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DIETARY PATTERS AND IMPACT OF A NUTRITION
EDUCATION INTERVENTION ON THE DIETARY
BEHAVIORS OF MIDDLE SCHOOL STUDENTS FROM
MILAN AND ITS PROVINCE: THE “PROJECT
ALIMENTAZIONE”

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Milano, 3 dicembre 2011.....

to all my friends

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SUMMARY

Childhood obesity prevalence has been rising worldwide in the last few decades generating concerns about future public health in most developed countries. Latest children and adolescents dietary patterns changes in Southern European countries show that healthy Mediterranean lifestyles are being abandoned, especially by young adolescents.

The purpose of the study was two-fold: (1) to investigate the dietary patterns of first and second year middle school students within Milan and its province, (2) to evaluate the impact of the "Project AlimentAzione" nutrition education intervention on dietary behaviors in the intervention group compared to the control group.

The "Project AlimentAzione" nutrition education intervention was a large study involving 5 middle schools and 5 to 7 classes in each school, resulting in 29 classes and 644 students. Daily student food and drink frequency was assessed through a 7-Day Food Record (7-DFR). To investigate the dietary patterns at baseline in the whole sample, intake frequencies by day and by meal episode were analyzed. The intervention consisted of three 2-hour workshops at school that addressed the following: (1) Bread and grains; (2) Fruit and vegetables; (3) Balancing energy intake and energy expenditure through a healthy diet. To study the impact of the nutrition education intervention, daily student food and drink frequency was assessed in the intervention group compared to the control group at school at three time points: Baseline (November 2008), Post-Intervention Assessment (March 2009) and Follow-up (November 2009).

Foods and drinks intake frequency by day at baseline showed that the intake of *Grains, grain products and substitutes*, *Fruit and vegetables*, Fish, Legumes, Whole-grain and Water were lower than the recommended intakes for this age population and that the intake of Meat (especially Red meat and Preserved meat products), *Sweets products and substitutes* (especially Other packaged snacks) and *Other beverages* (especially Soft drink) were higher than maximum recommended amounts for this age population.

The "Project AlimentAzione" nutrition intervention increased children's intakes of the categories of *Fruit and vegetables*, and *Grains, grain products and tubers*; and the individual items of Fish and Water. At follow-up, the results were less definitive: the individual items of Sandwiches, White meat, and Chocolate.

This study investigated the dietary patterns of middle school students highlighting the different importance of meal and snacking patterns in middle school students and addressing future intervention strategies. Furthermore, the evaluation of the impact of the "Project AlimentAzione" nutrition education intervention showed its effectiveness in the promotion of healthier dietary behaviors among middle school students from Milan and its province. Future interventions among this age population can take advantage from these findings in the design and the implementation of this complex preventive strategy.

SOMMARIO

L'aumento di obesità infantile in tutto il mondo degli ultimi decenni genera preoccupazioni sul futuro della salute pubblica nella maggior parte dei paesi sviluppati. La dieta Mediterranea che un tempo caratterizzava le abitudini alimentari delle popolazioni del Sud Europa sta scomparendo, in particolare tra i giovani adolescenti.

Gli scopi dello studio erano due: (1) indagare il comportamento alimentare degli studenti del primo e secondo anno di Scuola Secondaria di Primo Grado di Milano e provincia, (2) valutare l'impatto del "*Progetto AlimentAzione*", un intervento di educazione alimentare rivolto alla promozione di comportamenti alimentari più salutaris nel gruppo di intervento rispetto al gruppo di controllo.

Il "*Progetto AlimentAzione*" ha coinvolto 5 scuole per un totale di 644 studenti. La frequenza di consumo di alimenti e bevande è stata valutata attraverso un Diario Alimentare Settimanale. Per studiare il comportamento alimentare, è stata analizzata la frequenza di consumo giornaliera e la frequenza di consumo per pasti.

L'intervento di educazione alimentare consisteva di tre laboratori di 2 ore ciascuno: (1) Pane e cereali, (2) Frutta e verdura, (3) Bilanciamento tra assunzione di energia e dispendio energetico anche attraverso una alimentazione corretta.

Per studiare l'impatto degli interventi di educazione alimentare, diversi comportamenti alimentari degli studenti sono stati analizzati nel gruppo di intervento rispetto al gruppo di controllo in tre momenti di indagine: Pre-intervento (novembre 2008), Post-intervento (marzo 2009) e Follow-up (novembre 2009).

La frequenza di consumo giornaliero di alimenti e bevande ha mostrato che l'assunzione di *Cereali, derivati e tuberi*, *Frutta e verdura*, pesce, legumi, alimenti integrali e acqua erano inferiori alle assunzioni raccomandate per ragazzi di pari età e che l'assunzione di carne (in particolare carni rosse e insaccati), di *Dolci e sostituti* (soprattutto merendine) e *Altre bevande* (soprattutto bevande gasate zuccherate) erano superiori ai limiti massimi consigliati per ragazzi di pari età.

I ragazzi che hanno partecipato all'intervento di educazione alimentare hanno aumentato il loro consumo nelle categorie *Frutta e verdura*, e *Cereali, derivati e tuberi*, e le sottocategorie pesce e acqua rispetto ai ragazzi del gruppo di controllo.

Al Follow-up, i risultati erano meno convincenti: i ragazzi del gruppo sperimentale hanno aumentato il loro consumo nelle sottocategorie panini, carne bianca e cioccolato rispetto ai ragazzi del gruppo di controllo.

Questo studio esamina il comportamento alimentare degli studenti delle scuole secondarie di primo grado e descrive i pattern alimentari al fine di indirizzare le strategie di intervento future. Inoltre, la valutazione dell'impatto del "*Progetto Alimentazione*" ha mostrato la sua efficacia nella promozione di sani comportamenti alimentari tra gli studenti. Interventi futuri possono trarre vantaggio da questi risultati nella progettazione e nell'attuazione di questa complessa strategia preventiva.

FOREWORD

The passion for the world of food and cooking awoke within me at the end of my classical high school studies and compelled me toward the discovery of the Food Science and Technology (FST) program at the Faculty of Agriculture, University of Milan. I was lucky to have my father working as a manager in a small organic bread-sticks company; he took me to several international organic fairs where I discovered the organic food market in Europe and in Italy.

During my studies I was able to spend five months at the Universidad Politecnica de Valencia (Spain), where I learned the language and experienced another Mediterranean food culture and food market. Upon my return to Italy, I, my father and Professor Rossi of Fats and Oils Technology in the Department of Food Science Technology and Microbiology agreed to conduct a study on my father's bread-sticks on which I based my thesis after four years of studies in food science and technology at the University of Milan. I did the analysis on bread-sticks for six months in the laboratories of the Department, I tested promising solutions to extend the bread-sticks' shelf-life and I wrote my thesis.

During that research, I realized that analytical chemistry of food was not one of my favorite interests.

My four year career at the University did not satisfy all of my curiosities concerning food and cooking and I decided to apply for a Master's Degree in Food Science and Technology at the same University. During my studies I understood the central role food and cooking was gaining in my life and I started working and volunteering in different contests as a nutrition educator with children and adolescents.

My Food Science and Technology Masters Thesis consisted of an intervention I conducted in two middle schools of Novate Milanese (Milan) with the collaboration of the Province of Milan (¹).

I then tried to supplement my experience as a nutrition educator by working directly with institutions, non-governmental organizations and schools. It was difficult to procure funding for my interventions and even harder incorporating a research approach to my activities with schools and other organizations.

I was lucky to find interest in my research (and a 3 year scholarship) at the PhD School in Technological Innovations for Agricultural, Food and Environmental Sciences in the Faculty of Agriculture at the University of Milan. During the last four years as a PhD student, I studied the causes and the consequences of child and adolescent overweight and obesity and I was able to investigate and experience several nutrition education interventions in Italy and in other developed countries.

Meanwhile I was working on the design and the implementation of the "*Project AlimentAzione*" the nutrition education intervention described in this PhD dissertation.

I was lucky to find unfailing collaboration in Andrea Bocciarelli of the Nutrition Education Section of the Agricultural Sector of the Province of Milan. Due to his position and suggestions we were able to design and implement the nutrition education intervention described here. We decided to request the collaboration of Lucia Baldi, Professor of Statistics from the Department of Agricultural Economy and Politics, Agricultural Faculty, of the University of Milan and she aided us in the

choice of the sample collection method in order to find a representative sample of first and second year middle school students from Milan and its Province.

We also asked for help from Professor Monica Ferraroni from the Medical Statistics Department, Medical Faculty, University of Milan; she provided interesting suggestions on the development of the instruments to collect students' dietary habits from her experience in large epidemiological studies and she also put me in contact with other Italian researchers in this field.

We were able to find five schools in Milan and its province that demonstrated their interest and guaranteed their participation in the project for one year; we instructed teachers in the data collection procedure and the time line of the study. I presented the instruments and the project in each class at the beginning of the intervention (November 2008) and I conducted the three two hour workshops in fifteen classes while the other fourteen classes from the same schools served as a control.

We then proposed two three hour workshops to all interested teachers of the five schools to show them how to promote the intake of fruit and vegetables to their students through autonomous, class-based, interventions in their schools.

With the fundamental help of Luca Boeri, we created a web-portal to facilitate students in the data entry from their diaries on paper into the web form in their computer classes at school. We even involved Technology Education as well as Italian teachers in the data entry process since Mathematics and Science teachers had already dedicated many of their class-hours to the nutrition education workshops.

We collected extensive dietary information from students and their parents at Baseline, at Post-Intervention assessment (after four months from baseline) and at Follow-up Assessment (after one year from baseline). Once all data was entered in the web portal individually by students, we were able to start the analysis on the diet of these students and on the impact of the nutrition education intervention implemented.

I was asked by my PhD school to find a research center abroad at which to spend at least six months of my doctoral research. I spent several months exploring the publications of my research field to find a foreign University I could ask to help me in my research. I thus decided to ask for a research experience at the Center for Food and Environment (CFE) at the Teachers College of Columbia University in New York, NY, USA. Once again I was lucky and I was accepted as a non-degree student for a five months period at the Teachers College.

New York, in many senses, is the center of the world and stimulated me very much in the discovery of the world of food and nutrition in the US. I found at Columbia a whole team of researchers, coordinated by Professor Contento, and the possibility of experiencing nutrition education interventions design, implementation and evaluation in a country where nutrition education is more developed than it is in Italy due to the quick development this matter has gained in the last thirty years as a solution to the concerning problem of the rapid increase in the obesity prevalence.

I spent my first five months at CFE, (Spring-Summer 2010) attending very interesting classes and building my dissertation database; it took an enormous

amount of time to recode open-ended foods and portions from more than five hundred students from three time periods (21 days each) into understandable food and drink categories.

Although the tremendous amount of work needed for my research project, in my first experience at CFE I was able to actively participate to several projects with the research team there; at the time of my return to Italy my analysis was not finished due to its complexity and I felt it would be advantageous for me to return to CFE to better research the field of behavioral nutrition and to experience the design, the implementation and the evaluation of various nutrition education interventions across New York City and the US.

I was once again lucky to participate with the CFE team at the 2010 conference of the International Society for Behavioral Nutrition and Physical Activity (ISBNPA) at Minneapolis, Mn, USA. There I was able to better understand the different views on the future of nutrition education research in the presentations of the top researchers in this field, many of which I cite in this writing due to their important contributions to this field. In particular I was fascinated by the different approaches of Tom Baranowsky (US) and Johannes Brug (The Netherlands) in their studies of the mediators (or determinants) of energy balance related dietary behaviors.

When I came back to Italy, my tutor assigned me a smart student of Human Nutrition who needed to write her Masters Thesis (²); we decided to describe in her work the findings from the student and parent questionnaires and the impact of the “*Project AlimentAzione*” nutrition education intervention on the consumption of sweetened drinks. The findings from that study highlighted the difficulties in the estimation of portion size for drinks and suggested that we evaluate daily intake frequency by food and drink category and sub-category rather than by the grams or servings consumed by students every day.

I decided to ask for one more year from my University to finish my dissertation and I used the extra time to fly back to the CFE for a six month period the following Summer (Summer-Fall 2011). My application was accepted and I spent six more months there as a part-time staff member. I participated in various research and work activities and I obtained fundamental help in the writing of the two papers reported in Chapter 2 and Chapter 3 of the present work.

The differences in the diet, food and beverage market, school meals and the importance of free choice between the two countries (Italy and US) was useful to better understand the food in the country that promotes the highest number of nutrition education interventions in the world and, therefore, the importance of the strong Italian cultural food tradition in the prevention of obesity. Child and adolescent food and drink consumption patterns in the two countries are different, but researchers from each country could take advantage of the others' experiences: Italian researchers should learn the importance of different academic contributions in the design, implementation and evaluation of nutrition education interventions focusing on energy balance related behaviors (food and drink together with physical activity and inactivity) while US researchers should understand the importance of an extensive food and drink assessment not only in the description of diet patterns but

also in the evaluation of an intervention aimed at the development of self-consciousness to promote healthier dietary habits in middle school students.

The interest in foods and drinks consumed by students in Milan and its province addressed both studies reported in this dissertation; on one hand the investigation of foods and drinks consumed by students at baseline was useful to compare students' dietary patterns with national and international recommendations (Chapter 2), on the other hand, the evaluation of the impact of the “*Project AlimentAzione*” nutrition education intervention was useful to demonstrate the effectiveness of the intervention on several energy balance related dietary behaviors (Chapter 3).

The story of my research during the last ten years highlights the importance of passion, dedication, experience and national and international networks in the design, implementation and evaluation of a nutrition education intervention aimed toward the investigation of dietary patterns and the promotion of healthier dietary behaviors in middle school students.

GENERAL INTRODUCTION

The latest available data regarding childhood and adolescent overweight and obesity prevalence in Italy, due to the paucity of data and the use of different definitions of childhood overweight and obesity, are difficult to compare and cannot be interpreted unequivocally⁽³⁻¹¹⁾. Nevertheless, the rapid increase in the prevalence of overweight and obesity of Italian children and adolescents generate concerns for future public health and highlight a urgent need for interventions to prevent obesity^(5,9).

As summarized by Flegal and her colleagues, obesity is defined as excess body fat and overweight as weight in excess of a weight standard. While among adults overweight is generally defined as a BMI¹ higher than 25 (kg/m²) and obesity as a BMI higher than 30 (kg/m²), in children BMI varies considerably with age, so generally the BMI of a child is compared with the BMI of a reference population of children of the same sex and age⁽¹²⁾.

The risks and the consequences of childhood and adolescence obesity in terms of immediate, intermediate consequences and long term ones were accurately described in a review by Must and Strauss⁽¹³⁾; the authors concluded that the high prevalence and dramatic secular trend toward increasing childhood obesity suggest that without aggressive approaches to prevention and treatment, the attendant health and social consequences would be both substantial and long-lasting.

In a recent review by Lobstein and Wang the authors investigated worldwide trends in childhood overweight and obesity and found that they have increased more dramatically in economically developed countries and in urbanized populations⁽¹⁴⁾.

Children and adolescents weight status and dietary patterns are related to the weight status and educational level of their parents⁽¹⁵⁻²¹⁾ with important differences between mothers' and fathers' educational level and weight status^(22,23); therefore the relation between students weight status and mothers and fathers educational level and weight status was included in this study.

Although weight and height measurement is highly recommended for children and adolescent surveys, self-assessment of age, weight and height of 11-12 years old students and their parents can be a quick and cost-effective way to screen a population's weight status for preventive purposes. However, as highlighted in various studies, self-assessed data tend to overestimate height and underestimate weight, especially in overweight and obese subjects⁽²⁴⁾.

The above cited trends in children and adolescents overweight and obesity together with the changes in food and activity patterns have been the subject of extensive research in the latest years⁽²⁵⁾.

Trends in food intake in Europe are rapidly moving toward healthier diet styles: in Italy the actual diet is characterized by an intake of animal protein and fats (both from animals and from plants) higher than recommended and by an intake of complex carbohydrates lower than recommended⁽²⁶⁾. Several characteristics of the traditional healthy Mediterranean diet, called to Immaterial Human Heritage by UNESCO in 2010⁽²⁷⁾ have been lost generating concerns about future dietary patterns and, subsequently, public health issues and costs^(28,29).

