Impact of a school meal programme on the dietary intake of children, aged 9-11 years, in a low decile school in South Auckland, New Zealand

A thesis presented in partial fulfilment of requirements for the degree of

Master of Science
in
Nutrition and Dietetics

At Massey University, Auckland
New Zealand

Nitasha Walia
2016
Abstract

Background: The prevalence of the multiple burdens of malnutrition, characterised by the coexistence of obesity and undernutrition, is increasing worldwide, including in New Zealand (NZ). These lead to inadequate growth and development towards adulthood due to associated non-communicable diseases and micronutrient deficiencies. The current food environment contributes towards reduced access to nutritionally adequate meals. Therefore, nutrition programmes, policies and guidelines have been developed by government bodies such as the Ministry of Health and charitable trusts. Feed the Need (FTN), is a school meal programme that provides lunch meals to children in decile one and two schools in South Auckland, NZ.

Aim: The aim of my thesis is to explore the effect of a school meal programme on children’s (9-11 years) dietary intake during school hours in a low decile school in South Auckland, NZ. School staff and children’s perceptions of the school meal programmes will also be evaluated.

Methods: Eighty-two children completed self-administered food records under supervision for two weeks. FTN meals were offered to all children on alternate days (FTN week) during week one, with FTN meals being absent in week two (non-FTN week). Dependent t-tests, Kruskal Wallis and post-hoc tests were used to analyse energy, macronutrient and micronutrient intake during school hours. Dietary intake for boys and girls during school hours was compared to 40% of the NZ Nutrient Reference Values (NRVs) and the United Kingdom (UK) dietary guidelines. This was to identify whether the children’s dietary intake met current recommendations. In addition, dietary intake for all children was compared between food sources including dairy, home, school food programmes, FTN and other food sources. Two focus groups were conducted with school staff and children to identify their perceptions of the school meal programme.

Results: Dietary intake was higher in energy, carbohydrate, dietary fibre, sugars, protein, total and saturated fat, calcium and iron during the FTN week (p<0.05) in
comparison to the non-FTN week. Girls did not meet dietary fibre recommendations during non-FTN week when compared to 40% of the dietary guidelines, whereas boys did not meet dietary fibre recommendations in both weeks. Boys and girls exceeded total fat intake recommendations by 15% and 21% during the FTN week, respectively. Overconsumption of saturated fat intake during the FTN and the non-FTN week was also observed. This is likely attributed to the local food environment, which allows easy access to unhealthy discretionary food items such as crisps, corn snacks, biscuits, cookies and pies. In addition, use of cheap cuts of meat in FTN meals increases their saturated fat content. During the FTN week children consumed food from all sources and did not use one food source as their major food provider. In contrast, during the non-FTN week food from home was the major food source for the children’s dietary intake during school hours.

**Conclusions:** FTN meals add to the children’s usual dietary intake and contribute towards the oversupply of energy, total and saturated fat. Modifications of FTN meals are required to reduce the saturated fat content of the meals. To reduce the prevalence of childhood obesity and undernutrition, implementation of school food and meal programmes should accompany interventions that are designed to reduce the intake of unhealthy discretionary foods.
Acknowledgments

There are various people I would like to thank for their involvement and support throughout this thesis.

Firstly, I would like to thank all the children and school staff involved during the data collection phase of this thesis. This research would not have been possible without you all.

I would also like to thank my supervisors Professor Bernhard Breier and Dr. Carol Wham for their ongoing support, knowledge, feedback and encouragement throughout this whole thesis. Your guidance has helped me improve my thesis and taught me many researching skills. I am also grateful for the funding support from the Massey University Research Fund.

Thank you to all the volunteers who helped with the data collection. All of you made the data collection process a lot smoother and well-managed.

I would also like to acknowledge Samantha Ansell for her support and working with me during the data collection and analysis.

