



E-ISSN: 2706-9575
P-ISSN: 2706-9567
IJARM 2021; 3(2): 546-551
Received: 01-07-2021
Accepted: 03-09-2021

Dr. Marab Younis Abdullah Al-Fathy
Ph.D., MSc., Community
Medicine, Center for Training
and Human Development/
Nineveh Health Directorate,
Iraq

Dr. Sakeena Abdul Jabbar Al-Tameemi
Diploma Specialist,
Department of Community
Medicine, Nineveh Health
Directorate, Iraq

Dr. Montha Hamid Ismaeel
Diploma / Specialist,
Department of Community
Medicine, Nineveh Health
Directorate, Iraq

Corresponding Author:
Dr. Marab Younis Abdullah Al-Fathy
Ph.D., MSc., Community
Medicine, Center for Training
and Human Development/
Nineveh Health Directorate,
Iraq

Assessment of nutritional status of blind and non-blind children in Mosul city

Dr. Marab Younis Abdullah Al-Fathy, Dr. Sakeena Abdul Jabbar Al-Tameemi and Dr. Montha Hamid Ismaeel

DOI: <https://doi.org/10.22271/27069567.2021.v3.i2i.302>

Abstract

Aim: To assess nutritional status of blind and non-blind child

Materials and Methods

Design: A case control study design.

Setting and Date: Case: (blind child and their mothers) collected from UmAl-Rbean Development Foundation for blind and purlinds.

Control: (non-blind child and their mothers) from privet clinic of dr. Skeena during Oct- Nov. 2021.

Sampling Methods and Sample Size: Non-probability purposive sample.

Case = 20 blind child and their mothers.

Control = 40 non-blind child and their mothers.

Inclusion criteria: Blind and non-blind child regardless their education, residence and aged between 5-17 years.

Outcome measures: Consumption of macronutrient and beverage per day by yes and no.

Height in cm

Weight in kg

Body mass index in kg/m²

Result: Mothers reported that 36(60%) of study sample eat protein twice a day, 46 (76.7%) eat cab frequently a day, 27 (45%) eat fat once a day, 34 (56.7%) eat fruit and vegetable twice a day. Eating sweet among blind and non-blind child was 13(65%) and 23 (57.5%) respectively.

Fast and canned food per day was more common among non-blind than blind it was 24 (40%) 19 (47.5%) respectively. One third of participant were did not eat breakfast and more prevalent among blind child 7(35%). Fifty percent of child in both groups had overweight and obesity by weight for age and body mass index indicators, it was more prevalent among non-blind child, two third of them were female and four fifth were aged more than 10 years. One fourth of children were stunted more common among blind child 7 (35%) according to height/age indicators.

Conclusion: Eating habit among participant was un acceptable. Overweight and obesity is common problem among both groups, it was more prevalent among female with age more than 10 years old of normal child. Stunting was seen among blind child.

Keywords: blind child BMI, weight /age indicators, mother's awareness

Introduction

Children need food sufficiently in quantity and good quality with all nutritional value, that is necessary for their normal growth and development [1]. Women in developing countries are still have primary responsibility for feeding children, without adequate nutritional knowledge and optimal feeding practices poor nutritional status among children can arise even in households with adequate income, food, good sanitation and availability of health services in quality and quantity [2, 3]. As a result of urbanization, modernization, expensive living, increase employment rate among female and social changes toward nuclear family in state of extended family [4], lead to increase burden on family and had no enough time to spend or take care of their children[5], the consequence of these trend is that young child feed by someone other than parents [6]. The percentage of employment among women in child bearing age in Mosul, 2008 was 40.8% as the women support their families in the face of the low economic conditions [7]. At same time replacing traditional food which is rich in nutrient and less calory with diets high in processed foods that had more salt, sugar and fat and are low in essential nutrients, in addition to unavailability and expensiveness of healthy food