The Mediterranean diet has been considered a healthy lifestyle since the 1960s when Ancel Keys, the coordinator of the Seven Countries Study, demonstrated its

1 Body Mass Index is defined as weight in kilograms divided by height in meters squared (kg/m²)

effects on the incidence and mortality rates of coronary heart disease ⁽³⁰⁾. In a recent research by Willett and colleagues, the authors discussed several studies published in the last 50 years on this topic and concluded that, together with regular physical activity and not smoking, over 80% of coronary heart disease, 70% of strokes and 90% of type 2 diabetes could be avoided by healthy food choices that are consistent with the traditional Mediterranean diet ⁽³¹⁾.

The latest dietary pattern changes in Mediterranean countries have been investigated by other authors: in a study by Kontogianni and colleagues ⁽³²⁾ the authors reported low adherence to a Mediterranean diet in a representative sample of Greek children and adolescents; in a study by Javier Aranceta: the author found that Spanish food patterns underwent a dramatic change between the 1960s and the 1980s and that current food patterns evidence high consumption of animal products such as meat, fish, milk and dairy products and intakes below desirable levels for cereals, potatoes and legumes resulting in a protein intake equal to 200% of the recommended level ⁽³³⁾.

Studies in Spain found similar results; in a research by Royo-Bordonada and colleagues, the authors evaluated 6-7 year old students' compliance with nutrient and food intake guidelines. They found that some characteristics of Mediterranean diet as include a higher intake of unsaturated fatty acids and of fruit and vegetables compared to such guidelines' goals. On the other side, they assessed that practically all children failed to comply with nutritional goals for fat, saturated fatty acids and carbohydrates intake. The authors underlined, consistently with other studies from Spain, a reduced intake of carbohydrates, high consumption of dairy and meat product, that Spanish children's dietary habits lay midway between a typically Mediterranean pattern and one more typical of Anglo-Saxon countries ⁽³⁴⁾. In a study by Ribas-Barba and colleagues, the authors analyzed trends in dietary patterns and food consumption between 1992 and 2003 in Spanish Catalonia showing an increase in eating between meals and outside of the home, in fast food consumers and dairy products consumption and a decrease in fruit and vegetables, potatoes, meat and fish consumption. Authors conclude the model of consumption in Catalonia is quite favorable and inherent to Mediterranean countries but presents important differences according to age. They warned that the youngest age groups were those who have deviated the most from this model of healthy eating ⁽³⁵⁾.

In a review regarding dietary habits and nutritional status in adolescents over Europe-Southern Europe, Cruz demonstrated that two important characteristics of Mediterranean diet, low consumption of saturated fatty acids and a high intake of carbohydrates have been lost on one hand due to a large increase in consumption of meat, dairy products, fats and oils, confectionery, cakes, biscuits etc. on the other hand due to a decrease in the intake of bread ⁽³⁶⁾.

Studies in the United Kingdom found similar trends towards unhealthier diets; in a research paper by Hackett and colleagues, comparing the dietary intake of 9-10 year old and 11-12 year old children in Liverpool, the authors demonstrated that the diets of children are dominated by a high prevalence of undesirable foods, and low prevalence of desirable foods. They stated that food choice changes appreciably between primary and secondary school and, in some key aspects, for the worse. They even linked this change to a growing independence of the child and

highlighted the importance of working with children in the last year of primary school and the first year of secondary school to promote healthy eating habits ⁽³⁷⁾.

In a study performed in Scotland by McDiarmid and colleagues, meal and snacking patterns of school aged children (5-17 years) were evaluated adding interesting findings to this research field. In particular, they assessed a higher total energy intake and higher percentage of intake from the category non-milk extrinsic sugar (NMES) intake in frequent snackers (those who average of more than two snacks per day) compared with infrequent snackers (those who average of less than two snacks per day). They also found that snacks were less nutritionally balanced than meals contributing a higher percentage of energy from Saturated Fatty Acids (SFA) and NMES. Furthermore, they underlined that diet and non-diet soft drinks and fruit juice were more frequently consumed as part of a meal than a snack. Authors concluded that future dietary promotion should focus on the consumption of food and drinks rather than just meal patters as many snack foods high in NMES and SFA are frequently consumed as part of main meals ⁽³⁸⁾.

The above cited studies on dietary pattern changes in children and adolescents highlight a need for extensive explorations into children and adolescents dietary behaviors in terms of various foods and drinks consumed per day as well as per meal and snack; the frequency of consumption (commonly measured in times/day or times/week) a certain food or drink is consumed is related to consumption ⁽³⁹⁾ and has been used in previous studies to describe children and adolescents dietary patterns ^(1,2,40).

Similar results have been found in Italian students: in a study by Martone and colleagues ⁽⁴¹⁾ the authors concluded that an unbalanced diet in terms of macro-nutrients and deficient in some micro-nutrients characterized middle school students from Rome: consumption of fruit, vegetables, legumes and fish were lower than recommended. From a nutrient perspective the diet of the students were low in complex carbohydrates and high in fats and sugars. In another research by Toselli and colleagues, among a sample of middle school students in Bologna, authors found that the overweight and obese adolescents consumed less carbohydrates and less fiber than their normal weight and underweight counterparts ⁽⁹⁾.

In Italy, major reasons for the above cited changes in food consumption patterns were well summarized by Leclerq and colleagues: the evolution of lifestyle, the availability of a large variety of new intensively advertised food products, the progressive aging of the population, and the increase of the meals consumed away from home and of convenience foods. ⁽⁴²⁾.

Observed trends in child and adolescent overweight and obesity prevalence and energy balance related dietary behaviors highlight that there is a urgent need for nutrition education interventions addressing children and adolescents ^(4,5,43).

As defined by Contento and colleagues, nutrition education is any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well being ⁽⁴⁴⁾. Food choice, especially during early adolescence, is a complex process because it is deeply embedded in culture, is influenced by many factors internal ⁽⁴⁵⁻⁴⁸⁾ and external ⁽⁴⁹⁻⁵⁸⁾ to the person and carries different meanings ⁽⁵⁹⁾.

Several reviews have compared different nutrition education interventions

targeted at youths to determine the more effective nutrition education strategies to promote more effective nutrition education interventions in this age population (⁶⁰⁻⁷³).

In these studies, few strategies of intervention have demonstrated to empower the effectiveness of the interventions: in particular, school-setting, behavioral focus, self-assessment of dietary behaviors, provision of adequate time and intensity, multi-component interventions, involvement of families, environmental component and focus on both terms of the energy balance equation (^{41,53-57}).

Some nutrition education interventions have addressed the promotion of energy balance related dietary behaviors in middle school students (^{58,59}), although the impacts of these interventions are hard to compare and frequently the results are small or null in food and drink intakes (⁶⁰).

Several reviews discussed the determinants (or mediators) of various energy balance related dietary behaviors to highlight what factors predict children and adolescent obesity (^{43,44,61-66}).

However, what specific behavior or behaviors were the most effective on children and adolescents obesity prevention is still unclear due to the complexity of the disease and the age of the subjects (⁶⁷). Therefore the importance of an extensive assessment of the changes in the frequency of intake of seven food and drink categories and twenty four food and drink sub-categories in the short term (after 4 months) and in the mid-term (after 1 year).

Schools are recognized as positive environments to promote nutrition education interventions among children and adolescents (⁷⁴⁻⁷⁶). Self-assessment of dietary intake has demonstrated as being an effective method to estimate food and drink consumption and an important factor of behavior change due to the influence of recording food and drink intake on personal awareness (⁷⁷). Multimedia technologies as web-based children and adolescents dietary assessment instruments are promising tools to collect information from young adolescents with relatively low staff resources (⁷⁸). No interventions were found in the available references using a web-based form for data entering purposes only.

In the design of the presented intervention, some of these strategies were implemented: in particular the school-setting, adequate time (1 year), the presence of different components (workshops, web-based assessment, teachers' professional development), the involvement of parents in questionnaire completion, and the collection of physical and sedentary activity data from students together with food and drink consumption in the 7-Day Food Records. Physical activity and inactivity data collected in this research will not be presented in this paper and will be described in future publications.

The original points of the “Project AlimentAzione” nutrition education intervention were the method of food and drink assessment combined with an innovative web-based data entry method and the play approach which promotes the utilization of hands-on activities such as cooking (⁷⁹), tasting (^{80,81}) and board game playing (⁸²).

The intervention described in this research focused on the promotion of the following energy balance related dietary behaviors: (1) increase the intake of complex carbohydrates; (2) increase the intake of whole grains; (3) increase the

intake of fruit; (4) increase the intake of vegetables; (5) increase the intake of white meat, fish, and legumes; (6) increase the intake of water; (7) decrease the intake of packaged snacks; (8) decrease the intake of other beverages; (9) decrease the intake of sweets; (10) decrease the intake of red meat. These energy balance dietary behaviors were selected according to the national guidelines for children and adolescents⁽⁸³⁾.

The purpose of this study was two-fold: first to investigate dietary patterns of first and second year middle school students from Milan and its province, second to evaluate the impact of a nutrition education intervention on the dietary behaviors of the students of the intervention group compared to the control group.

**CHAPTER 2:
DIETARY PATTERS OF MIDDLE SCHOOL
STUDENTS FROM MILAN AND ITS PROVINCE:
THE “PROJECT ALIMENTAZIONE”**

Abstract

Background: The Mediterranean diet has been considered a healthy lifestyle since the 1960s when Ancel Keys, the coordinator of the Seven Countries Study, demonstrated its effects on the incidence and mortality rates of coronary heart disease. Unfortunately, traditional lifestyles and diet patterns in most Mediterranean countries are changing rapidly towards those of Northern Europe and United States. Therefore the importance of an extensive assessment of the frequency of intake of nine food and drink categories and fifty one food and drink sub-categories. The purpose of the study was to investigate the dietary patterns of first and second year middle school students within Milan and its province.

Methods: Daily student food and drink frequency was assessed through a 7-Day Food Record (7-DFR). Once the paper copy of the 7-DFR was completed, each student was instructed to transcribe what was reported on the paper to a web based copy of the 7-DFR. Demographics of students and their parents were collected through the Student Questionnaire (SQ) and the Parent Questionnaire (PQ). Students' self-reported age, weight and height were used to calculate students' BMI (kg/m^2) according to overweight and obesity IOTF cut-off points. Student intake was investigated by how many times per day foods and drinks were consumed. Intake frequency by meal episode was analyzed for breakfast, morning snack, lunch, afternoon snack, dinner and extra snack according to the structure of the 7-DFR.

Results: Overall intake frequency by meal showed that about 18% of daily food and drink items was consumed at breakfast, 10% at morning snack, 29% at lunch, 10% at afternoon snack, 28% at dinner and 5% as extra snack. The overall intake frequency resulted 10.47 ± 2.73 times/day. Daily intake frequency by food and drink category resulted following: *Cereals, cereal product and tubers* ($2.90 \pm .82$ times/day), *Water* ($1.54 \pm .88$ times/day), *Sweet products and substitutes* ($1.54 \pm .86$ times/day), *Meat, fish, eggs and legumes* ($1.18 \pm .53$ times/day), *Other beverages* ($1.12 \pm .80$ times/day), *Fruit and vegetables* ($1.10 \pm .95$ times/day), *Milk and dairy products* ($1.00 \pm .62$ times/day), *Oils and fats* ($.07 \pm .17$ times/day) and *Miscellaneous* ($.02 \pm .07$ times/day). Intake frequency by day of foods and drinks showed that the intake of *Grains, grain products and substitutes*, *Fruit and vegetables*, *Fish*, *Legumes*, *Wholegrain* and *Water* were lower than the recommended intakes for this age population and that the intake of *Meat* (especially *Red meat* and *Preserved meat products*), *Sweets products and substitutes* (especially *Other packaged snacks*) and *Other beverages* (especially *Soft drink*) were higher than maximum recommended amounts for this age population.

Conclusion: Our findings, consistent with other studies, show that certain characteristics of the Mediterranean diet are confirmed while other characteristics are being lost. The trends observed in children and adolescents dietary patterns underline the need for nutrition education interventions, even where a strong food culture (the traditionally healthy Mediterranean lifestyle) should have protected youth dietary patterns from the developing *obesogenic* environment.

Introduction

The Mediterranean diet has been considered a healthy lifestyle since the 1960s when Ancel Keys, the coordinator of the Seven Countries Study, demonstrated its effects on the incidence and mortality rates of coronary heart disease ⁽²⁾. In a recent research by Willett and colleagues, the authors discussed several studies published in the last 50 years on this topic and concluded that, together with regular physical activity and not smoking, over 80% of coronary heart disease, 70% of strokes and 90% of type 2 diabetes could be avoided by healthy food choices that are consistent with the traditional Mediterranean diet ⁽³⁾. Unfortunately, traditional lifestyles and diet patterns in most Mediterranean countries quickly become more like those of Northern Europe and United States ^(4,5).

Food consumption patterns are changing rapidly in the Italian population: the traditional Mediterranean diet is being modified ⁽⁶⁾. In the last Italian National Food Consumption Survey (INRAN-SCAI 2005-2006), the authors found that some aspects of this traditional diet are confirmed as having a large contribution from oils and fats from olive oil, from cereals, bread, pizza and pasta while some other aspects express the rapid change in dietary pattern such as consumption of red meat (700 g/week raw weight) significantly higher than the goal (400-450 g/week raw weight) ⁽⁶⁾.

Turrini and her colleagues analyzed changes in Italian food consumption patterns between the 1980-1984 surveys and the 1994-1996 surveys. The authors concluded that the average Italian diet is changing with increasing attention to healthy aspects by large sectors of the population but also found a rise in opposite tendencies that should be carefully monitored. They underlined that attention should be paid to the food habits of children and adolescents that seem to go in the opposite direction to healthy behavior. The adolescents (10-17 years old) presented the highest intake versus all the other age classes in the categories 'bread and pizza', 'ham salami etc', and 'soft drinks' ⁽⁷⁾.

In another Italian study by Leclercq and her colleagues, the authors concluded that three important characteristics of the Mediterranean diet, a low consumption of saturated fats, high intake of carbohydrates and fiber are at risk of being lost. Their conclusion even suggests that there is a need for intervention programs that focus on increasing the intake of fruit and vegetables and decreasing the intake of high-fat containing food, in order to reduce long-term health problems ⁽⁸⁾.

Studies in Spain found similar results; in a research by Royo-Bordonada and colleagues, the authors evaluated 6-7 year old students' compliance with nutrient and food intake guidelines. They found that some characteristics of Mediterranean diet were confirmed such as a high intake of unsaturated fatty acids and of fruit and vegetables compared to guidelines' goals. On the other side, they assessed that practically all children failed to comply with nutritional goals for fat, saturated fatty acids and carbohydrates intake. The authors underlined, consistently with other studies from Spain showing a reduced intake of carbohydrates, high consumption of dairy and meat products, that Spanish children's dietary habits lay midway between a typically Mediterranean pattern and one more typical of Anglo-Saxon countries ⁽⁹⁾.

In a study by Ribas-Barba and colleagues, authors analyzed trends in dietary

patterns and food consumption between 1992 and 2003 in Spanish Catalonia showing an increase in eating between meals and outside of the home, in fast food consumers, in dairy products consumption and a decrease in fruit and vegetables, potatoes, meat and fish consumption. The authors concluded that the model of consumption in Catalonia is quite favorable and inherent to Mediterranean countries but presents important differences according to age. They warned that the youngest age groups were those who deviated the most from this model of healthy eating (⁹).

In a review regarding dietary habits and nutritional status in adolescents over Europe-Southern Europe, Cruz demonstrated that two important characteristics of Mediterranean diet, low consumption of saturated fatty acids and a high intake of carbohydrates have been lost on one hand due to a large increase in consumption of meat, dairy products, fats and oils, confectionery, cakes, biscuits etc. on the other hand due to a decrease in the intake of bread (¹⁰).

Studies in the United Kingdom found similar results; in a research paper by Hackett and colleagues, comparing the dietary intake of 9-10 year old and 11-12 year old children in Liverpool, the authors demonstrated that the diets of children are dominated by a high prevalence of undesirable foods, and low prevalence of desirable foods. They stated that food choice changes appreciably between primary and secondary school and, in some key aspects, for the worse. They even linked this change to a growing independence of the child and highlighted the importance of working with children in the last year of primary school and the first year of secondary school to promote healthy eating habits (¹¹).