Finally, I would like to thank my family and friends for their immense support and encouragement. I would not have been able to do this without your understanding, wisdom and positivity.
Table of contents

Abstract .................................................................................................................................................. i
Acknowledgments.............................................................................................................................. iii
Table of contents ................................................................................................................................ iv
List of Tables ........................................................................................................................................ vi
List of Figures ....................................................................................................................................... vii
List of Appendices .............................................................................................................................. viii
Abbreviations ....................................................................................................................................... ix

Chapter 1: Introduction ....................................................................................................................... 1
  1.1 Background ................................................................................................................................... 1
  1.2 Justification for this study .......................................................................................................... 2
  1.3 Problem statement .................................................................................................................... 3
  1.4 Aim of this study ....................................................................................................................... 4
    1.4.1 Specific Objectives ........................................................................................................... 4
  1.5 Structure of this thesis .............................................................................................................. 4
  1.6 Researcher’s contribution .......................................................................................................... 5

Chapter 2: Childhood nutrition, growth and development: A review from a public health perspective ........................................................................................................................................ 7
  2.1 Introduction .............................................................................................................................. 7
  2.2 Childhood nutrition .................................................................................................................. 8
    2.2.1 Nutrition guidelines and recommendations ..................................................................... 8
    2.2.2 The importance of adequate nutrition during childhood .............................................. 12
    2.2.3 The obesogenic environment ......................................................................................... 13
    2.2.4 Non-communicable diseases ........................................................................................ 14
    2.2.5 Undernutrition in children ............................................................................................ 15
    2.2.6 The multiple burdens of malnutrition ......................................................................... 15
  2.3 Determinants of childhood health in low decile areas ............................................................ 16
    2.3.1 Socioeconomic disparities ............................................................................................ 16
    2.3.2 Accessibility and Availability ....................................................................................... 17
  2.4 Current initiatives to improve childhood nutrition ................................................................. 18
    2.4.1 Obesity and its related non-communicable diseases .................................................. 18
    2.4.2 Strategies to reduce the multiple burdens of malnutrition ......................................... 20
    2.4.3 Programmes and policies in New Zealand ................................................................... 21
  2.5 The school environment ........................................................................................................... 25
    2.5.1 The importance of nutrition in the school environment ............................................. 25
    2.5.2 Barriers to healthy eating in schools .......................................................................... 26
    2.5.3 School meal programmes ............................................................................................ 26
    2.5.4 Perceptions of school staff and children towards school meal programmes ........... 27
    2.5.5 School food programmes in New Zealand ................................................................. 28
  2.6 Summary ...................................................................................................................................... 29
Chapter 3: Impact of a school meal programme on the dietary intake of children in a decile one school in South Auckland

3.1 Abstract .................................................................................................................. 31
3.2 Introduction ............................................................................................................. 33
3.3 Methodology .......................................................................................................... 35
  3.3.1 Study Design .................................................................................................... 35
  3.3.2 Ethical approval ............................................................................................... 36
  3.3.3 Participants ...................................................................................................... 36
  3.3.4 Data Collection ............................................................................................... 36
  3.3.5 Dietary Analysis ............................................................................................. 38
  3.3.6 Statistical Analysis ......................................................................................... 40
  3.3.7 Focus groups .................................................................................................. 41
3.4 Results .................................................................................................................. 42
  3.4.1 Participant Characteristics .............................................................................. 42
  3.4.2 Dietary intake compared during the feed the need week and the non-feed the need week: ................................................................. 42
  3.4.3 Dietary intake compared during the feed the need days and the non-feed the need days: ................................................................. 44
  3.4.4 Dietary intake of boys and girls compared to the New Zealand nutrient reference values and the United Kingdom dietary guidelines: ........ 44
  3.4.5 Dietary intake compared between the different food sources for all children: .... 48
  3.4.6 Focus group findings from the school staff: .................................................. 54
  3.4.7 Focus group findings from the children: ......................................................... 55
3.5 Discussion .............................................................................................................. 56
  3.5.1 Participant characteristics .............................................................................. 56
  3.5.2 Dietary intake of children, aged 9-11 years, during the feed the need week and the non-feed the need week: ................................................................. 56
  3.5.3 Dietary intake in comparison to the New Zealand nutrient reference values and dietary guidelines in the United Kingdom: ........................................... 57
  3.5.4 Dietary intake of the children during school hours as categorised by the food sources during the feed the need week and the non-feed the need week: ................................................................. 59
  3.5.5 Perceptions of the school staff and children towards the school meal programme: ................................................................. 60
  3.5.3.2 Strategies for improvement of the feed the need meals and the dietary intake of the children during school hours: ................................................................. 61
3.5.6 Limitations of this study .................................................................................. 62
3.6 Conclusions ......................................................................................................... 62