such as fresh fruits and vegetables [8]. These trends lead to increase the risk of malnutrition which is imbalances in a person’s intake of energy and/or nutrients, it includes overweight, obesity, diet-related noncommunicable diseases, micronutrient deficiencies and undernutrition (wasting, stunting and underweight), these mostly occur in low- and middle-income countries [9]. Childhood overweight is a multifactorial problem [10], to overcome it WHO 2013, recommended to reduce the level of salt, free and add sugar, saturated fat, limit access calorie intake and increase availability, affordability, consumption of vegetable and fruit [11]. Overweight and obesity mean excessive fat accumulation due to imbalance between energy consumption and energy expenditure due to increase intake in sugars and fats and less physical activity [12]. Many indicators used to evaluate nutritional status of child such as weight-for-age used to monitor child growth up to 10 years old, in older children, we cannot depend on it as many children are experiencing the pubertal growth spurt and appearing to have excess fat when in fact, they are just tall so that BMI-for-age is the recommended indicator for assessing thinness, overweight and obesity in children 10-19 years in addition to height -for-age to assess child's length [13]. As a result of adapting western life style with prevalence of physical inactivity, availability electronic devices, immigration, changes in family structure and employment pattern in Mosul city specially after 2014 make women to spent less time with their child and increase availability and accessibility of fast and canned food and beverage make child to serve large amount of fat and calorie instate of healthy diet (vegetable and fruit) lead nutritional imbalance in children resulted in many health problem, so that the aim of present study was to assess the nutritional status of children in Mosul city.

Persons and Methods

Ethical and scientific approval was received from Nineveh Health Directory/ MoH/ Iraq licenses' Number session 221 held on the date 19 Sep 2021 of the numbered research project 116/21. A case control study design was carried out at Um Al-Rabeen institution for blind and purblind child. The study extended for four-month duration from 1st Oct– 1st Nov. 2021 among 60 mothers (20 blind's child mother and 40 non-blind's child mothers), interviewed face to face

ask them by using standardized data collection form consist from four items.

First part: Demographic characters (age in years, sex male and female, education level of the mother (illiterate, primary, secondary).

Second part: Behavior of mother to nutrition of their children. (Frequency of eating proteins, carbohydrates, fats, fruits and vegetables, fast and canned foods and sweets), eating breakfast and drink of water and tea.

Third part: Assessment of nutritional status by measuring height, weight, BMI using weight/age indicator, height/age indicator and BMI.

Measurement

Body height was measured to the nearest centimeter with the subject wearing no shoes and data analyses using height/age chart. Weight was measured to the nearest 100 g with child wearing minimal clothing and no shoes using weight/age chart. Body mass index (BMI) was calculated as the ratio of the weight in kilograms to the square of the height in meters.

[underweight <18.5, normal between (≥ 18.5- 24.9), over weight (25-29.9) and obesity ≥30].

BMI-for-age (5-19 years)

Interpretation of cut-offs

Overweight: >+1SD (equivalent to BMI 25 kg/m2 at 19 years).

Obesity: >+2SD (equivalent to BMI 30 kg/m2 at 19 years).

Thinness: <-2sd.

Height-for-age (5-19 years)

Weight-for-age (5-10 years)

Statistical analysis: Data were tabulated, categorized, and analyzed using Minitab (version 16) software program. Simple percentage were used and put in suitable tables and figures. Using X² to study the association between two variables with P- value equal to or less than (0.05)

Result

Table 1: Study demographic characters of participant

Category	Blind=20	Normal=40	Total=60	P- value*
Age of children				
Under10	6	30	11	0.839
Over 10	14	70	29	
Sex of children				
male	8	40	13	0.566
female	12	60	27	
Educational level of Mothers				
Illiterate	3	15	8	0.967
Primary	9	45	16	
Secondary	6	30	12	
University and high education	2	10	4	

*Using X² test

Demographic characters of participant seen in (Table 1), as 43 (72.0%) of participant age more than 10 years with no differences between blind and non-blind child. Primary

education more prevalent among study sample, it was 25 (41.6%). Illiterate mother of blind and non-blind child was 3 (15%) and 8 (20%) respectively, P-value (0.967).