In a study performed in Scotland by McDiarmid and colleagues, meals and snacking patterns of school aged children (5-17 years) were evaluated adding interesting findings to this research field. In particular, they assessed a higher total energy intake and higher percentage of intake from the category non-milk extrinsic sugar (NMES) intake in frequent snackers (average of more than two snacks per day) compared with infrequent snackers (average of less than two snacks per day). They also found that snacks were less nutritionally balanced than meals contributing a higher percentage of energy from Saturated Fatty Acids (SFA) and NMES. Furthermore, they underlined that diet and non-diet soft drinks and fruit juice were more frequently consumed as part of a meal than a snack. Authors concluded that future dietary promotion should focus on the consumption of food and drinks rather than just meal patterns as many snack foods high in NMES and SFA are frequently consumed as part of main meals (¹²).

The above cited studies on dietary patterns changes in children and adolescents highlight a need for extensive explorations into children and adolescents dietary behaviors in terms of various foods and drinks consumed per day as well as per meals and snacks; the frequency of consumption (commonly measured in times/day or times/week a certain food or drink is consumed) is related to consumption (¹³) and has been used in previous studies to describe children and adolescents dietary patterns (^{1,14,15}).

Energy balance is determined by both energy intake and energy expenditure: recognizing the importance on intervening on both terms of energy balance equation, the time spent in vigorous and moderate physical activity, the time spent walking, and the time spent in sedentary activities and sleeping were measured but

will be the object of future publications and therefore were not presented in this research.

As summarized by Flegal and her colleagues, obesity is defined as excess body fat and overweight as weight in excess of a weight standard. While among adults overweight is generally defined as a BMI² higher than 25 (kg/m²) and obesity as a BMI higher than 30 (kg/m²), in children BMI varies considerably with age, so generally the BMI of a child is compared with the BMI of a reference population of children of the same sex and age (¹⁶).

The risks and the consequences of childhood and adolescence obesity in terms of immediate, intermediate and long term consequences were accurately described in a review by Must and Strauss (¹⁷); the authors concluded that the high prevalence and dramatic secular trend toward increasing childhood obesity suggest that without aggressive approaches to prevention and treatment, the attendant health and social consequences would be both substantial and long-lasting.

Several studies underlined a paucity of children and adolescent weight status data in Southern European countries (^{18,19}) and in Italy (²⁰); unfortunately, these countries, once characterized by healthier food patterns a lower prevalence of overweight and obesity, nowadays present higher childhood and adolescence overweight and obesity prevalence than in Northern Europe (²¹).

Children and adolescents weight status and dietary patterns are related to the weight status and educational level of their parents (²²⁻²⁸) with important differences between mothers' and fathers' educational level and weight status (^{29,30}); therefore the relationship between students weight status and mothers and fathers educational level and weight status was included in this research.

Although weight and height measurement is highly recommended for children and adolescent surveys, self-assessment of age, weight and height of 11-12 years old students and their parents can be a quick and cost-effective way to screen a population's weight status for preventive purposes. However, as highlighted in various studies, self-assessed data tend to overestimate height and underestimate weight, especially in overweight and obese subjects (³¹).

Food and drink intake assessment in children and adolescents presents several challenges depending on how food and drinks are categorized, what is measured (grams, portion, frequency, etc.), what instrument is used (parent reports, food records, frequency questionnaires, food records etc.), the provenience and the age of participants, the quantification of portion size, the study setting and the data collection method (³²).

Web-based instruments to assess food and drink intake have been extensively developed in the last two decades due to their cost effectiveness and the increasing presence of computers in schools and homes (³³⁻³⁷). Several web-based intake assessment instruments were shown to be effective to collect foods and drinks intake data (³⁸). To the knowledge of the author there are no studies using a web-based questionnaire and 7-Days Food Records for data entry purposes only. The accuracy of the data entry method used in this study was tested on a sub-sample of 100 students reporting a similar intake in their paper copy of the 7-DFR and in their web-based copy.

2 Body Mass Index is defined as weight in kilograms divided by height in meters squared (kg/m²)

Dietary pattern changes discussed above have been demonstrated to affect the development of childhood obesity⁽³⁹⁾. In particular, reducing meal and snack frequency, especially breakfast skipping, seems to be a component causing childhood obesity and limiting consumption of sugar-sweetened beverages and snack foods may be associated with a reduction in the risk of obesity.

Dietary pattern studies are becoming as important as food consumption studies to assess dietary habits and to address national and international guidelines⁽³⁹⁾.

The dietary behavior changes and dietary pattern changes described before are two of the main fields of research to counteract overweight and obesity in most developed countries. The reasons of these changes were explored through the studies focusing on the determinants (in Europe) or mediators (in the U.S.) of energy balance related behaviors^(28,40-42), .

The determinants of childhood and adolescence overweight and obesity have been widely discussed in the recent literature with the purpose of address guidelines and actions aimed to preserve youth public health. Main common findings of these studies indicate the importance of the environmental level determinants^(22,41-54) together with the personal level ones⁽⁵⁵⁻⁶⁰⁾.

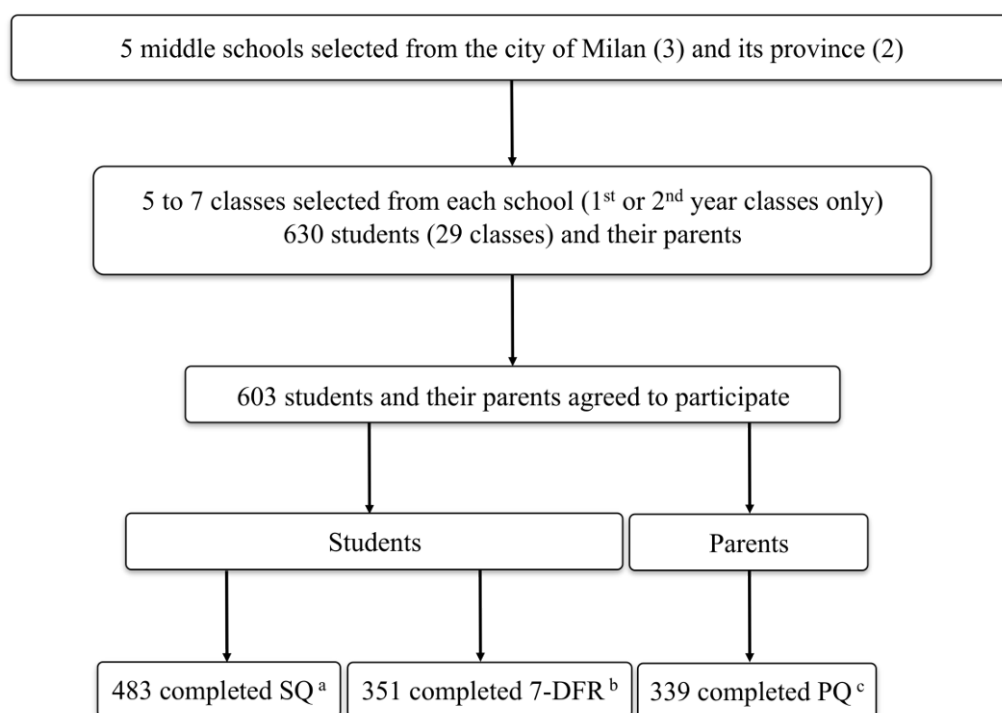
Familial determinants, such as parents' weight status, dietary behaviors, educational level and family meal patterns directly impact dietary behaviors in children: in recent decades, fruit^(25,61), vegetable⁽⁵¹⁾, snacks^(26,62-64) and sweetened carbonated beverages intakes^(45,65,66) have been widely analyzed.

The purpose of the study was to investigate the dietary patterns of first and second year middle school students from Milan and its province.

Methods

Three schools in the city of Milan and two schools in its province were selected based upon the social economic status (SES) of each school's population; this provided a representative sample of 11-12 years old middle school students in Milan and its province. Principals and teachers from the schools all agreed to work for one year on the program and to guarantee approximately 100 students in first and second year middle school.

Figure 1. Study setting and sample selection of the “*Project AlimentAzione*” at baseline.



^aSQ: Students' Food Habits Questionnaire; ^b7-DFR: Students' 7-Day Food Record; ^cPQ: Parents' Food Habits Questionnaire

Students' characteristics were collected through the Students' Food Habits Questionnaire (SQ). This instrument consisted of four parts: (1) physical characteristics such as gender, age, height and weight; (2) food preferences and food habits; (3) parents' food habits; and (4) students' leisure time and physical activity patterns.

Parents' characteristics were collected through the Parents' Food Habits Questionnaire (PQ), brought home by students and completed by their parents during December 2008. The questionnaire consisted of three parts: (1) mothers' age, height, weight, socio-economic status, and food habits; (2) fathers' age, height, weight, socio-economic status, and food habits; (3) family food habits, and student's physical activity patterns.

Daily student food and drink frequency was assessed through a 7-Day Food

Record (7-DFR). The 7-DFR consisted of two sections: one for foods and beverages consumed throughout the day (breakfast, morning snack, lunch, afternoon snack, dinner, other); and the second section investigated physical activity (vigorous, moderated, sedentary) as well as hours of sleep per night. The researcher administered these three instruments to students over a 30 minutes period in each classroom during November 2008. Each student was provided a small book containing SQ, 7-DFR and instructions regarding how to record food and portion sizes. Each book contained pictures of 16 food samples from the *Atlante Ragionato di Alimentazione* ⁽⁶⁷⁾ in three portion sizes (small, medium, large). Students were asked to refer to the booklet to estimate portion sizes for all the foods they ate. Once the paper copy of the 7-DFR was completed, each student was instructed to transcribe what was reported on the paper to a web based copy of the 7-DFR.

The web-based copy of 7-DFR contained 313 categories of foods and 14 categories of portion sizes. Each student was asked to find the food or portion size recorded in the paper copy within the categories provided by the web instrument. If students were unable to find their selections, they were asked to type in the food or portion category in a separate text box. Foods and portions submitted by students were populated into existing categories in Foods and Portions Database. Various food and drink categorized in each food and drink category and sub-category are reported in Table 10 in the Appendix.

Students' self-reported age, weight and height were used to calculate students' BMI (kg/m²) according to overweight, obesity ⁽⁶⁸⁾ and underweight ⁽⁶⁹⁾ cut-off points proposed by Cole and colleagues.

Student intake was investigated by how many times per day foods and drinks were consumed. Portion size data were not included due to inconsistency and a large volume of missing data ⁽⁷⁰⁻⁷²⁾. Daily mean food and drink frequency (times/day) were calculated for those students who completed at least 4 days (containing at least one weekend day) in the 7-DFR ^(73,74). Intake frequency by meal episode were calculated for breakfast, morning snack, lunch, afternoon snack, dinner and extra snack³ according to the structure of the 7-DFR.

Percentage of consumers was calculated considering as a consumer each student who ate or drank at least once a particular category/sub-category in the 7-DFR.

Percentage of consumer per meal episode were calculated considering as a consumer each student who ate or drank at least once a particular category/sub-category in a particular meal episode in the 7-DFR.

Data collection, data cleaning, recoding of open-ended questions and a major part of the analysis was performed using Microsoft Excel (2008) for Windows. Statistical data analysis was performed using SPSS 18.0 for Macintosh.

3 Extra snack reports answers to two questions printed at the end of each day of the 7-DFR: "Did you eat anything else during the day?" and "Did you drink anything else during the day?"

Results

Students' characteristics and parents' education grade by gender are listed in Table 1. The student's sample average age was 11.9 ± 0.8 years. The category presenting the highest percentages of education grade for both mothers' and fathers resulted 'High school' (57.8% versus 46.6% respectively).

Table 1. Students' characteristics and parents' higher education grade in “Project AlimentAzione” by gender

	Total sample n=483	Girls n=232 (48%)	Boys n=251 (52%)
Age ^a	11.9 ± .8	11.8 ± .7	11.9 ± .8
Born in Italy, n (%)	269 (93)	134 (94)	135 (92)
Mother's education, n (%)			
Elementary school	6 (1.9)	5 (3.2)	1 (.6)
Middle school	62 (19.8)	25 (15.9)	37 (23.7)
High school	181 (57.8)	87 (55.4)	94 (6.3)
University	64 (2.4)	40 (25.5)	24 (15.4)
Father's education, n (%)			
Elementary school	7 (2.4)	3 (2.1)	4 (2.7)
Middle school	76 (26.0)	33 (22.9)	43 (29.1)
High school	136 (46.6)	66 (45.8)	70 (47.3)
University	73 (25.0)	42 (29.2)	31 (2.9)

^a Values are means ± standard deviations .

Students' BMI and weight status by gender are reported in Table 2. Students' BMI and was higher in boys than in girls (19.1 ± 3.1 kg/m² versus 18.4 ± 3.8 kg/m² respectively). Prevalence of overweight and obesity was higher in boys than in girls (17.3% versus 6.7% respectively).

Table 2. Students' BMI and weight status by gender in “Project AlimentAzione”

	Total sample	Girls	Boys	Statistics	p-value ^f
Students' BMI ^a (kg/m ²)	18.8 ± 3.4	18.4 ± 3.8	19.1 ± 3.1	-2.212 ^b	.028*
Students' weight status					
Under and normal weight ^c	35 (87.5)	153 (93.3)	162 (82.7)	9.241 ^e	.002**
Overweight and obese ^d	45 (12.5)	11 (6.7)	34 (17.3)		

^a Body Mass Index = weight (kg) / height (m²). Values are means ± standard deviations.

^d Independent Student t-test by gender.

^c Underweight is calculated using international cut-off points proposed by Cole *et al.* (2007)ⁿ. Values are n (%).

^d Overweight and obesity are calculated using international cut-off points proposed by Cole *et al.* (2000)ⁿ

^e Chi-square test between weight status and gender.

^f Significance: *p<.05, **p < .01.

Table 3 shows parents' BMI, weight status and education grade and their relationship with students' BMI and weight status. Both mothers' and fathers' BMI

resulted significantly correlated with students' BMI (Pearson correlation = .197, $p < .01$ and Pearson correlation = .217, $p < .001$ respectively). Students' weight status resulted significantly related to both fathers' and mothers' weight status ($\chi^2=6.120$, $p = .013$ and $\chi^2=6.068$, $p = .014$ respectively). Students' weight status was significantly related to father's education grade but not mother's education grade ($\chi^2=3.034$, $p = .386$ and $\chi^2=8.467$, $p = .037$ respectively).

Table 3. Parents' BMI, weight status and education grade in relationship with students' BMI and weight status in “Project AlimentAzione”

	Total sample	Statistics	p-value ^h
Mothers' BMI (kg/m ²) ^a	22.8 ± 3.8	.197 ^b	.002**
Mothers' weight status, n (%)			
Underweight and Normal weight	196 (82.7)		
Overweight or obese	41 (17.3)	6.120 ^c	.013*
Mother's education, n (%)			
Elementary school	6 (2.5)		
Middle school	49 (20.2)		
High school	138 (57.0)	3.034 ^d	.386
University	49 (20.2)		
Fathers' BMI (kg/m ²)	25.2 ± 3.5	.217 ^e	.001**
Fathers' weight status, n (%)			
Underweight and Normal weight	119 (52.9)		
Overweight or obese	106 (47.1)	6.068 ^f	.014*
Father's education, n (%)			
Elementary school			
Middle school	76 (26.0)	8.467 ^g	.037*
High school	136 (46.6)		
University	73 (25.0)		

^a Body Mass Index = weight (kg) / height (m²). Values are means ± standard deviations.

^b Pearson correlation between mothers' BMI and students' BMI.

^c Chi-square test between students' weight status and mothers' weight status.

^d Chi-square test between students' weight status and mothers' education.

^e Pearson correlation between fathers' BMI and students' BMI.

^f Chi-square test between students' weight status and fathers' weight status.

^g Chi-square test between students' weight status and fathers' education.

^h Significance: * $p < .05$, ** $p < .01$.

Table 4 shows means and standard deviations for daily intake frequency in the total students' sample (n=351) and in consumers for 9 food and drink categories (*Cereals, cereal products and tubers; Fruit and vegetables; Meat, fish, eggs, legumes; Milk and dairy product; Oils and fats; Sweet products and substitutes; Other beverages; Water and Miscellaneous*) and for 24 food and drink sub-categories. Number, percentage, mean and standard deviation for consumers are printed in Table 4 next to mean and standard deviation for the total sample in order to provide a realistic intake frequency for food and drink categories and sub-categories with low percent of consumers.

