be willing to participate in an individual interview. We invite you to take part in an interview which should take approximately 15 to 60 minutes. It will involve answering questions about your interest and views of food literacy in Australian high schools. The information provided in an individual interview will remain anonymous.

Please find information sheet attached regarding the research. If you are willing to participate, please email me to schedule an appointment to meet the researcher on school premises or convenient time to call. Your request for an appointment will be an indication of your informed consent to participate in the research.

For further information or to speak to a member of the research team, please contact Rimante Vaitkeviciute on the contact details provided below. This research is being conducted as a part of the student’s doctoral studies.

Kind Regards,

Rimante Vaitkeviciute, PhD Candidate  
*Student Researcher*  
School of Medicine  
Gold Coast campus  
Griffith University QLD 4222  
Australia  
Ph: (07) 555 27903  
E-mail: rimante.vaitkeviciute@griffithuni.edu.au

Neil Harris, A/Prof  
*Chief Investigator*  
School of Medicine  
Gold Coast campus  
Griffith University QLD 4222  
Australia  
Ph: (07) 555 27879  
E-mail: n.harris@griffith.edu.au

## Appendix 5: An information sheet for HETs to participate in a semi-structured interview



Griffith University  
School of Medicine  
Griffith Health Institute  
Gold Coast Campus  
Queensland, 4222

### Home Economics teachers' role in enhancing adolescents' food literacy

#### INFORMATION SHEET

##### Who is conducting the research?

Chief Investigator 1: **Neil Harris**, PhD, A/Prof, School of Medicine, Ph (61-7) 555 27879, [n.harris@griffith.edu.au](mailto:n.harris@griffith.edu.au)

Chief Investigator 2: **Lauren Ball**, PhD, School of Allied Health Sciences, Ph (61-7) 567 8 7342, [l.ball@griffith.edu.au](mailto:l.ball@griffith.edu.au)

Chief Investigator 3: **Donna Pendergast**, PhD, Prof, School of Education and Professional studies, Ph (61-7) 3735 1088, [d.pendergast@griffith.edu.au](mailto:d.pendergast@griffith.edu.au)

Student Researcher: **Rimante Ronto**, PhD candidate, School of Medicine, Ph (61-7) 555 27903, [r.ronto@griffith.edu.au](mailto:r.ronto@griffith.edu.au)

This research is being conducted as a part of the student's doctoral studies.

##### Why is the research being conducted?

The research study aims to understand high school home economics teachers' current role in enhancing adolescents' food literacy levels and healthy dietary intake. Exploring food literacy educators' views about food literacy may have important implications for the development of effective food literacy enhancing interventions for adolescents. Food literacy enhancing interventions could assist in the prevention and management of overweight and obesity. Obesity is one of the most serious public health challenges of the 21<sup>st</sup> century, and its prevalence has increased substantially over the past two decades.

##### What you will be asked to do

You will be asked to participate in an interview with a researcher, which will last approximately 15-30 minutes. Interview will be conducted face-to-face or by telephone depending on your location and convenience. At the beginning of the interview the researcher will ask for your permission to audio-record the interview. Transcribed and de-identified interview extracts may be used in the producing a publication to the academic journal or conference. At the end of the interview you will be asked if you would be willing to discuss about the possibility to participate in the next stage of the research with your school's principal where your students will have an opportunity to express their opinion and understanding about food literacy in more depth and healthy dietary intake.

##### The expected benefits of the research

Your involvement in this study will contribute to a better understanding of food literacy at secondary schools, thereby enabling the improvement of health promotion programs and interventions targeting childhood overweight and obesity.

##### Risks to you

There are no significant risks to you associated with participation in this study. Should you feel discomfort please feel free to discontinue your participation in the research.

##### Your confidentiality

To ensure your confidentiality, the research team will manage the data collected through the research. All data collected will be de-identified and kept by researchers in a secure room for 5 years and then destroyed as confidential waste. The computerized information will be protected by password. Your identity will not be identifiable in any publication or reporting resulting from this research. Please note that once the interview is transcribed it will not be feasible to withdraw your consent as all audio recordings will be erased after the transcription.

##### Your participation is voluntary

Your participation is voluntary and you are not under any obligation to consent to participate in this research. There are no direct benefits of this research to you. You are entirely free to discontinue your participation at any time, or to decline to answer any question/s. Interviews will be audio recorded only

with your permission.

#### **Your consent to participate in the research**

The scheduled appointment demonstrates your voluntary, informed and competent decision to participate in the research. The scheduled appointment will be indicated as your informed consent to participate in the interview.

#### **Questions / further information**

For additional information about the project, please contact Rimante Vaitkeviciute via email: [r.ronto@griffith.edu.au](mailto:r.ronto@griffith.edu.au) or phone (61-7) 555 27903. A short summary of findings will be prepared and made available to participants for further feedback. If you would like to receive a summary of research findings please indicate this during the interview.