Table 2: Daily macronutrient and beverage intake among children

Frequency of eating /day	Blind=20		Normal=40		Total=60	
	No.	%	No.	%	No.	%
Protein						
Once	4	20	5	12.5	9	15
Twice	10	50	26	65	36	60
Frequently	5	25	6	15	11	18.3
Occasionally	1	5	3	7.5	4	6.7
Carb						
Once	0	0	1	2.5	1	1.6
Twice	6	30	7	17.5	13	21.7
Frequently	14	70	32	80	46	76.7
Fat						
Once	5	25	22	55	27	45
Twice	8	40	14	35	22	36.7
Frequently	6	30	1	2.5	7	11.6
Occasionally	1	5	3	7.5	4	6.6
Fruits and Vegetables						
Once	6	30	4	10	10	16.7
Twice	9	45	25	62.5	34	56.7
Frequently	2	10	9	22.5	11	18.3
Occasionally	2	10	2	5	4	6.6
Not Eat	1	5	0	0	1	1.7
Drinking water						
Plenty	9	45	6	15	15	25
At thirst	11	55	34	85	45	75
Drinking tea						
Yes	11	55	36	90	47	78.3
No	9	45	4	10	13	21.7

Table (2) Behavior of mother according to nutrition of their children revealed that 10(50%) blind children eat protein twice daily, 14 (70.0%) eat carb frequently and 8 (40%) eat fat twice a day. Normal child eats fruit and vegetables twice a day 25 (62.5%) and blind child was 9 (45%). Three fourth

of children drunk water at thirst, it was 11 (55%) and 34 (85%) among blind and non-blind child respectively. Drinking tea more common among non-blind, it was 36(90%).

Table 3: Eating fast and canned food / day among study sample

Fast and canned food	Blind =20		Normal =40		Total= 60		P-value*
	No.	%	No.	%	No.	%	
Yes	17	85	39	97.5	56	93.3	0.06
No	3	15	1	2.5	4	6.7	

*Using X² test

Table (3) revealed that eating fast and canned food daily was 56 (93.3%) commonly seen among normal child 39 (97.5%) and to a leaser extend among blind, it was 17(85%).

Eating habit among study sample seen in (Table 5), 19 (31.7%) did not eat breakfast and frequently seen among blind child 7 (35%). P-value not significant.

Table 4: Eating sweet /day among participant

Sweets Eating / day	Blind =20		Normal =40		Total= 60		P-value*
	No.	%	No.	%	No.	%	
Yes	13	65	23	57.5	36	60	0.57*
No	7	35	17	42.5	24	40	

*Using X² test

Table 4 depict that 36 (60%) of study sample eating sweet daily with no differences between blind and non-blind child, (P-value = 0.57)

Table 6.a: Nutritional status of children according weight/age

Weight/age	Blind = 20		Normal = 40		Total = 60		P-value*
	No	%	No	%	No	%	
Under weight	3	15	1	2.5	4	6.7	0.27
Normal	9	45	19	47.5	28	46.7	
Over weight	4	20	13	32.5	17	28.3	
Obese	4	20	7	17.5	11	18.3	

*Using X² test

Table 6.b: Distribution of overweight and obese child according to sex

Gender	Blind =8		Normal=20		Total=28		P-value*
	No.	%	No.	%	No.	%	
Male	4	50	7	35	11	39.2	0.46
Female	4	50	13	65	17	60.7	

*Using X² test

Table 5: Eating habit toward breakfast

Breakfast	Blind = 20		Normal = 40		Total = 60		P-value*
	No.	%	No.	%	No.	%	
Daily	9	45	16	40	25	41.7	0.71
Occasionally	4	20	12	30	16	26.6	
Not eat	7	35	12	30	19	31.7	

*Using X² test

Table 6.c: Distribution of overweight and obese child according to age

Age in Years	Blind = 8		Normal = 20		Total = 28		P-value*
	No.	%	No.	%	No.	%	
<10	2	25	3	15	5	17.9	0.53
≥ 10	6	75	17	85	23	82.1	

*Using X² test

Nutritional status of study sample seen in (Table 6.a) as 28 (46.6%) of children were overweight and obese. Fifty percent among normal and 8 (40%) among blind child. Sixty percent of obese child was female and 82.1% was aged equal and more than 10 years with no statistical difference between blind and normal child P-value 0.46, 0.53 respectively. This is clear in Table (6.b) and (6.c) respectively.

Table 7: Nutritional status of study sample according to Height/age

Height/age	Blind = 20		Normal = 40		Total = 60		P-value*
	No.	%	No.	%	No.	%	
Stunted	7	35	7	17.5	14	23.3	0.04
Normal	13	65	33	82.5	46	76.7	

*Using Fisher exact test.

Height /age indicators of nutritional status shown in (Table 7), nearly one fourth 14 (23.3%) of participant was stunted, (P- value 0.04).