The overall intake frequency resulted 10.47±2.73 times/day. Intake frequency by food and drink category resulted following: *Cereals, cereal product and tubers*

(2.90±.82 times/day), *Water* (1.54±.88 times/day), *Sweet products and substitutes* (1.54±.86 times/day), *Meat, fish, eggs and legumes* (1.18±.53 times/day), *Other beverages* (1.12±.80 times/day), *Fruit and vegetables* (1.10±.95 times/day), *Milk and dairy products* (1.00±.62 times/day), *Oils and fats* (.07±.17 times/day) and *Miscellaneous* (.02±.07 times/day).

Table 5 shows intake frequency for 9 food and drink categories and for 24 food and drink sub-categories per day and per meal episodes as the 7-DFR was structured: breakfast, morning snack, lunch, afternoon snack, dinner and extra snack⁴.

Table 6 shows percentages of consumers for 9 food and drink categories and for 24 food and drink sub-categories throughout the day and by meal. Overall intake frequency by meal is shown in Figure 2. About 18% of daily food and drink items was consumed at breakfast, 10% at morning snack, 29% at lunch, 10% at afternoon snack, 28% at dinner and 5% as extra snack. Figure 3 shows the prevalence of each food and drink category throughout the day while Figure 4 shows the prevalence of each food and drink category by meal. Figures 5-10 reported in the Appendix describe dietary patterns per meal and per snack exploring selected food and drink category.

Tables 7, 8, and 9 reported in the Appendix, show similar but more detailed results than the ones presented in tables 4, 5, and 6; in tables 7, 8 and 9 results are presented for 9 food and drink categories and for 51 (instead of 24) food and drink sub-categories. Table 10 reported in the Appendix, show the various foods and drinks (in Italian and in English) grouped in the various food and drink categories and sub-categories.

The following paragraphs present results by food and drink category in order to help the reader in following the main findings of this study.

Grains, grain products and tubers

In the category *Grains, grain products and tubers* the sub-category presenting the highest intake frequency resulted as follows: Pasta and rice dishes (1.22±.40 times/day), Bread and substitutes (.52±.48 times/day), Pizza (.30±.28 times/day), Salty snacks (.26±.33 times/day) and Sandwiches (.23±.29 times/day). This category was consumed by 100% of the total students' sample; in its sub-categories Breakfast cereals were consumed by 30%, Pasta and rice by 100%, Bread and substitutes by 79%, Sandwiches by 60%, Pizza by 79%, Potatoes by 64% and Salty snacks by 58%. Less than half of the sample (48%) consumed the sub-category Pasta and rice dishes with vegetables and/or legumes presenting an intake frequency of .27±.16 times/day. The sub-category Fast food sandwiches were consumed by 8% of students' sample (.26±.17 times/day). The sub-category French fries were consumed by 32% of the total students' sample (.22±.12 times/day).

As reported in Table 5, in the category *Grains, grain products and tubers*, the sub-categories with the highest intake frequencies at breakfast resulted Breakfast cereals (.13±.26 times day) and Bread and substitutes (.10±.21 times/day).

4 Extra snack reports answers to two questions printed at the end of each day of the 7-DFR: "Did you eat anything else during the day?" and "Did you drink anything else during the day?"

Regarding snacks, the sub-categories with the highest intake frequencies resulted as follows: Salty snacks (.14±.25 times/day at morning snack, .07±.14 times/day at afternoon snack, .02±.06 times/day as extra snack), Bread and substitutes and Sandwiches.

A different trend is shown at lunch and dinner since Pasta and rice dishes presented the highest intake frequencies (.63±.26 times/day at lunch and .56±.26 times/day at dinner); following categories at lunch were Bread and substitutes, Sandwiches, Potatoes, tubers and their products and Pizza (.13±.19 times/day, .09±.15 times/day, .09±.14 times/day, .09±.12 times/day respectively) and at dinner were Pizza, Potatoes, tubers and their products and Bread and substitutes (.11±.13 times/day, .10±.13 times/day, .08±.15 times/day respectively). As reported in Table 5, certain sub-categories of the category *Grains, grain products and tubers* showed a prevalent consumption during lunch and dinner especially for the sub-categories Potatoes, tubers and their products (40% at lunch and 44% at dinner), Pasta and rice dishes (99% at lunch and 97% at dinner). Some other sub-categories showed a different trend and were consumed both as main meals and as snacks: Bread and substitutes (26% at breakfast, 34% at morning snack, 45% at lunch, 31% at afternoon snack, and 34% at dinner), Sandwiches (13% at morning snack, 34% at lunch, 15% at afternoon snack, 19% at dinner) and Pizza (15% at morning snack, 41% at lunch, 17% at afternoon snack and 48% at dinner). Other sub-categories were consumed mainly as a snack e.g. Salty snacks (36% at morning snack, 8% at lunch, 31% at afternoon snack, 8% at dinner and 11% as extra snack).

Fruit and vegetables

The category *Fruit and vegetables* was consumed by 92% of students and consumers' intake frequency resulted 1.19±.93 times/day. Fruit presented an intake frequency .62±.66 times/day while Vegetables presented an intake frequency .48±.46 times/day. As reported in table 8, 78% of the total students' sample declared to eat Fruit, 14% declared to eat Nuts, olives and their products and 76% declared to eat Vegetables at least once during the 7-DFR.

Intake patterns of this category throughout the day are shown in Table 5 and in Figure 5: Fruit and vegetables presented low intake frequency at breakfast and snacks (.03±.13 times/day at breakfast, .03±.11 times/day at morning snack, .09±.18 times/day at afternoon snack and .04±.14 at extra snack) compared to lunch and dinner (.42±.42 times/day and .49±.44 times/day respectively).

As just shown from results reported in Table 5, even Table 6 demonstrates a similar trend regarding Fruit and Vegetables sub-categories: Fruit was consumed at lunch and at dinner by more than half of the student sample (53% at lunch and 56% at dinner) while was consumed at breakfast only by 9% of the students, at morning snack only by 11%, at afternoon snack by 27% and as extra snack by 11% of students. Vegetable was mainly consumed at lunch and at dinner (58% at lunch and 64% at dinner) while the percentages of consumers for other meals were low (0% as breakfast, 2% as morning snack, 3% as afternoon snack and 2% as ES).

Meat, fish, eggs and legumes

In the category *Meat, fish, eggs and legumes* the sub-categories presenting the highest intake frequencies resulted: Meat (.90±.46 times/day), Fish (.15±.18 times/day), Eggs (.09±.15 times/day) and Legumes (.05±.11 times/day). In the sub-category Meat, Red meat was consumed by 89% of the sample and presented an intake frequency of .44±.31 times/day (.49±.29 times/day in consumers); Preserved products was consumed by 68% of the sample and presented an intake frequency of .26±.27 times/day (.38±.25 times/day in consumers); White meat was consumed by 66% of the sample and presented an intake frequency of 20±.21 times/day (.38±.25 in consumers). The category *Meat, fish, eggs and legumes* presented a higher frequency of intake at lunch and at dinner than at other meal episodes: students' reported a frequency of intake at lunch of .54±.32 times/day and at dinner of .50±.32 times/day.

Milk and dairy products

In the category *Milk and dairy products*, Milk was consumed by 81% of students and presented an intake frequency of .66±.47 times/day (.82±.37 times/day in consumers); Cheese and substitutes was consumed by 62% of students and presented an intake frequency of .24±.29 times/day (.38±.28 times/day in consumers); Yogurt was consumed by 27% of students and presented an intake frequency of .09±.20 times/day (.33±.25 in consumers).

Students reported an intake frequency of *Milk and dairy products* of 1.00±.62 times/day throughout the day; the consumption of foods and drinks grouped in this category by meal resulted as follows: breakfast with a frequency of intake of .62±.42 times/day, dinner (.15±.15 times/day), lunch (.12±.13 times/day), afternoon snack, morning and extra snack (.06±.15 times/day, .02±.12 times/day, .02±.10 times/day respectively). This food and drink category presents a higher percentage of consumers at main meals than at snacks: 79% of students ate at least one food or drink from this category at breakfast, 47% at lunch and at dinner while 21% of students consumed any food or drink from this category at afternoon snack, 7% at morning snack and extra snack.

Sweet products and substitutes

In the category *Sweet products and substitutes* the sub-category Other packaged snacks was consumed by three quarter of students and presented a frequency of intake of .53±.56 times/day (.70±.54 times/day in consumers). Biscuits were consumed by 66% of students and presented an intake frequency of .39±.41 times/day (.59±.37 times/day). Other sweet products were consumed by 59% of the sample and presented a frequency of intake of .29±.39 times/day (.48±.40 in consumers).

As reported in Table 5 in the category *Sweets products and substitutes*, the sub-category with highest frequency of intake at breakfast resulted following: Biscuits (.27±.33 times/day), Other packaged snacks (.15±.27 times/day) and Other sweet

products ($.11 \pm .25$ times/day). Different trends in the frequency of intake are shown comparing snacks (morning snacks, afternoon snacks and extra snacks) and main meals (lunch and dinner): Other Packaged snacks resulted the sub-category with the highest frequency of intake at morning snack and at afternoon snack ($.21 \pm .32$ times/day and $.13 \pm .21$ times/day respectively) followed by Biscuits then by Chocolates while Other sweet products resulted the highest sub-category at lunch and dinner followed by Chocolate than by Ice cream.

Sweets products and substitutes resulted the category with the highest frequency of intake as extra snack ($.15 \pm .23$ times/day) led by the sub-category Candies and gums ($.08 \pm .17$ times/day). The category *Sweet products and substitutes* was consumed by 99% of students throughout the day and by 85% of the sample at breakfast, by 59% at morning snack, by 35% at lunch, by 72% at afternoon snack, by 32% at dinner and by 43% as extra snack (presenting the highest percentage of consumer as extra snack).

Water and Other beverages

Water was drunk by 95% of students and presented an intake frequency of $1.63 \pm .83$ times/day in consumers. *Water* intake frequency resulted higher than *Other beverages* intake frequency ($1.54 \pm .88$ times/day versus $1.12 \pm .86$ times/day respectively).

In the category *Other beverages* the sub-category Coffee, tea, herbal tea and substitutes was consumed by 54% of students and presented the highest intake frequency equal to $.36 \pm .49$ times/day ($.67 \pm .50$ times/day in consumers). The sub-category Soft drinks was consumed by 66% of students and presented an intake frequency of $.35 \pm .45$ times/day ($.53 \pm .47$ times/day in consumers). The sub-category Fruit juices was consumed by 51% of students and presented an intake frequency of $.28 \pm .42$ times/day ($.55 \pm .44$ times/day in consumers).

As reported in table 5 in the category *Other beverages*, the sub-category with highest frequency of intake at breakfast resulted following: Coffee, tea, herbal tea and substitutes ($.14 \pm .29$ times/day), Chocolate beverages ($.10 \pm .25$ times/day) and Fruit juices ($.04 \pm .15$ times/day). Different trends in the frequency of intake are shown between snacks and main meals: Fruit juices resulted the sub-category with the highest frequency of intake at morning snack and at afternoon snack ($.12 \pm .25$ times/day and $.06 \pm .15$ times/day respectively); Soft drinks was the highest sub-category at lunch and dinner and extra snack ($.12 \pm .20$ times/day, $.10 \pm .14$ times/day and $.04 \pm .12$ times/day respectively).

Water was consumed by students mainly during lunch and dinner attesting a frequency of intake of $.62 \pm .33$ times/day and $.52 \pm .32$ times/day respectively.

Comparing *Other beverages* and *Water* frequencies of intake a different trend between main meals and snacks can be observed: *Water* frequency of intake was higher than *Other beverages* at lunch and dinner ($.62 \pm .33$ versus $.16 \pm .24$ times/day and $.54 \pm .32$ versus $.18 \pm .24$ times/day respectively) while was lower at breakfast, morning snack and afternoon snack ($.05 \pm .17$ versus $.29 \pm .36$ times/day at BF, $.11 \pm .21$ times/day versus $.20 \pm .30$ times/day at MS, $.11 \pm .19$ versus $.19 \pm .24$ times/day at AS respectively).

Other beverages were consumed by 53% of the sample at breakfast, by 41% as morning snack, by 44% as lunch by 55% as afternoon snack, by 51% as dinner and by 29% as extra snack.

Sub-categories of drinks in *Other beverages* category show an interesting percentages of consumption during the day: at breakfast the highest percentage of consumption was reported in the sub-category Coffee, tea, herbal tea and substitutes (28%) then in Chocolate beverages (22%), then in Fruit Juices (13%) then by Soft drinks (1%).

At morning snack Fruit Juices was the sub-category with the highest percentage of consumers (26%) then Coffee, tea, herbal tea and substitutes (19%), then Soft drinks (3%) and then Chocolate beverages (1%).

At afternoon snack Coffee, tea, herbal tea and substitutes resulted the sub-category with the highest percentage of consumers (23%) then Fruit Juices (22%), then Soft drinks (18%) and then Chocolate beverages (11%).

At lunch and dinner less than 10 percent of students declared to consume Coffee, tea, herbal tea and substitutes, Chocolate beverages and Fruit juices while 36% of students reported a consumption of Soft drinks at lunch and 45% of students reported Soft drink consumption at dinner.

A part from breakfast and extra snack, in the rest of meal episodes during the day, percentages of students consuming *Water* (29% at MS, 91% at L, 36% at AS, 87% at D and 28% at ES) was higher than percentages of students consuming any drink sub-categories of the category *Other beverages* (Coffee, tea, herbal tea and substitutes; Chocolate beverages; Fruit juices and Soft drinks). Furthermore, at lunch and at dinner percentages of students consuming *Water* were higher than percentages of student consuming the category *Other beverages* (91% versus 45% at L and 87% versus 53% at D). Otherwise, during snacks percentages of students drinking water was lower than percentages of students drinking *Other beverages* (29% versus 40% at morning snack; 36% versus 56% at afternoon snack; and 28% versus 29% at extra snack).

Oils and fats

Oils and fats resulted to be consumed by 21% of students' sample and presented an intake frequency of $.07 \pm .17$ times/day ($.32 \pm .25$ times/day in consumers). Highest frequency of intake during the day resulted at lunch and dinner ($.03 \pm .11$ times/day and $.02 \pm .08$ times/day respectively).

Table 4. Daily intake frequency in the total sample and in consumers for students participating at the “Project AlimentAzione”.

	Total sample		n	Consumers ^a		
	Mean	SD		%	Mean	SD
<i>Grains, grain products and tubers</i>	2.90	.82	351	100	2.90	.82
Breakfast cereals	.15	.29	106	30	.49	.32
Pasta and rice dishes	1.22	.40	351	100	1.22	.40
Bread and substitutes	.52	.48	277	79	.66	.45
Sandwiches	.23	.29	212	60	.38	.29
Pizza	.30	.28	278	79	.38	.26
Wheat, other cereals and flours	.02	.10	28	8	.31	.20
Potatoes, tubers and their products	.20	.20	224	64	.31	.17
Salty snacks	.26	.33	205	58	.45	.33
<i>Fruit and vegetables</i>	1.10	.95	322	92	1.19	.93
Fruit	.62	.66	273	78	.79	.64
Vegetables	.48	.46	268	76	.63	.43
<i>Meat, fish, eggs and legumes</i>	1.18	.53	350	100	1.18	.52
Meat	.90	.46	346	99	.91	.45
Fish	.15	.18	188	54	.27	.15
Eggs	.09	.15	131	37	.23	.16
Legumes	.05	.11	67	19	.24	.15
<i>Milk and dairy products</i>	1.00	.62	332	95	1.06	.59
<i>Sweet products and substitutes</i>	1.54	.86	347	99	1.56	.85
Biscuits	.39	.41	230	66	.59	.37
Candies and gums	.11	.21	107	30	.35	.25
Chocolates	.17	.27	162	46	.37	.29
Ice cream	.06	.14	81	23	.24	.18
Other packaged snacks	.53	.56	265	75	.70	.54
Other sweet products	.29	.39	208	59	.48	.40
<i>Other beverages</i>	1.12	.84	328	93	1.20	.81
Coffee, tea, herbal tea and substitutes	.36	.49	189	54	.67	.50
Chocolate beverages	.13	.29	103	29	.46	.37
Fruit juices	.28	.42	179	51	.55	.44
Soft drinks	.35	.45	231	66	.53	.47
<i>Water</i>	1.54	.88	333	95	1.63	.83
<i>Oils and fats</i>	.07	.17	73	21	.32	.25
<i>Miscellaneous</i>	.02	.07	31	9	.22	.13

^a Students who reported a consumption of at least once in the 7-Day Food Record are considered consumers of that food category.