#### **The ethical conduct of this research**

Griffith University conducts research in accordance with the *National Statement on Ethical Conduct in Human Research*. If you have any concerns or complaints about the ethical conduct of the research project you should contact the Manager, Research Ethics on (07) 373 54375 or [research-ethics@griffith.edu.au](mailto:research-ethics@griffith.edu.au).

#### **Privacy Statement**

The conduct of this research involves the collection, access and/or use of your identified personal information. The information collected is confidential and will not be disclosed to third parties without your consent, except to meet government, legal or other regulatory authority requirements. A de-identified copy of this data may be used for other research purposes. However, your anonymity will at all times be safeguarded. For further information consult the University's Privacy Plan at <http://www.griffith.edu.au/about-griffith/plans-publications/griffith-university-privacy-plan> or telephone (07) 373 54375.

**CONSENT** to participate in the study:

I confirm that I have read and understood the information sheet and in particular have noted that:

- Participation in the research will involve the completion of one interview comprising answering questions regarding home economics teachers' role in food literacy;
- I understand that the interview will be audio-recorded only with my permission;
- I have had any questions answered to my satisfaction;
- I understand the risks involved;
- I understand that there will be no direct benefit to me from my participation in this research;
- I understand that my participation in this research is voluntary;
- I understand that if I have any additional questions I can contact the research team;
- I understand that I am free to withdraw at any time, without explanation or penalty;
- I understand that I can contact the Manager, Research Ethics, at Griffith University Human Research Ethics Committee on 3735 4375 (or [research-ethics@griffith.edu.au](mailto:research-ethics@griffith.edu.au)) if I have any concerns about the ethical conduct of the project; and
- I agree to participate in the project.

**Consent to participate in the study is indicated by your request for an appointment**

**Appendix 6:** A list of 22 aspects of food literacy presented to adolescents in the focus group

Food knowledge	
Positive attitude towards cooking and healthy eating	
Healthy and unhealthy foods	
Where to find food and nutrition information	
Appropriate portion sizes for different foods	
Dietary guidelines	
Where to obtain food from	
Environmental sustainability (e.g. food miles, locally sourced food)	
Where food comes from (food chain)	
Animal welfare	

Food Skills	
Prepare and cook food from basic/available ingredients	
Use common kitchen equipment, utensils and appliances	
Store food appropriately and safely	
Follow and adapt recipes based on available foods	
Select and prepare food in accordance with dietary guidelines	
Plan and manage a budget for food	
Identify and critically analyse food related information	
Plan and manage time for food shopping	
Gather food from different sources (e.g. supermarkets, markets)	

Capacity	
Positive attitude towards cooking and healthy eating	
Confidence in skills related to sourcing, preparing and cooking food	
Creativity and ability to improvise with ingredients	
Regular social eating experiences	



## Appendix 7: An informed consent form for adolescents to participate in a focus group



Griffith University  
School of Medicine  
Menzies Health Institute Queensland  
Gold Coast Campus  
Queensland, 4222

### Food literacy at secondary schools

#### INFORMATION SHEET

##### Who is conducting the research?

Chief Investigator 1: Neil Harris, PhD, A/Prof, School of Medicine, Ph (61-7) 555 27879, [n.harris@griffith.edu.au](mailto:n.harris@griffith.edu.au)

Chief Investigator 2: Lauren Ball, PhD, School of Allied Health Sciences, Ph (61-7) 555 29702, [l.ball@griffith.edu.au](mailto:l.ball@griffith.edu.au)

Chief Investigator 3: Donna Pendergast, PhD, Prof, School of Education and Professional Studies, Ph (61-7) 3735 1082, [hosdeaneducation@griffith.edu.au](mailto:hosdeaneducation@griffith.edu.au)

Student Researcher: Rimante Ronto, PhD candidate, School of Medicine, Ph 0497104500, [rimate.ronto@griffithuni.edu.au](mailto:rimate.ronto@griffithuni.edu.au)

This research is being conducted as a part of the student's doctoral studies.

##### Why is the research being conducted?

The research study aims to better understand adolescents' understanding and views about food literacy and their food choices. Exploring adolescents' views about food literacy may have important implications for the development of more effective food literacy enhancing interventions for adolescents. Food literacy enhancing interventions could contribute to the prevention and management of overweight and obesity. Obesity is one of the most serious public health challenges of the 21<sup>st</sup> century, and its prevalence has increased substantially over the past two decades.

##### What you will be asked to do

You will be asked to participate in one focus group with a researcher, which will last approximately 45-60 minutes. The focus group will be conducted face-to-face at the school premises and will investigate adolescents' views regarding food literacy and healthy eating.

##### The expected benefits of the research

Your involvement in this study will contribute to a better understanding of food literacy at secondary schools, thereby enabling the improvement of health promotion programs and interventions targeting healthy eating among adolescents.

##### Risks to you

There are no foreseeable or significant risks to you associated with participation in this study. If you feel discomfort in any way, please feel free to discontinue participation in the research and you can talk about it with your school's counsellor.