Table 8: Study nutritional status of participant according to BMI

BMI	Blind = 20		Normal = 40		Total = 60	
	No.	%	No.	%	No.	%
Under weight	2	10	1	2.5	3	5
Normal	9	45	18	45	27	45
Over weight	3	15	6	15	9	15
Obese	6	30	15	37.5	21	35

*Using X² test not applicable because 3 cell with expected count less than 5

Table 8 revealed that 6 (30%), 15 (37.5%) were obese and 27 (45%) normal weight with no differences between blind and normal child.

Discussion

Middle childhood and adolescence are the period from age 5 to 19, is a second window of opportunity for growth, psychosocial development, and establishing lifelong dietary and lifestyle habit. Well-nourished children and adolescents learn better and lead to more productive lives, more cognitive, and can achieve social and economic growth (Young people today, men of tomorrow) [14]. The present study showed that although blind child eat fat, fast and canned food once daily and drink tea less than non- blind but eating sweat daily and drink water at thirst more frequently. Eating protein and fruit and vegetable twice daily more among non-blind. The study shows that there is dietary imbalance among both group (blind and non-blind child) resulted in malnutrition in form of overweight, obesity and stunting. Educational status of the mother plays an important role in child's eating behavior, socioeconomic factors determining quality of feeding practice [15] as in a study among 3941 child and adolescent in Greece 2013, on student diet quality showed that low socioeconomic status strongly associated with low food quality [16]. In last decades

there was increased prevalence of unhealthy food with inappropriate marketing and advertising and increased of processed foods in cities and even in remote areas and easily access to fast food and highly sweetened beverages [15]. These finding proved in a study in USA 2007, revealed that the trend now day that young children spend less time eating at the family table and have routine exposure to large portions of palatable, energy dense foods than in previous generations [6]. Association of life style, dietary habit and consumption of commercially beverage among 480 male students in Korea 2011, showed that frequent drinking commercial beverage strongly associated with frequent snacking, meal skipping, eating out, eat deliver, processed and sweet food [17]. Another study regarding eating habit among 723 adolescents aged 15-18 years in Mosul city 2014, found that girl consume a high intake of french fries, sweets and chocolates mean while boys consume fast foods, sugar-sweetened drinks, and energy drink the study concluded that we should take an attention to the behavioral risk factors for diet related non-communicable disease that led to malnutrition [18]. A literature review of 50 studies from 42 countries from 2000 to 2014 on dietary intake of children aged 6–19 years. The result varies from limited consumption to only plant- based food with a low energy and insufficient micronutrient intake to an emerging trend of consumption of high-energy snacks and beverages, particularly in urban areas in developing countries. The presence of negative and positive energy imbalance in the same population points to the dual burden of malnutrition [19]. Beverage are important to replace fluid specially in childhood, it should be a banded, available, accessible and clean the most important one was water in addition to milk, tea, fruit juice, fruit drinks, soy beverages, and soft drinks including energy drink. Data taken from National Health and Nutrition Examination Survey in US in last three decade including child aged less than 5 years old revealed that there was increase trend to consumption of all beverage in general and especially soft drink it reaches up to 30% of participant, that beverage provide high energy with very low nutrient [20]. UNCEF report 2019, revealed that the consumption of carbonated sugary soft drinks at least once a day among school-going adolescents in low- and middle-income countries was 42% and eating fast food at least once a week 46%. Those rates higher among adolescents in high-income countries, it reaches to 62 % and 49% respectively [15]. To overcome this problem Philippines experience took action from stakeholders to re-shape urban food environments to decrease malnutrition burden [21].

Eating breakfast was seen more common among blind child than non- blind but statistically not significant. Breakfast is brain fuel helps children and adolescent to concentrate in the classroom and maintaining a healthy weight. Skipping breakfast specially in quality than quantity e.g, milk in morning meal, lead to impossible achieving adequate nutrients intakes, causing lethargy, tiredness, difficulty concentrating and behavior Adapting [22]. Healthy behavior in childhood required time, motivation and repetition which mainly the role of family [4]. Inspit of eating breakfast is very important but usually missed according to study in Mosul 2014, found that girls frequently skipping breakfast than boys in study among 723 adolescents aged 15-18 years [18]. Also UNCEF report revealed that breakfast was usually missed by adolescent and they consume less fruits, vegetables, fish and dairy products and eat regularly snacks