Table 5. Intake frequency throughout the day and by meal in students participating at the “Project AlimentAzione”

	All day		Breakfast		Morning snack		Lunch		Afternoon snack		Dinner		Extra snack ^a	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Grains, grain products and tubers	2.90	.82	.26	.34	.38	.36	1.05	.33	.26	.26	.91	.29	.05	.11
Breakfast cereals	.15	.29	.13	.26	.00	.01	.00	.00	.01	.06	.00	.02	.00	.01
Pasta and rice	1.22	.40	.00	.05	.01	.03	.63	.26	.01	.05	.56	.26	.00	.03
Bread and substitutes	.52	.48	.10	.21	.13	.23	.13	.19	.07	.13	.08	.15	.01	.05
Sandwiches	.23	.29	.01	.09	.04	.12	.09	.15	.04	.13	.04	.09	.00	.04
Pizza	.30	.28	.01	.05	.05	.15	.09	.12	.04	.11	.11	.13	.01	.04
Wheat, other cereals and flours	.02	.10	.00	.04	.01	.06	.00	.03	.00	.03	.00	.03	.00	.02
Potatoes, tubers and their products	.20	.20	.00	.00	.00	.02	.09	.14	.00	.02	.10	.13	.00	.02
Salty snacks	.26	.33	.00	.01	.14	.25	.02	.06	.07	.14	.01	.05	.02	.06
Fruits and vegetables	1.10	.95	.03	.13	.03	.11	.42	.42	.09	.18	.49	.44	.04	.14
Fruits	.62	.66	.03	.13	.03	.10	.21	.26	.08	.17	.23	.29	.04	.14
Vegetables	.48	.46	.00	.01	.00	.03	.21	.26	.01	.04	.25	.26	.00	.02
Meat, fish, eggs and legumes	1.18	.53	.01	.06	.01	.05	.54	.32	.01	.05	.60	.32	.01	.05
Meat	.90	.46	.00	.05	.01	.05	.43	.29	.01	.05	.44	.27	.01	.04
Fish	.15	.18	.00	.01	.00	.00	.06	.10	.00	.01	.09	.15	.00	.01
Eggs	.09	.15	.00	.03	.00	.02	.03	.08	.00	.00	.05	.10	.00	.01
Legumes	.05	.11	.00	.00	.00	.00	.02	.06	.00	.01	.02	.08	.00	.01
Milk and dairy products	1.00	.62	.62	.42	.02	.12	.13	.17	.06	.15	.15	.21	.02	.10
Sweet products and substitutes	1.54	.86	.58	.41	.30	.35	.08	.14	.32	.30	.09	.17	.17	.25
Biscuits	.39	.41	.27	.33	.03	.11	.00	.03	.06	.13	.01	.03	.01	.06
Candies and gums	.11	.21	.00	.01	.01	.04	.00	.01	.01	.05	.00	.03	.08	.19
Chocolates	.17	.27	.04	.16	.03	.10	.01	.06	.06	.12	.01	.06	.02	.08
Ice cream	.06	.14	.00	.01	.00	.00	.02	.05	.01	.06	.02	.06	.01	.06
Other packaged snacks	.53	.56	.15	.27	.21	.32	.01	.04	.13	.21	.01	.05	.02	.08
Other sweet products	.29	.39	.11	.25	.03	.10	.04	.10	.04	.10	.05	.11	.01	.05
Other beverages	1.12	.84	.29	.36	.20	.30	.16	.24	.19	.24	.18	.24	.10	.20
Coffee, tea, herbal tea and substitutes	.36	.49	.14	.29	.07	.18	.03	.11	.07	.15	.02	.09	.03	.09
Chocolate beverages	.13	.29	.10	.25	.00	.05	.00	.01	.02	.06	.00	.01	.00	.03
Fruit juices	.28	.42	.04	.15	.12	.25	.02	.07	.06	.15	.01	.06	.02	.08
Soft drinks	.35	.45	.00	.04	.01	.05	.12	.20	.04	.10	.14	.21	.04	.12
Water	1.54	.88	.05	.17	.11	.21	.62	.33	.11	.19	.54	.32	.12	.24
Oils and fats	.07	.17	.00	.04	.00	.00	.03	.11	.00	.03	.02	.08	.00	.01
Miscellaneous	.02	.07	.00	.02	.00	.00	.01	.04	.00	.00	.01	.05	.00	.01

^a'Extra Snack' column reports answers to two questions printed at the end of each day of the 7-DFR: “Did you eat anything else during the day?” and “Did you drink anything else during the day?”

Table 6. Percentage of consumers throughout the day and by meal in students participating at the “Project AlimentAzione”

	All day	Break-fast	Morning snack	Lunch	Afternoon snack	Dinner	Extra snack ^a
	%	%	%	%	%	%	%
<i>Grains, grain products and tubers</i>	100	52	70	100	68	100	21
Breakfast cereals	30	27	1	0	5	1	1
Pasta and rice	100	1	3	99	4	97	3
Bread and substitutes	79	26	34	45	31	34	6
Sandwiches	60	4	13	34	15	19	2
Pizza	79	2	15	41	17	48	3
Wheat, other cereals and flours	8	1	3	1	1	2	1
Potatoes, tubers and their products	64	0	1	40	2	44	1
<i>Fruits and vegetables</i>	92	9	12	74	30	81	13
Fruits	78	9	11	53	27	56	11
Vegetables	76	0	2	58	3	64	2
<i>Meat, fish, eggs and legumes</i>	100	3	7	93	6	96	3
Meat	99	1	6	88	5	93	3
Fish	54	0	0	29	0	37	0
Eggs	37	2	1	18	0	24	0
Legumes	19	0	0	12	0	11	0
<i>Milk and dairy products</i>	95	79	7	47	21	47	7
<i>Sweet products and substitutes</i>	99	85	59	35	72	32	43
Biscuits	66	53	12	3	24	3	5
Candies and gums	30	1	3	0	7	1	24
Chocolates	46	12	11	5	24	6	12
Ice cream	23	0	0	9	7	9	4
Other packaged snacks	75	36	44	4	40	3	10
Other sweet products	59	27	10	21	19	20	8
<i>Other beverages</i>	93	54	40	45	56	53	29
Coffee, tea, herbal tea and substitutes	54	28	19	8	23	9	11
Chocolate beverages	29	22	1	0	11	1	2
Fruit juices	51	13	26	7	22	6	11
Soft drinks	66	1	3	37	18	46	17
<i>Water</i>	95	11	29	91	36	87	28
<i>Oils and fats</i>	21	2	0	13	2	9	0
<i>Miscellaneous</i>	9	1	0	4	0	4	0

^a ‘Extra Snack’ column reports answers to two questions printed at the end of each day of the 7-DFR: “Did you eat anything else during the day?” and “Did you drink anything else during the day?”

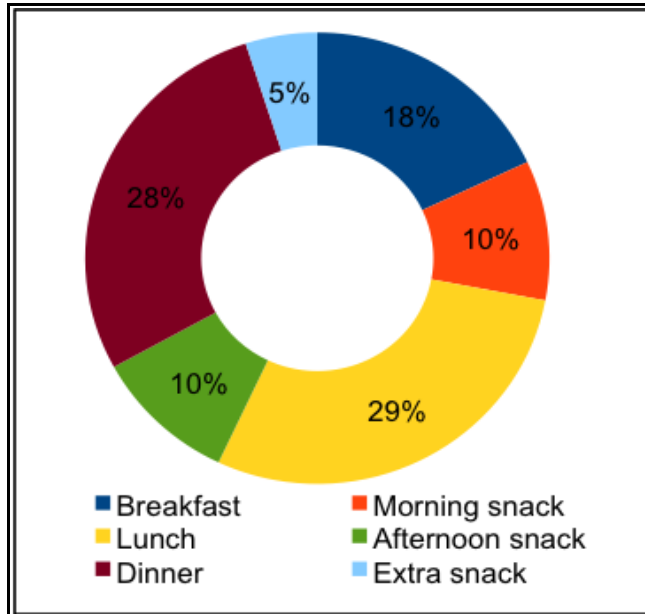


Figure 2. Overall daily intake frequency by meal

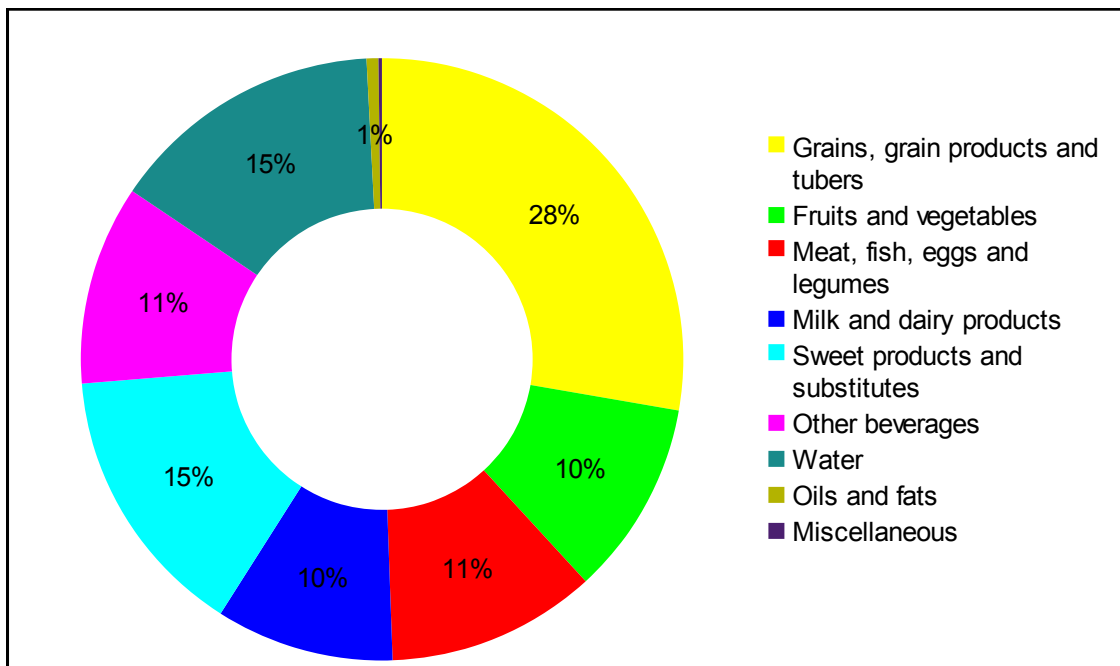


Figure 3. Overall daily intake frequency by food and drink category

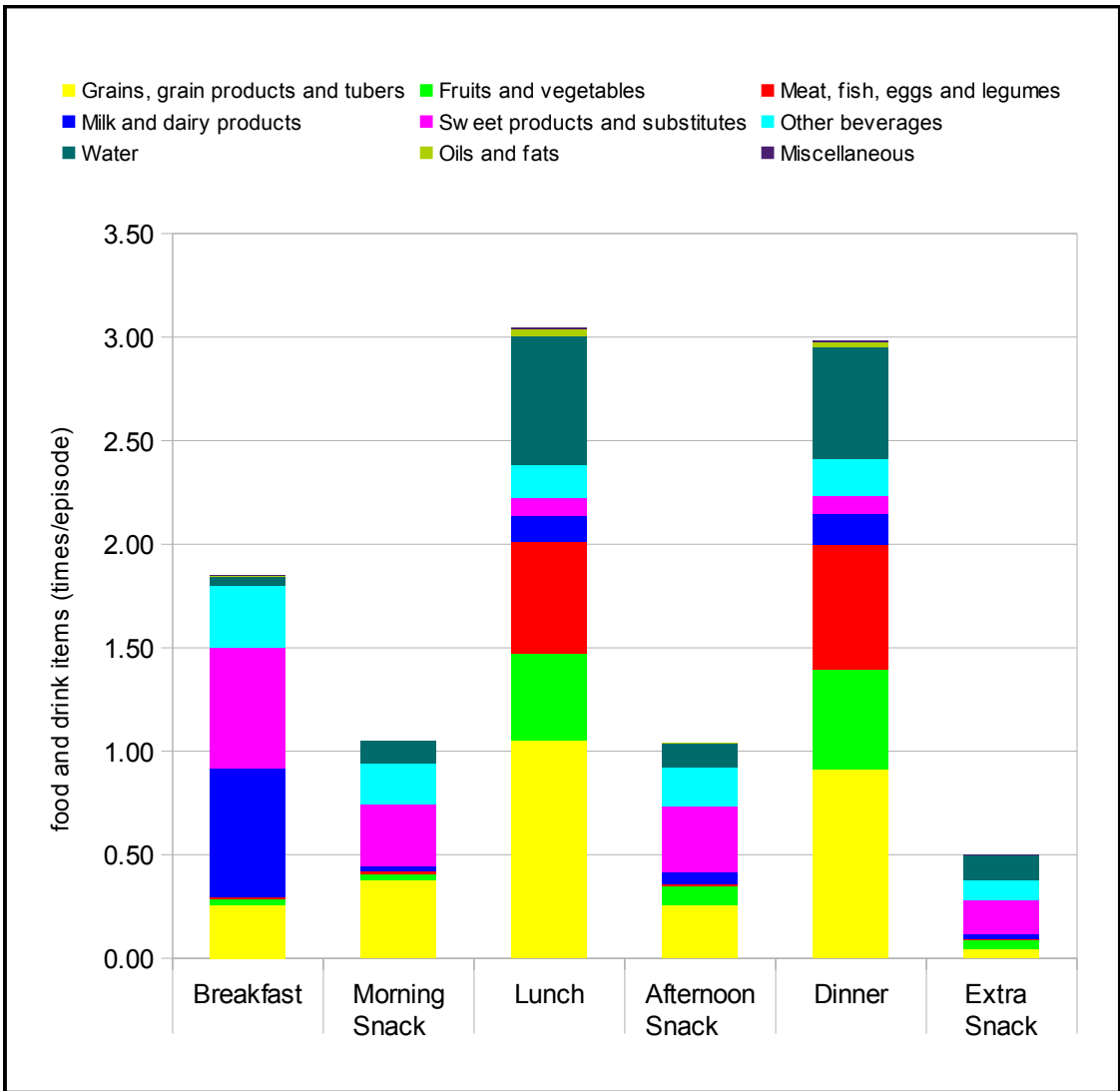


Figure 4. Overall daily intake frequency by meal and by food and drink category

Discussion

The purpose of the study was to investigate the dietary patterns of first and second year middle school students within Milan and its province. The “*Project AlimentAzione*” was a large study involving five middle schools of Milan and its province and five to seven classes in each school, resulting in 29 classes and 644 students. Humans eat foods in meals. Yet, there is very little information on how children (or adults) are eating in terms of meals and patterns. Hence the importance of investigating what middle school children were eating (in particular, their *patterns* of eating) not just a list of foods and how much, nor just calculating the amounts of nutrients in their diets.

Intake frequency by day of foods and drinks showed that the intake of *Grains, grain products and substitutes, Fruit and vegetables, Fish, Legumes, Wholegrain and Water* were lower than the recommended intakes for this age population and that the intake of *Meat (especially Red meat and Preserved meat products), Sweets products and substitutes (especially Other packaged snacks) and Other beverages (especially Soft drinks)* were higher than maximum recommended amounts for children ⁽⁷⁵⁾.

According to the “*Pyramid of the modern Mediterranean diet*”, presented by CIISCAN and INRAN in 2009 ⁽⁷⁶⁾, the intake of Red meat and Sweet products and substitutes should be lower than twice a week while they were $.44 \pm .31$ times/day and $1.54 \pm .86$ times/day respectively; the recommendations for the intake of Preserved meat products is less than once a week but was $.26 \pm .27$ times/day (almost twice a week) in the observed students. As suggested in the “*Pyramid of the modern Mediterranean diet*” the intake of Fish and the intake of Legumes should both be higher or equal to twice a week but were $.15 \pm .18$ times/day for Fish (about once a week) and $.05 \pm .11$ times/day for Legumes (about once every two weeks).

According to national guidelines for adolescents ⁽⁷⁵⁾, consumption of two portions of vegetables and three to four portions of fruit or fruit juice is suggested while in the observed students the intake of fruit was $.62 \pm .66$ times/day and the intake of vegetables was $.48 \pm .46$ times/day. Although in US french fries and tomato sauce over pizza are still counted as vegetables, the USDA guidelines are commonly used to compare consumption data with recommendations ^(9,77). These Guidelines recently moved from the concept of the pyramid to that of the plate: the latest USDA guidelines ⁽⁷⁸⁾ suggest making half of your plate consist of fruits and vegetables while the intake of fruit and vegetables in the observed students was only 10% of foods and drinks consumed throughout the day.