Chapter 4: Conclusions and recommendations ........................................................................ 63
4.1 Summary of findings .............................................................................................. 63
4.2 Impact of research findings .................................................................................. 66
4.3 Strengths of this research study ........................................................................... 67
4.4 Limitations of this research study ......................................................................... 68
4.5 Final recommendations ....................................................................................... 68

References ...................................................................................................................... 70
List of Tables
Table 1: Key nutrients required for growth and development of children, aged 9-11 years. ..............................................................................................................................................................................9
Table 2: Summary of New Zealand programmes aiming to improve childhood nutrition. ........................................................................................................................................................................22
Table 3: Participant demographics and Characteristics (n=82)..............................................................................................................42
Table 4: Mean nutrient intakes during school hours of the FTN week and the non-FTN week for children, aged 9-11 years, from a low decile school in South Auckland. 43
Table 5: Mean nutrient intake of Boys and Girls during the FTN week and the non-FTN week in comparison to the recommended intake during school hours..................46
Table 6: Mean dietary Intake of children aged 9-11 years old, categorised by the source of the food provided, during the FTN week and the non-FTN week. .......................50
List of Figures

Figure 1: Overview of study design for food record collection ........................................35
Figure 2: Data collection during a school day. .................................................................38
Figure 3: Total number of food items being consumed from different food sources for all the children who completed the food records during the FTN week and the non-FTN week. ..............................................................................................................53
List of Appendices

Appendix A: Supplementary methods ................................................................. 90
  School food and meal programmes offered to all children in Manurewa South School, South
  Auckland, New Zealand.................................................................................. 90
  Assumptions used when entering food items or beverages from food records into
  Foodworks. ................................................................................................... 91
  Alternate food items and beverages used when entering food records in Foodworks........ 94

Appendix B: Supplementary results .................................................................... 99
  Mean nutrient Intake during Morning tea and Lunch within school hours of children aged 9-
  11 years old from a low decile School in South Auckland..................................... 99
  Comparison of nutrient intake of children aged 9-11 years old on FTN days and non-FTN
  days, during school hours in a low decile School in South Auckland......................... 100
  Comparison of nutrient intake of children aged 9-11 years old between non-FTN days,
  during school hours in a Low decile School in South Auckland .................................. 101
  Dietary analysis of FTN recipes. ......................................................................... 102
  Ingredients list for FTN recipes. .......................................................................... 103
  Incidences of consumption for the most commonly consumed food items from the
  dairy during the FTN week and the non-FTN week.................................................103
  Focus group key themes – school staff............................................................... 104
  Focus group key themes – children...................................................................... 107

Appendix C: Materials used ............................................................................... 110
  Self-administered food record template used by children during data collection: .......... 110
  Moderator Guide for focus group - Teachers.......................................................... 113
  Moderator Guide for focus group - Children.......................................................... 115
### Abbreviations

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full form</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMDR</td>
<td>Average Macronutrient Distribution Range</td>
</tr>
<tr>
<td>BMI</td>
<td>Body Mass Index</td>
</tr>
<tr>
<td>CVD</td>
<td>Cardiovascular Disease</td>
</tr>
<tr>
<td>EAR</td>
<td>Estimated Average Requirement</td>
</tr>
<tr>
<td>ECE</td>
<td>Early Childhood Education Centre</td>
</tr>
<tr>
<td>EER</td>
<td>Estimated Energy Requirement</td>
</tr>
<tr>
<td>FIS</td>
<td>Fruit in Schools</td>
</tr>
<tr>
<td>INFORMAS</td>
<td>International Network for Food and Obesity/non-communicable diseases Research, Monitoring and Action Support</td>
</tr>
<tr>
<td>MoH</td>
<td>Ministry of Health</td>
</tr>
<tr>
<td>NCD</td>
<td>Non-communicable disease</td>
</tr>
<tr>
<td>NRVs</td>
<td>Nutrient Reference Values</td>
</tr>
<tr>
<td>NSLP</td>
<td>National School Lunch Program</td>
</tr>
<tr>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>PEM</td>
<td>Protein Energy Malnutrition</td>
</tr>
<tr>
<td>SBP</td>
<td>School Breakfast programme</td>
</tr>
<tr>
<td>SES</td>
<td>Socioeconomic status</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>US</td>
<td>United States</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
</tbody>
</table>