high in sugar, salt and saturated fat ^[23]. Regarding the importance of breakfast, a randomized, controlled trial of giving breakfast to 407 undernourished and adequately nourished children in Jamaican schools in New York City, showed that, height, weight, and attendance were improved in addition to arithmetic improvement specially seen among undernourished child ^[24]. Obesity and overweight a common problem among study sample with no statistical difference between blind and non-blind according to weight/age and BMI measures stunting more common among blind child according to height/ age indicators. A report of UNICEF 2021, declare there was increase trend of both obesity and overweight among children aged 5-19 years during period 2000-2016, the proportion doubled from 1:10 to 1:5. Ten time more in girls and 12 times more in boys in this age group than in 1975 ^[25]. If not control childhood overweight and obesity lead to adulthood obesity and its consequences on health as it was predisposing to non-communicable disease, this finding was clear in USA 2014, it showed that people with BMI more than 40 younger than 55 years old having more than two health condition as type 2- diabetes mellites, gall bladder disease, hypertension and so on. The study concluded to increase effort to prevent childhood obesity rather than control co-morbidity ^[26]. Another finding was seen among blind Spanish 229 boys and girls middle childhood and adolescent (8-18 years), there were imbalanced in diet as consumption of low carbohydrates and very high fats. Although pattern of dietary consumption was bad in quantity and quality among both groups but the prevalence of overweight and obesity is higher in non-blind than blind ^[27]. Unlike Australian study 2007, among 4,487 children aged 9-16 years showed that 55% of sugar sweetened beverages consumption occurred at home and 10% occurred at school and 30% for the lowest socioeconomic, 6% of children who were obese and on differences between overweight and non. The study provides little support to conclude that overweight in children is currently related to excessive sugar sweetened beverages consumption with exception to some obese children, the authors declare that finding limited to their study ^[28].

Limitation: Small sample size cannot generalize the result to population.

Conclusion: The study concluded mother's eating behavior toward their children feeding practice in both group (blind and non-blind) children was bad. Half of children in both groups complain from overweight and obesity, it was more prevalent among female with age more than 10 years old of normal child and one fourth of blind child were stunted.

Recommendation

1. Exclusive education program to child's mother to improve their health practice toward their child nutrition.
2. Encourage further research to such important strata in community with large sample size.

Conflicts of Interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgements: The authors thank all the participants

involved in this study for their cooperation and support.

References

1. Early childhood nutrition, preventing malnutrition in infants and young children. [Online] 1 Sep 2021 [cited 10 Nov 2021]. Available from: UNICEF. URL:<https://www.unicef.org/nutrition/early-childhood-nutrition>
2. Tippet KS, Clevel LE. Results from USDA's diet and health knowledge survey. Washington, DC: US Department of Agriculture, Agricultural Research Service, 1994-96, 200.
3. Jemide JO, Ene-Obong HN, Edet EE, Udoh EE. Association of maternal nutrition knowledge and child feeding practices with nutritional status of children in Calabar South local government area, cross river state. Nigeria. *Int. J Home Sci.* 2016;2(1):293-8.
4. Al-Youzbaki DB. Cultural sociology for health and illness. Mosul, Iraq: Dar Ibn Al-Atheer Press, 2007, 83-116.
5. Sastre LR, Matson S, Gruber KJ, Haldeman L. A qualitative study examining medical provider advice, barriers, and perceived effectiveness in addressing childhood obesity to patients and families from a low-income community health clinic. *SAGE Open Med.* 2019;7:1-9.
6. Savage JS, Fisher JO, Birch LL. Parental influence on eating behavior: conception to adolescence. *Journal of Law, Medicine and Ethics.* 2007;35(1):22-34.
7. Al-Fathy, MYA. Work and health status among married women during child bearing age in Mosul city. M.Sc., [Thesis] in Community Medicine and Public health. Mosul: Mosul University Press, 2008.
8. Pries AM, Rehman AM, Filteau S, Sharma N, Upadhyay A, Ferguson EL. Unhealthy snack food and beverage consumption is associated with lower dietary adequacy and length-for-age z-scores among 12–23-month-olds in Kathmandu Valley, Nepal. *The Journal of nutrition.* 2019;149(10):1843-51.
9. World Health Organization. Malnutrition. [Online] 22 March 2017 [cited 10 Oct 2021]. URL: <http://www.who.int/news-room/fact-sheets/detail/malnutrition>.
10. Birch LL, Davison KK. Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Pediatric Clinics.* 2001;48(4):893-907.
11. World Health Organization (WHO). Global action plan for the prevention and control of noncommunicable diseases 2013-2020. Geneva, Switzerland; WHO: 2013.
12. Park K. Park's textbook of preventive and social medicine: Nutrition. 20th ed. India: Jabalpur, 2009, 527-47.
13. Blössner M, Siyam A, Borghi E, Onyango A, De Onis M. WHO AnthroPlus for personal computers manual: software for assessing growth of the world's children and adolescents. Geneva, Switzerland; WHO, 2009.
14. Rojas A. Who are the youth of today? Generation unlimited. [Online] 26 Nov 2020 [cited 11 Nov 2021]. Available from: UNICEF. URL: <https://www.unicef.org/cuba/en/publications/who-are-the-youth-today-generation-unlimited>
15. Brian K, Céline L, Eric Z. The State of the World's Children 2019 children, food and nutrition: growing