It seems remarkable that the category *Fruit and vegetables* didn't include the fruit and vegetables consumed through Fruit juices, Pasta with vegetables and Pasta with tomato sauce: these sub-categories were grouped in other food and drink categories (Fruit juice in *Other beverages* Pasta with vegetables and Pasta with tomato sauce in *Grains, grain products and substitutes*). Similarly, the Meat, fish, eggs and legumes may be underestimated due to the exclusion of the meat consumed in the sub-categories Pasta and rice with meat sauce, Sandwiches and Pizza, all three included in the category

Grains, grain products and substitutes.

Fruit and vegetables category had the highest standard deviation of all food and drink categories showing the high variability of this food group in students' diet: it is reasonable to assume that some students eat fruit and vegetable twice or more a day while some other students do not eat any food from this category, or a very little amount. The intake frequency for the category Oils and fats was extremely lower than expected; it seems reasonable to assume that real students intake of Oils and fats was way higher than what was reported for the category Oils and fats, due to the wide-spread use of oils and fats in the preparation of mixed dishes.

Intake frequency by meal (breakfast, lunch and dinner) highlighted many interesting patterns of food and drink intake and some protective characteristics of these meal structures.

The investigated breakfast dietary patterns highlighted the importance of breakfast in the daily pattern of intake (18% of foods and drinks consumed throughout the day) and the foods and drinks consumed at breakfast: a good intake of *Milk and dairy products* (34% of breakfast intake), a high intake of *Sweets products and substitutes* (32% of breakfast intake), an high intake of Other beverages (16% of breakfast intake) and a low intake Grains, grain products and substitutes (14% of breakfast intake). As defined in a study by Giovannini and colleagues, the authors examined the relationship between foods and drinks consumed at breakfast and obesity and concluded that the ideal breakfast should include: (i) Milk and milk derived products (low fat), (ii) Cereals (preferably whole grains, unrefined) and (iii) Fruit (fresh fruit or natural juice, no sugar) ⁽⁷⁹⁾. Unfortunately, our findings from the breakfast patterns of our sample indicate a limited adherence to this ideal: only 9% of students consumed fruit at breakfast at least once in the 7-DFR. The choice to include the sub-category Biscuits in the category *Sweets products and substitutes* instead of the category *Grains, grain products and substitutes*, consistent with other studies in Italy ⁽⁶⁾, may lead to an overestimation of sweets intake, in particular at breakfast where Biscuit represented about 16% of foods and drinks consumed at breakfast.

Lunch and dinner dietary patterns showed their central role in the daily pattern of consumption (29% and 28% of foods and drinks consumed throughout the day respectively) and the variety of foods consumed during main meals: a good intake of grains (30%), a good intake of proteins from the category meat, fish, eggs and legumes (about 19%), a good intake of dairy products (about 5%), few fruit and vegetables (about 15%) and a good consumption of water (about 19%).

Although the variety and healthiness of these dietary patterns, the intake of Red Meat and Preserved meat products ($\frac{3}{4}$ of *Meat, fish, eggs and legumes* at main meals) and the consumption of soft drinks ($\frac{3}{4}$ of *Other beverages* at main meals) generate concerns about the high intake of saturated fats, proteins and sugars in the observed students diets. The author would like to underline that the intake of water at lunch and dinner was higher than the intake of *Other beverages*.

Intake frequency of snacks (morning snack, afternoon snack and extra snack)

underlined the importance of these 'meals' on the provision of unhealthy foods and drinks to student's diet. Although the intake at snacks was 'just' ¼ of daily intake, the intake Salty snacks, the intake of Other packaged snacks (¾ of *Sweet products and substitutes* at morning snack), the consumption of Soft drinks (¾ of *Other beverages* at main meals) and the low consumption of Fruit and vegetables generate concerns about the high intake of saturated fats and sugars and the low intake of fiber, vitamins and minerals in the average diet. As opposed to lunch and dinner, the intake of water at snacks was lower than the intake of *Other beverages* at snacks.

Dietary patterns at morning snack (10% of foods and drinks consumed throughout the day) showed a high intake of *Sweet products and substitutes* (32% of morning snack intake) and of *Other beverages* (19%), a good intake of *Grains, grain products and substitutes* (36%), a low intake of *Milk and dairy products* (2%), *Fruit and vegetables* (3%), and Water (10%).

Dietary patterns at afternoon snack (10% of foods and drinks consumed throughout the day) showed a high intake of *Sweet products and substitutes* (31% of morning snack intake), a high intake of *Other beverages* (18%), a moderate intake of *Grains, grain products and substitutes* (25%), a low intake of *Fruit and vegetables* (9%), a low intake of *Milk and dairy products* (6%) and a low intake of Water (11%).

Dietary patterns at extra snack (5% of foods and drinks consumed throughout the day) showed a high intake of *Sweet products and substitutes* (34% of extra snack intake), a high intake of *Other beverages* (20%), a moderate intake of *Grains, grain products and substitutes* (10%), a low intake of *Fruit and vegetables* (8%), a low intake of *Milk and dairy products* (4%), and a modest intake of Water (24%).

The percent of students who consumed a certain food or drink by meal and snack showed trends consistent with the intake frequency trends; these results are consistent with the findings from other studies among children and adolescents in Italy (6,8,80-82) and the rest of Europe (11,12,14,80). In particular, the percent of students who consumed certain food or drink sub-categories, represents students' preference for various foods and drinks: the relatively high percentages of students consuming Other packaged snacks in the category *Sweet products and substitutes* and Soft drinks in the category *Other beverages* highlight the importance of taste (these products are commonly designed to target children's taste) together with massive television advertisements (these product are commonly the most advertised) on the dietary choices of students.

Students' overweight and obesity prevalence was lower than that reported by other authors in similar samples (81,82). This difference in the comparison with measured data reported in other studies may be due to the underestimation of weight and overestimation of height in self reported data (31,35). Student's BMI was positively correlated with both mother's and father's BMI and student's weight status was significantly related with both mother's and father's weight status confirming the assumption that parents' BMI and weight status are two of the main mediators (determinants) of students BMI. Student's weight status was significantly related to their father's educational level but the relationship with their mother's educational level was

not significant: other studies evaluated parents' educational level and its relationship with family income. These studies found that the father's educational level is a better predictor of family income than the mother's educational level; therefore our findings highlight the importance of the fathers' educational level and indirectly of family income as a predictor of child and adolescent overweight and obesity.

The study has many strengths. First, the sample collection method provided a representative sample of first and second year middle school students from Milan and its province. Second, the instrument used to collect students frequency of intake by day, by meal and by snack, is a gold standard method to assess food and drink intake. Third, the web-based data entry method allowed students to enter their dietary data relatively quickly and accurately. Fourth, the collection of extensive information on family food habits from students and from parents through parallel questionnaires ⁽¹⁵⁾ was fundamental to put dietary patterns findings from this research into context. Fifth, the study of the dietary patterns by 9 food and drink categories and 51 food and drinks sub-categories required an enormous amount of work but provided a detailed description of foods and drinks consumed by the observed students.

The study also has some limitations. First, the self-report was selected as the method for assessing dietary and physical activity behaviors and psychosocial variables, because of its ease of use with middle school students. This is the standard method used in almost all school-based interventions, but this limitation should be kept in mind. Second, the portion sizes of foods and drinks consumed were collected but not analyzed, due to inconsistency and to a large volume of missing data. This exclusion resulted in the quantification of intake frequencies (times per day a certain food or drink is consumed) rather than weight of food consumed (grams or milliliters per day) or servings (servings per day). Although the intake frequency of a certain food or drink is related to its consumption ⁽¹³⁾, the exclusion to the analysis of portion size information make difficult to compare the findings from this study to the ones from other studies (frequently reported as grams or servings per day).

Conclusions

In conclusion, consistent with other studies ^(6,9), the dietary patterns of the observed students show that certain characteristics of the Mediterranean diet as a good intake of complex carbohydrates are confirmed while other characteristics as a low consumption of meat, saturated fats and sugars and a high consumption of fruit and vegetables, whole grains, fish and legumes are being lost. The findings from our students from Milan and its province show that the influence of these trends in children and adolescents dietary patterns justify the increasing concerns on future public health and underline the urgent need for nutrition education interventions, even where a strong food culture (the traditionally healthy Mediterranean lifestyle) should have protected youth dietary patterns from the developing *obesogenic* environment our societies are facing nowadays.

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APPENDIX

Table 7. Intake frequency throughout the day and by meal in students participating at the “Project AlimentAzione

	Total sample		n	Consumers ^a		SD
	Mean	SD		%	Mean	
Grains, grain products and tubers	2.90	.82	351	100	2.90	.82
Breakfast cereals	.15	.29	106	30	.49	.32
Breakfast cereals	.08	.20	69	20	.39	.28
Breakfast cereals with chocolate	.07	.21	55	16	.46	.32
Pasta and rice dishes	1.22	.40	351	100	1.22	.40
Pasta and rice dishes with veg. and/or legumes	.13	.18	167	48	.27	.16
Pasta and rice dishes with meat	.17	.18	209	60	.29	.15
Pasta and rice dishes with tomato sauce	.22	.24	227	65	.35	.22
Other pasta and rice dishes	.69	.42	346	99	.70	.41
Bread and substitutes	.52	.48	277	79	.66	.45
Bread	.34	.37	245	70	.49	.36
Crackers, breadsticks and other substitutes	.16	.27	144	41	.39	.28
Wholegrain bread and substitutes	.02	.10	20	6	.33	.25
Sandwiches	.23	.29	212	60	.38	.29
Sandwiches with preserved meat and/or cheese	.14	.23	144	41	.34	.24
Other sandwiches	.07	.17	87	25	.28	.23
Fast food Sandwiches	.02	.09	28	8	.26	.17
Pizza	.30	.28	278	79	.38	.26
Wheat, other cereals and flours	.02	.10	28	8	.31	.20
Potatoes, tubers and their products	.20	.20	224	64	.31	.17
French fries	.07	.12	112	32	.22	.12
Potatoes and other tubers	.13	.16	172	49	.26	.12
Salty snacks	.26	.33	205	58	.45	.33
Fruit and vegetables	1.10	.95	322	92	1.19	.93
Fruit	.62	.66	273	78	.79	.64
Fresh fruits	.59	.64	259	74	.80	.63
Nuts, olives and their products, dried fruits	.03	.08	50	14	.20	.09
Vegetables	.48	.46	268	76	.63	.43
Fresh and frozen vegetables	.48	.46	268	76	.62	.42
Vegetables, processed	.00	.03	5	1	.20	.13
Meat, fish, eggs and legumes	1.18	.53	350	100	1.18	.52
Meat	.90	.46	346	99	.91	.45
Red meat	.44	.31	313	89	.49	.29
White meat	.20	.21	231	66	.31	.19
Preserved products	.26	.27	239	68	.38	.25
Fish	.15	.18	188	54	.27	.15
Fish, seafood, fresh and frozen	.12	.16	170	48	.25	.14
Fish and seafood preserved	.03	.07	46	13	.19	.09
Eggs	.09	.15	131	37	.23	.16
Legumes	.05	.11	67	19	.24	.15
Milk and dairy products	1.00	.62	332	95	1.06	.59
Milk	.66	.47	283	81	.82	.37
Yogurt	.09	.20	95	27	.33	.25
Cream	.01	.05	29	8	.18	.08
Cheese and substitutes	.24	.29	219	62	.38	.28
Sweet products and substitutes	1.54	.86	347	99	1.56	.85
Biscuits	.39	.41	230	66	.59	.37
Candies and gums	.11	.21	107	30	.35	.25
Chocolates	.17	.27	162	46	.37	.29
Ice cream	.06	.14	81	23	.24	.18
Other packaged snacks	.53	.56	265	75	.70	.54
Other sweet products	.29	.39	208	59	.48	.40
Other beverages	1.12	.84	328	93	1.20	.81
Coffee, tea, herbal tea and substitutes	.36	.49	189	54	.67	.50
Chocolate beverages	.13	.29	103	29	.46	.37
Fruit juices	.28	.42	179	51	.55	.44
Soft drinks	.35	.45	231	66	.53	.47
Water	1.54	.88	333	95	1.63	.83
Oils and fats	.07	.17	73	21	.32	.25
Miscellaneous	.02	.07	31	9	.22	.13

^a Students who reported a consumption of at least once in the 7-Day Food Record are considered consumers of that food category

Table 8. Intake frequency throughout the day and by meal in students participating at the “Project AlimentAzione

Food categories and sub-categories	All day		Breakfast		Morning snack		Lunch		Afternoon snack		Dinner		Extra snack ^a	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Grains, grain products and tubers	2.90	.82	.26	.34	.38	.36	1.05	.33	.26	.26	.91	.29	.05	.11
Breakfast cereals	.15	.29	.13	.26	.00	.01	.00	.00	.01	.06	.00	.02	.00	.01
Breakfast cereals	.08	.20	.07	.18	.00	.00	.00	.00	.01	.05	.00	.01	.00	.01
Breakfast cereals with chocolate	.07	.21	.07	.20	.00	.01	.00	.00	.00	.03	.00	.02	.00	.00
Pasta and rice	1.22	.40	.00	.05	.01	.03	.63	.26	.01	.05	.56	.26	.00	.03
Pasta and rice dishes with veg. and/or legumes	.13	.18	.00	.00	.00	.01	.05	.10	.00	.02	.08	.12	.00	.00
Pasta and rice dishes with meat	.17	.18	.00	.00	.00	.01	.10	.13	.00	.02	.07	.11	.00	.02
Pasta and rice dishes with tomato sauce	.22	.24	.00	.00	.00	.02	.13	.17	.00	.01	.09	.14	.00	.01
Other pasta and rice dishes	.69	.42	.00	.05	.00	.02	.35	.25	.01	.05	.32	.25	.00	.02
Bread and substitutes	.52	.48	.10	.21	.13	.23	.13	.19	.07	.13	.08	.15	.01	.05
Bread	.34	.37	.06	.18	.02	.10	.12	.18	.04	.10	.08	.14	.01	.04
Crackers, breadsticks and other substitutes	.16	.27	.03	.11	.10	.20	.01	.04	.03	.08	.00	.02	.00	.02
Wholegrain bread and substitutes	.02	.10	.01	.05	.01	.07	.00	.02	.00	.02	.00	.01	.00	.01
Sandwiches	.23	.29	.01	.09	.04	.12	.09	.15	.04	.13	.04	.09	.00	.04
Sandwiches with preserved meat and/or cheese	.14	.23	.00	.02	.03	.10	.06	.13	.03	.11	.02	.06	.00	.01
Other sandwiches	.07	.17	.01	.08	.01	.04	.02	.07	.01	.07	.02	.06	.00	.02
Fast food Sandwiches	.02	.09	.00	.03	.00	.03	.01	.05	.00	.02	.00	.03	.00	.04
Pizza	.30	.28	.01	.05	.05	.15	.09	.12	.04	.11	.11	.13	.01	.04
Wheat, other cereals and flours	.02	.10	.00	.04	.01	.06	.00	.03	.00	.03	.00	.03	.00	.02
Potatoes, tubers and their products	.20	.20	.00	.00	.00	.02	.09	.14	.00	.02	.10	.13	.00	.02
French fries	.07	.12	.00	.00	.00	.02	.03	.08	.00	.02	.03	.07	.00	.01
Potatoes and other tubers	.13	.16	.00	.00	.00	.00	.06	.11	.00	.00	.07	.11	.00	.01
Salty snacks	.26	.33	.00	.01	.14	.25	.02	.06	.07	.14	.01	.05	.02	.06
Fruit and vegetables	1.10	.95	.03	.13	.03	.11	.42	.42	.09	.18	.49	.44	.04	.14
Fruit	.62	.66	.03	.13	.03	.10	.21	.26	.08	.17	.23	.29	.04	.14
Fresh fruit	.59	.64	.03	.13	.03	.10	.20	.26	.08	.17	.22	.28	.03	.14
Nuts, olives and their products, dried fruits	.03	.08	.00	.01	.00	.02	.01	.04	.01	.04	.01	.04	.00	.02
Vegetables	.48	.46	.00	.01	.00	.03	.21	.26	.01	.04	.25	.26	.00	.02
Fresh and frozen vegetables	.48	.46	.00	.01	.00	.03	.21	.26	.01	.04	.25	.26	.00	.02
Vegetables, processed	.00	.03	.00	.00	.00	.00	.00	.01	.00	.00	.00	.02	.00	.00