##### Your confidentiality

To ensure your confidentiality, the research team will manage the data collected through the research. All data collected will be de-identified and kept by researchers in a secure room for 5 years and then destroyed as confidential waste. The computerised information will be protected by password. Your identity will not be identifiable in any publication or reporting resulting from this research. Also, your school will not be able to identify which answers are yours from the summary of findings.

### **Your participation is voluntary**

Your participation is voluntary and you are not under any obligation to consent to participate in this research. There are no direct benefits of this research to you. You are entirely free to discontinue your participation at any time, or to decline to answer any question/s. The focus group will be audio-recorded only if participants agree. Please note that once the focus group is transcribed it will not be feasible to withdraw your consent as it will not be possible to identify which responses are yours.

### **Questions/ further information**

For additional information about the project, please contact Rimante Ronto via email: [rimate.ronto@griffithuni.edu.au](mailto:rimate.ronto@griffithuni.edu.au) or phone 0497104500. A short summary of findings will be prepared and made available to all participants. If you would like to receive a summary of research findings please provide your postal or email address in the sheet provided at the end of the consent form.

### **The ethical conduct of this research**

Griffith University conducts research in accordance with the *National Statement on Ethical Conduct in Human Research*. If you have any concerns or complaints about the ethical conduct of the research project you should contact the Manager, Research Ethics on 3735 54375 or [research-ethics@griffith.edu.au](mailto:research-ethics@griffith.edu.au).

### **Privacy statement**

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**PLEASE TEAR OFF AND RETAIN THIS INFORMATION SHEET**



Griffith University  
School of Medicine  
Menzies Health Institute Queensland  
Gold Coast Campus  
Queensland, 4222

**Food literacy at secondary schools**

**CONSENT FORM**

**Research team**

Chief Investigator 1: Neil Harris, PhD, A/Prof, School of Medicine, Ph (61-7) 555 27879, [n.harris@griffith.edu.au](mailto:n.harris@griffith.edu.au)

Chief Investigator 2: Lauren Ball, PhD, School of Allied Health Sciences, Ph (61-7) 555 29702, [l.ball@griffith.edu.au](mailto:l.ball@griffith.edu.au)

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This research is being conducted as a part of the student’s doctoral studies.

By signing below, I confirm that I have read and understood the information package and in particular have noted that:

- I understand that my involvement in this research will include participation in one focus group that aims to explore adolescents’ understanding and views about food literacy;
- I have had any questions answered to my satisfaction;
- I understand the risks involved;
- I understand that there will be no direct benefit to me from my participation in this research;
- I understand that my participation in this research is voluntary;
- I understand that I should respect the privacy of other participants;
- I understand that if I have any additional questions I can contact the research team;
- I understand that I am free to withdraw at any time, without explanation or penalty;
- I understand that I can contact the Manager, Research Ethics, at Griffith University Human Research Ethics Committee on 3735 4375 (or [research-ethics@griffith.edu.au](mailto:research-ethics@griffith.edu.au)) if I have any concerns about the ethical conduct of the project; and

I agree to participate in this study

I would like to receive a summary of this research findings (If yes, please write your postal or email address below)

Name.....

Signature.....

Date.....

## **Appendix 8: An informed consent form for parents/guardians for allowing adolescents to participate in a focus group**



Griffith University  
School of Medicine  
Menzies Health Institute Queensland  
Gold Coast Campus  
Queensland, 4222

### **Food literacy at secondary schools INFORMATION SHEET**

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#### **What you will be asked to do**

Your child will be asked to participate in one focus group with a researcher, which will last approximately 45-60 minutes. The focus group will be conducted face-to-face at the school premises and will investigate adolescents' views regarding food literacy and healthy eating.

#### **The expected benefits of the research**

Your child's involvement in this study will contribute to a better understanding of food literacy at secondary schools, thereby enabling the improvement of health promotion programs and interventions targeting healthy eating among adolescents.

#### **Risks to you**

There are no foreseeable or significant risks to your child associated with participation in this study. If your child feels discomfort in any way, they are free to discontinue participation in the research and if needed school counsellor will be available to talk about it.

#### **Your confidentiality**

To ensure your confidentiality, the research team will manage the data collected through the research. All data collected will be de-identified and kept by researchers in a secure room for 5 years and then destroyed as confidential waste. The computerised information will be protected by password. Your child's identity will not be identifiable in any publication or reporting resulting from this research. Also, your child's school will not be able to identify which answers are your child's from the summary of findings.

### **Your participation is voluntary**

Your child's participation is voluntary and he/she is not under any obligation to consent to participate in this research. There are no direct benefits of this research to your child. Your child is entirely free to discontinue his/her participation at any time, or to decline to answer any question/s. The focus group will be audio-recorded only if participants agree. Please note that once the focus group is transcribed it will not be feasible to withdraw your consent as it will not be possible to identify which responses are your child's responses.

### **Questions/ further information**

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**PLEASE TEAR OFF AND RETAIN THIS INFORMATION SHEET**

**Food literacy at secondary schools**

**CONSENT FORM**

**Research team**

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I agree my child to participate in this study.

I would like to receive a summary of this research findings (if yes, please write your postal or email address below)

Name.....

Signature.....

Date.....