- well in a changing world. New York; UNICEF, 2019.
16. Kastorini CM, Lykou A, Yannakoulia M, Petralias A, Riza E, Linos A. The influence of a school-based intervention programme regarding adherence to a healthy diet in children and adolescents from disadvantaged areas in Greece: the DIATROFI study. *J Epidemiol Community Health*. 2016;70(7):671-7.
 17. Kim H, Han SM, Song K, Lee H. Lifestyle, dietary habit and consumption pattern of male university student according to frequency of commercial beverage consumption. *Nutr Res Pract*. 2011;5(2):124-131.
 18. Musaiger AO, Al-Muftly BA, Al-Hazzaa HM. Eating habits, inactivity, and sedentary behavior among adolescents in Iraq: sex differences in the hidden risks of non-communicable diseases. *Food and Nutrition Bulletin*. 2014;35(1):12-9.
 19. Ochola S, Masibo PK. Dietary intake of schoolchildren and adolescents in developing countries. *Annals of Nutrition and Metabolism*. 2014;64(Suppl. 2):24-40.
 20. Fulgoni VL, Quann EE. National trends in beverage consumption in children from birth to 5 years: analysis of NHANES across three decades. *Nutr J* 2012;11(92):1-11.
 21. Oyuela A. Building food and nutrition resilience in Quezon City: A case study on integrated food systems. [Online] 25 Nov 2020 [cited 10 Oct 2021]. Available from: UNICEF. URL Case-study_Quezon-City-Food-and-Nutrition-Resilience-EAT-UNICEF-QUEZON.pdf (eatforum.org)
 22. Ferrer-Cascales R, Sánchez-SanSegundo M, Ruiz-Robledillo N, Albaladejo-Blázquez N, Laguna-Pérez A, Zaragoza-Martí A. Eat or skip breakfast? The important role of breakfast quality for health-related quality of life, stress and depression in Spanish adolescents. *International journal of environmental research and public health*. 2018;15(8):1781.
 23. Bundy DAP, Silva ND, Horton S, Jamison DT, Patton GC, editors. Disease control priorities: child and adolescent health and development. In: Lassi Z, Moin A, Bhutta Z. *Nutrition in middle childhood and adolescent*. 3rd edi. 8 Vol. Washington: World Bank publication, 2007.
 24. Powell CA, Walker SP, Chang SM, Grantham-McGregor SM. Nutrition and education: a randomized trial of the effects of breakfast in rural primary school children. *Am J Clin Nutr*. 1998;68:873-9.
 25. United Nations Children's Fund (UNICEF). *Programming Guidance: Nutrition in Middle Childhood and Adolescence*. New York, UNICEF, 2021.
 26. Must A, Spadano J, Coakley EH, Field AE, Colditz G, Dietz WH. The disease burden associated with overweight and obesity. *JAMA*. 1999;282(16):1523-9.
 27. Montero P. Nutritional assessment and diet quality of visually impaired Spanish children. *Annals of Human Biology*. 2005;32(4):498-512.
 28. Clifton PM, Chan L, Moss CL, Miller MD, Cobiac L. Beverage intake and obesity in Australian children. *Nutrition and metabolism*. 2011;8(1):1-1.