^a ‘Extra snack’ column reports answers to two questions printed at the end of each day of the 7-DFR: “Did you eat anything else during the day?” and “Did you drink anything else during the day”

Food categories and sub-categories	All day		Breakfast		Morning snack		Lunch		Afternoon snack		Dinner		Extra snack ^a	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Meat, fish, eggs and legumes</i>	1.18	.53	.01	.06	.01	.05	.54	.32	.01	.05	.60	.32	.01	.05
Meat	.90	.46	.00	.05	.01	.05	.43	.29	.01	.05	.44	.27	.01	.04
Red meat	.44	.31	.00	.00	.00	.02	.20	.21	.00	.02	.23	.20	.00	.02
White meat	.20	.21	.00	.00	.00	.02	.10	.14	.00	.02	.10	.14	.00	.01
Preserved products	.26	.27	.00	.05	.01	.04	.13	.17	.01	.03	.11	.17	.00	.03
Fish	.15	.18	.00	.01	.00	.00	.06	.10	.00	.01	.09	.15	.00	.01
Fish, seafood, fresh and frozen	.12	.16	.00	.01	.00	.00	.04	.08	.00	.00	.08	.13	.00	.01
Fish and seafood preserved	.03	.07	.00	.00	.00	.00	.01	.05	.00	.01	.01	.05	.00	.00
Eggs	.09	.15	.00	.03	.00	.02	.03	.08	.00	.00	.05	.10	.00	.01
Legumes	.05	.11	.00	.00	.00	.00	.02	.06	.00	.01	.02	.08	.00	.01
<i>Milk and dairy products</i>	1.00	.62	.62	.42	.02	.12	.13	.17	.06	.15	.15	.21	.02	.10
Milk	.66	.47	.59	.41	.00	.03	.00	.01	.03	.12	.01	.06	.02	.09
Yogurt	.09	.20	.03	.12	.02	.11	.01	.05	.02	.09	.01	.05	.00	.03
Cream	.01	.05	.00	.01	.00	.00	.01	.04	.00	.01	.01	.03	.00	.00
Cheese and substitutes	.24	.29	.00	.03	.00	.03	.11	.16	.00	.02	.12	.19	.00	.02
<i>Sweet products and substitutes</i>	1.54	.86	.58	.41	.30	.35	.08	.14	.32	.30	.09	.17	.17	.25
Biscuits	.39	.41	.27	.33	.03	.11	.00	.03	.06	.13	.01	.03	.01	.06
Candies and gums	.11	.21	.00	.01	.01	.04	.00	.01	.01	.05	.00	.03	.08	.19
Chocolates	.17	.27	.04	.16	.03	.10	.01	.06	.06	.12	.01	.06	.02	.08
Ice cream	.06	.14	.00	.01	.00	.00	.02	.05	.01	.06	.02	.06	.01	.06
Other packaged snacks	.53	.56	.15	.27	.21	.32	.01	.04	.13	.21	.01	.05	.02	.08
Other sweet products	.29	.39	.11	.25	.03	.10	.04	.10	.04	.10	.05	.11	.01	.05
<i>Other beverages</i>	1.12	.84	.29	.36	.20	.30	.16	.24	.19	.24	.18	.24	.10	.20
Coffee, tea, herbal tea and substitutes	.36	.49	.14	.29	.07	.18	.03	.11	.07	.15	.02	.09	.03	.09
Chocolate beverages	.13	.29	.10	.25	.00	.05	.00	.01	.02	.06	.00	.01	.00	.03
Fruit juices	.28	.42	.04	.15	.12	.25	.02	.07	.06	.15	.01	.06	.02	.08
Soft drinks	.35	.45	.00	.04	.01	.05	.12	.20	.04	.10	.14	.21	.04	.12
<i>Water</i>	1.54	.88	.05	.17	.11	.21	.62	.33	.11	.19	.54	.32	.12	.24
<i>Oils and fats</i>	.07	.17	.00	.04	.00	.00	.03	.11	.00	.03	.02	.08	.00	.01
<i>Miscellaneous</i>	.02	.07	.00	.02	.00	.00	.01	.04	.00	.00	.01	.05	.00	.01

^a ‘Extra snack’ column reports answers to two questions printed at the end of each day of the 7-DFR: “Did you eat anything else during the day?” and “Did you drink anything else during the day”

Table 9. Percentage of consumers throughout the day and for different meal episodes in the total sample of students participating at the “Project AlimentAzione”

	All day	Break fast	Morning snack	Lunch	Afternoon snack	Dinner	Extra snack ^a
	%	%	%	%	%	%	%
Grains, grain products and tubers	100	52	70	100	68	100	21
Breakfast cereals	30	27	1	0	5	1	1
Breakfast cereals	20	17	0	0	3	1	1
Breakfast cereals with chocolate	16	14	1	0	2	1	0
Pasta and rice	100	1	3	99	4	97	3
Pasta and rice dishes with veg. and/or legumes	48	0	0	23	1	36	0
Pasta and rice dishes with meat	60	0	0	44	1	35	1
Pasta and rice dishes with tomato sauce	65	0	1	50	0	39	0
Other pasta and rice dishes	99	1	2	88	2	82	2
Bread and substitutes	79	26	34	45	31	34	6
Bread	70	18	8	42	19	32	5
Crackers, breadsticks and other substitutes	41	9	26	4	13	2	1
Wholegrain bread and substitutes	6	2	2	1	1	1	0
Sandwiches	60	4	13	34	15	19	2
Sandwiches with preserved meat and/or cheese	41	1	11	23	9	9	1
Other sandwiches	25	3	3	10	5	10	1
Fast food Sandwiches	8	0	1	4	1	3	1
Pizza	79	2	15	41	17	48	3
Wheat, other cereals and flours	8	1	3	1	1	2	1
Potatoes, tubers and their products	64	0	1	40	2	44	1
French fries	32	0	1	18	2	17	1
Potatoes and other tubers	49	0	0	28	0	34	0
Salty snacks	58	1	36	8	31	8	11
Fruits and vegetables	92	9	12	74	30	81	13
Fruits	78	9	11	53	27	56	11
Fresh fruits	74	9	11	51	25	54	10
Nuts, olives and their products, dried fruits	14	0	1	5	4	5	2
Vegetables	76	0	2	58	3	64	2
Fresh and frozen vegetables	76	0	2	58	3	64	2
Vegetables, processed	1	0	0	1	0	1	0
Meat, fish, eggs and legumes	100	3	7	93	6	96	3
Meat	99	1	6	88	5	93	3
Red meat	89	0	1	63	1	73	2
White meat	66	0	1	44	1	44	0
Preserved products	68	1	3	50	4	42	1
Fish	54	0	0	29	0	37	0
Fish, seafood, fresh and frozen	48	0	0	23	0	34	0
Fish and seafood preserved	13	0	0	9	0	5	0
Eggs	37	2	1	18	0	24	0
Legumes	19	0	0	12	0	11	0
Milk and dairy products	95	79	7	47	21	47	7
Milk	81	78	1	1	12	5	5
Yogurt	27	6	4	7	9	5	2
Cream	8	1	0	4	0	4	0
Cheese and substitutes	62	1	1	42	2	41	0
Sweet products and substitutes	99	85	59	35	72	32	43
Biscuits	66	53	12	3	24	3	5
Candies and gums	30	1	3	0	7	1	24
Chocolates	46	12	11	5	24	6	12
Ice cream	23	0	0	9	7	9	4
Other packaged snacks	75	36	44	4	40	3	10
Other sweet products	59	27	10	21	19	20	8
Other beverages	93	54	40	45	56	53	29
Coffee, tea, herbal tea and substitutes	54	28	19	8	23	9	11
Chocolate beverages	29	22	1	0	11	1	2
Fruit juices	51	13	26	7	22	6	11
Soft drinks	66	1	3	37	18	46	17
Water	95	11	29	91	36	87	28
Oils and fats	21	2	0	13	2	9	0
Miscellaneous	9	1	0	4	0	4	0

^a ‘Extra snack’ column reports answers to two questions printed at the end of each day of the 7-DFR: “Did you eat anything else during the day?” and “Did you drink anything else during the day?”

Figure 5. Dietary pattern at breakfast by food category

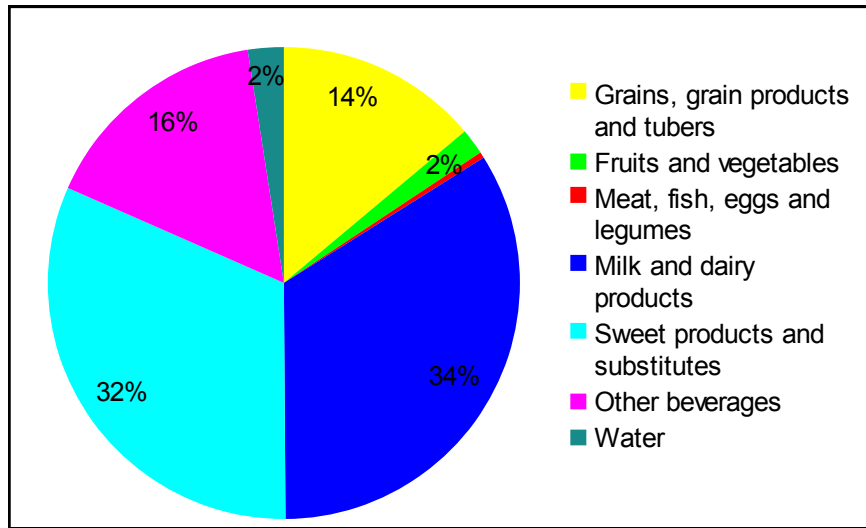


Figure 5.1. Grains, grain products and tubers at breakfast

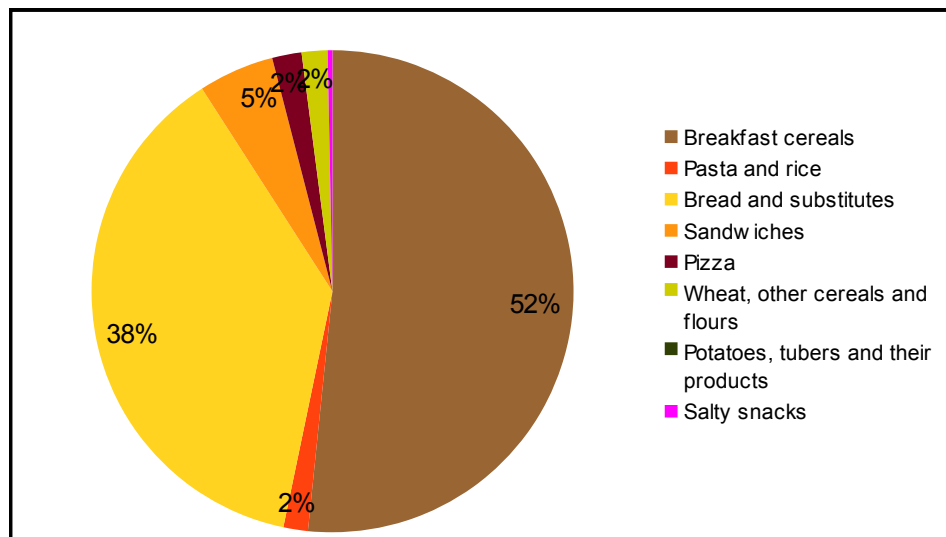


Figure 5.2. Milk and dairy products at breakfast

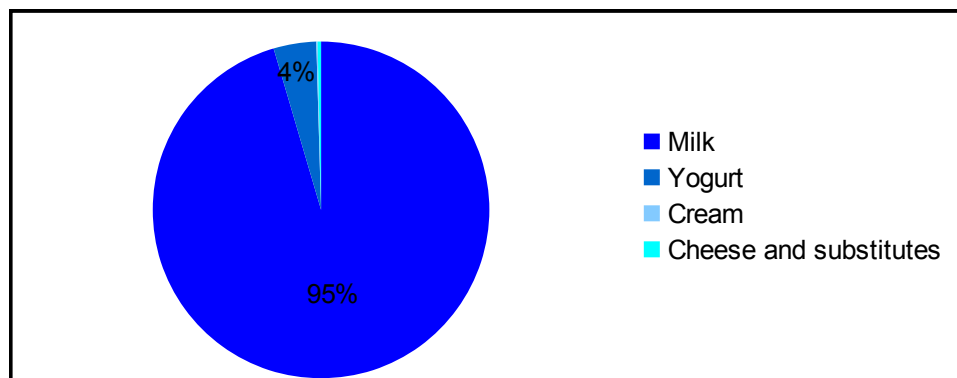


Figure 5.3. Sweet products and substitutes at breakfast

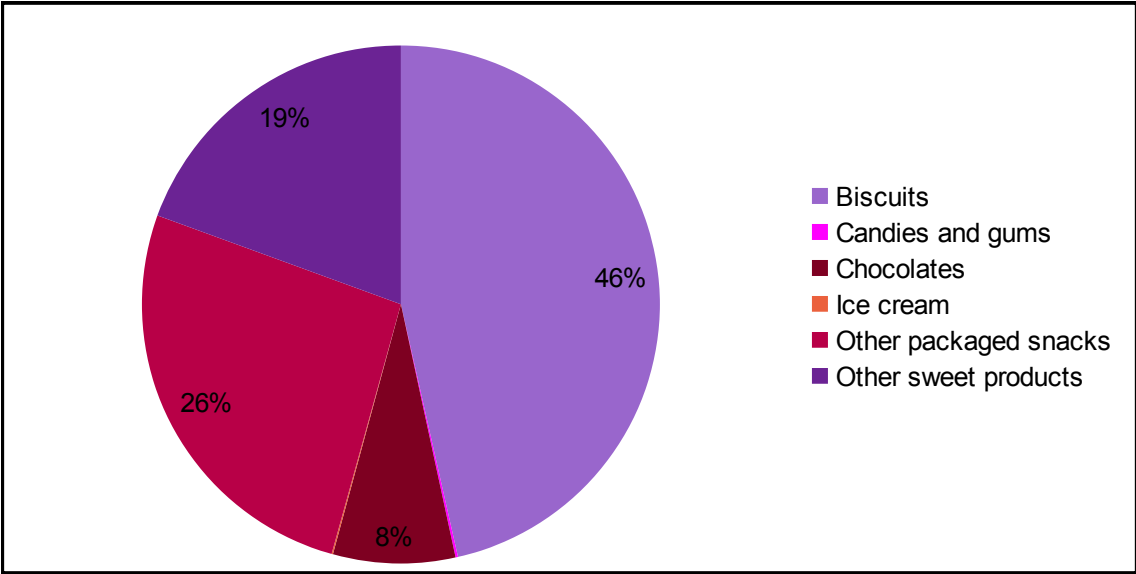


Figure 5.4. Other beverages at breakfast

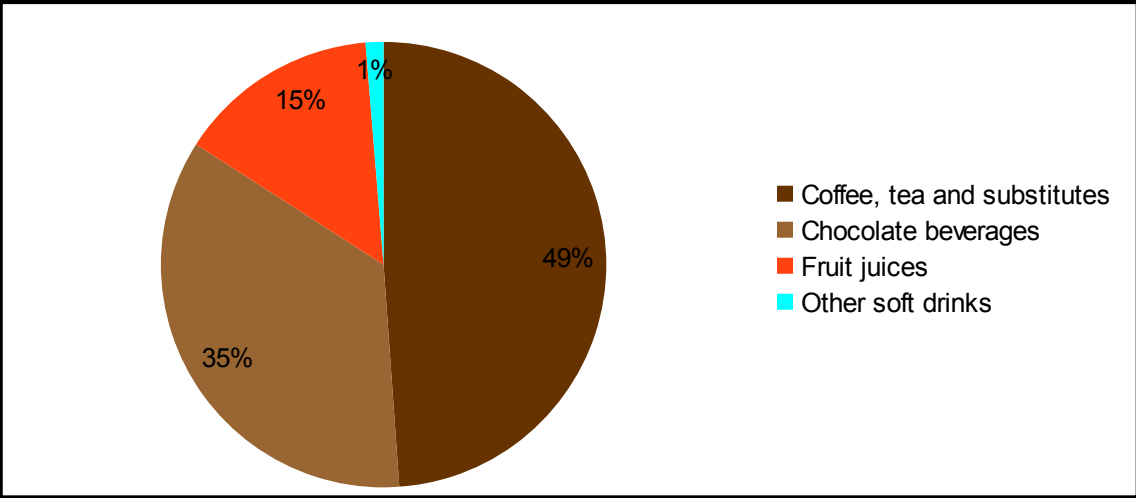


Figure 6. Food and drink pattern at morning snack by food category

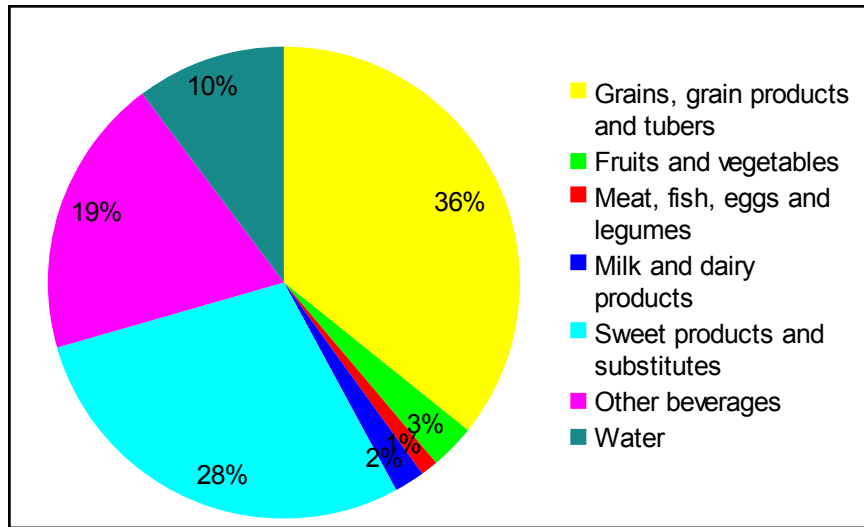


Figure 6.1. Grains, grain products and tubers at morning snack

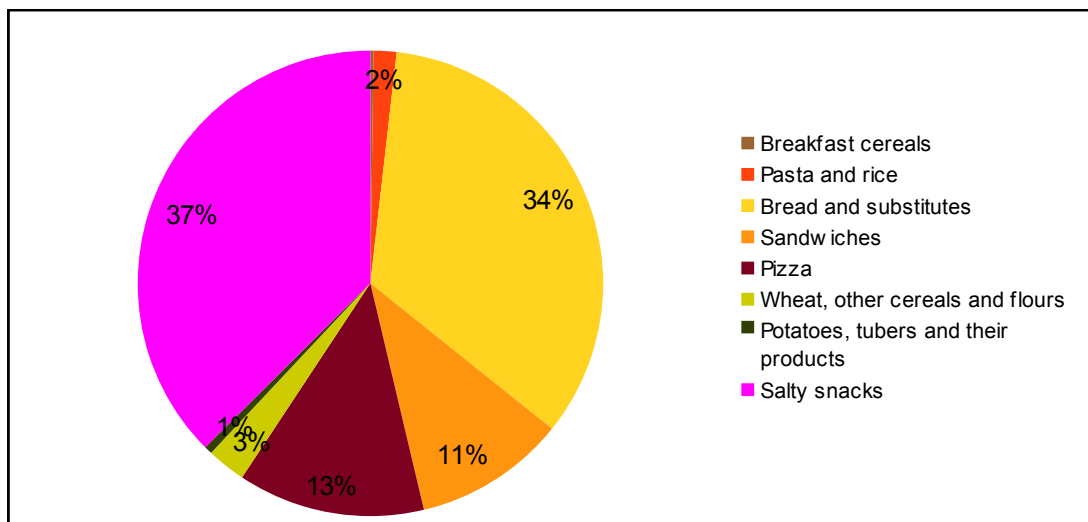


Figure 6.2. Fruit and vegetables at morning snack

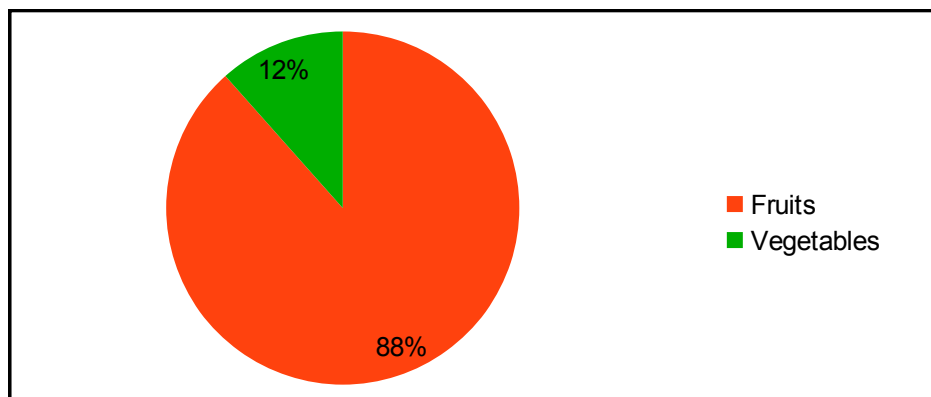


Figure 6.3. Sweet products and substitutes at morning snack

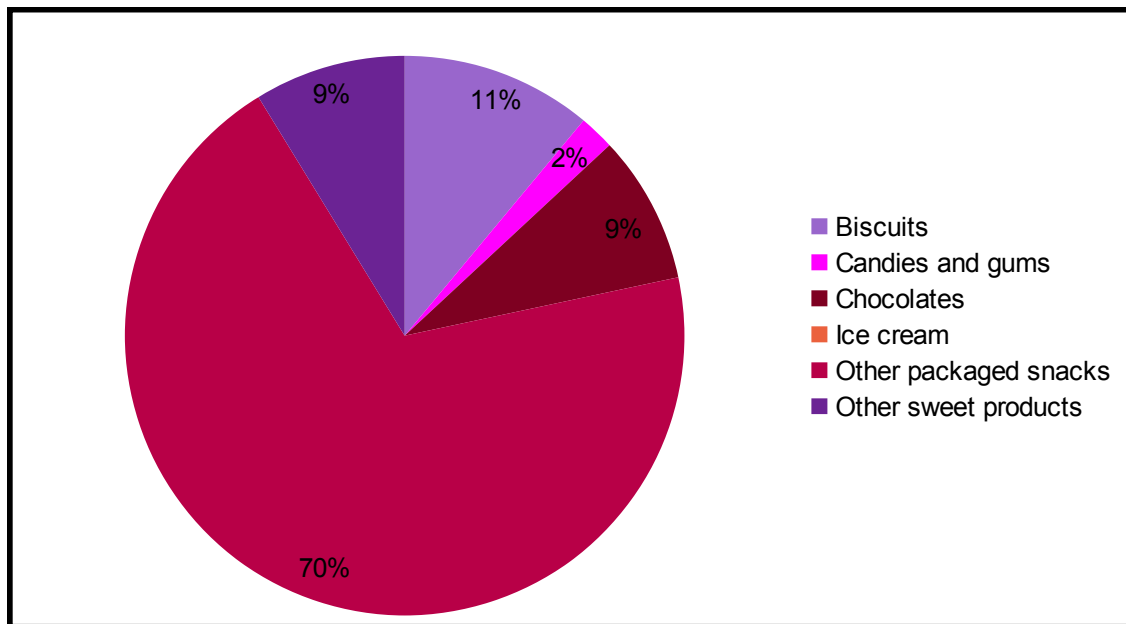


Figure 6.4. Other beverages at morning snack

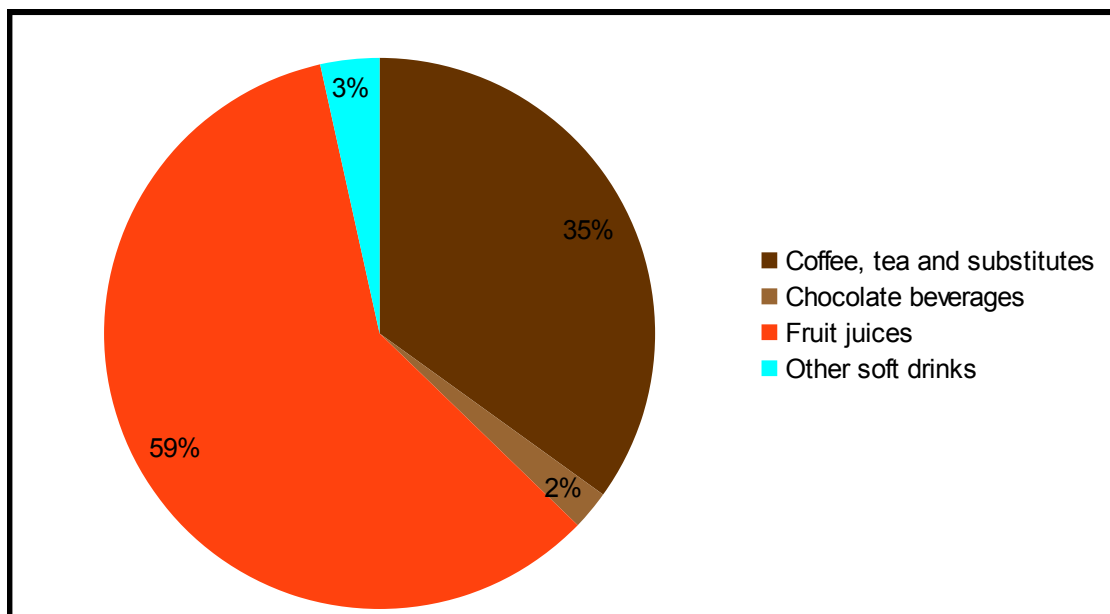


Figure 7. Dietary pattern at lunch by food category

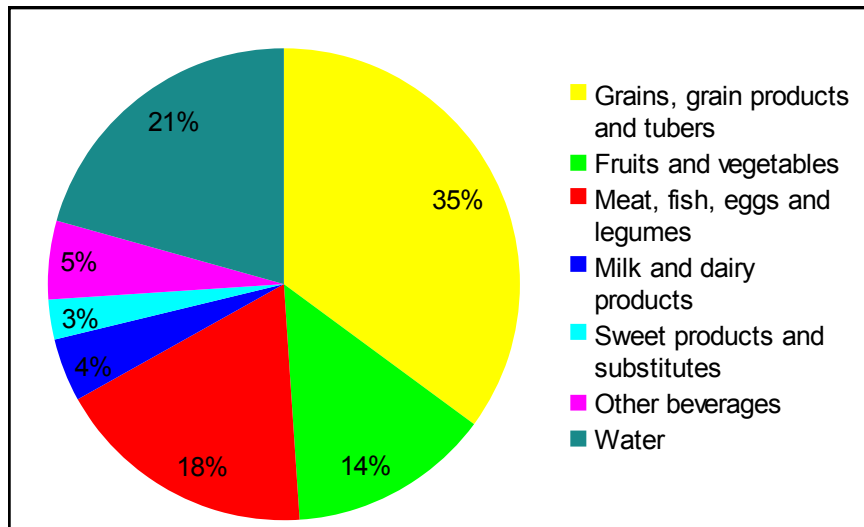


Figure 7.1. Grains, grain products and tubers at lunch

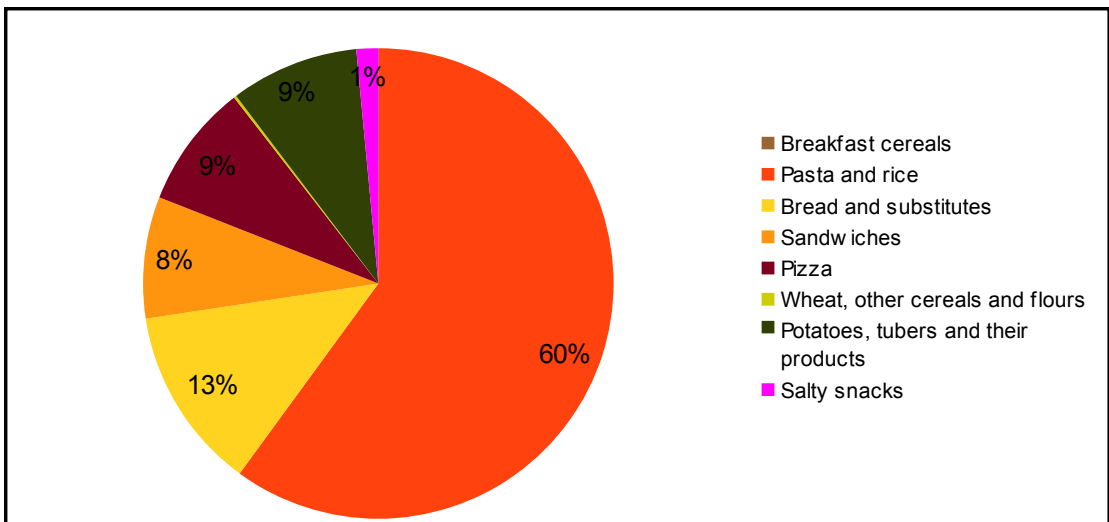


Figure 7.2. Fruit and vegetables at lunch

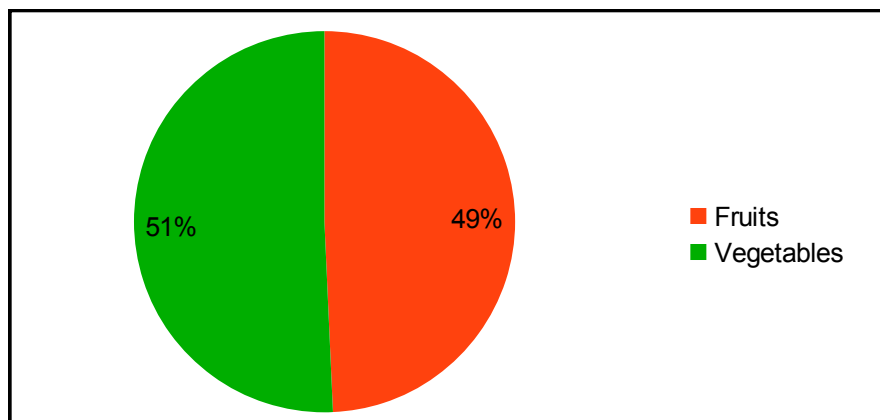


Figure 7.3. Meat, fish eggs and legumes at lunch

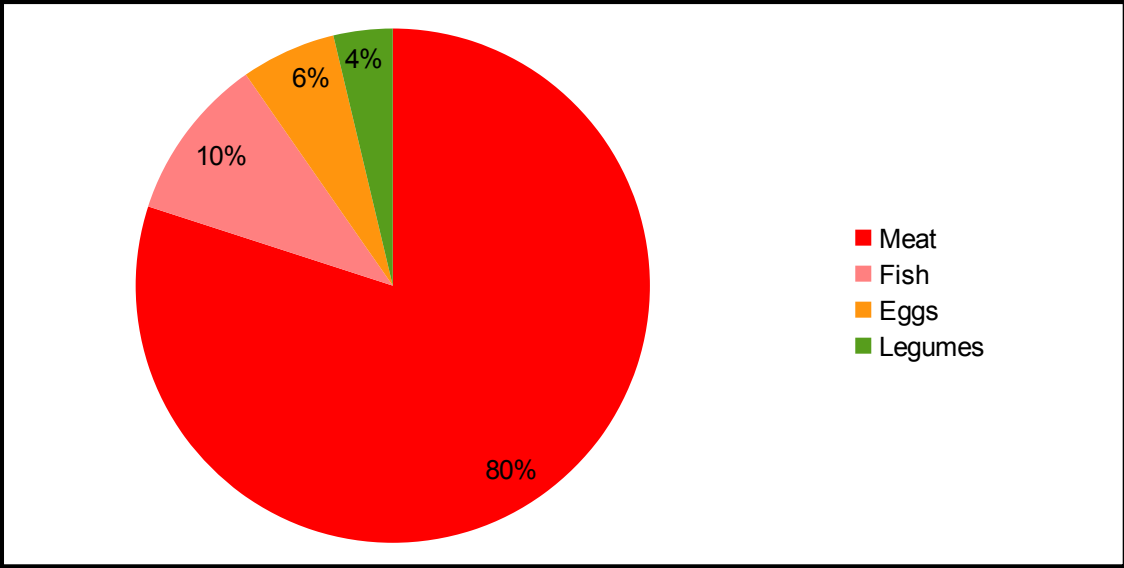


Figure 7.4. Milk and dairy products at lunch

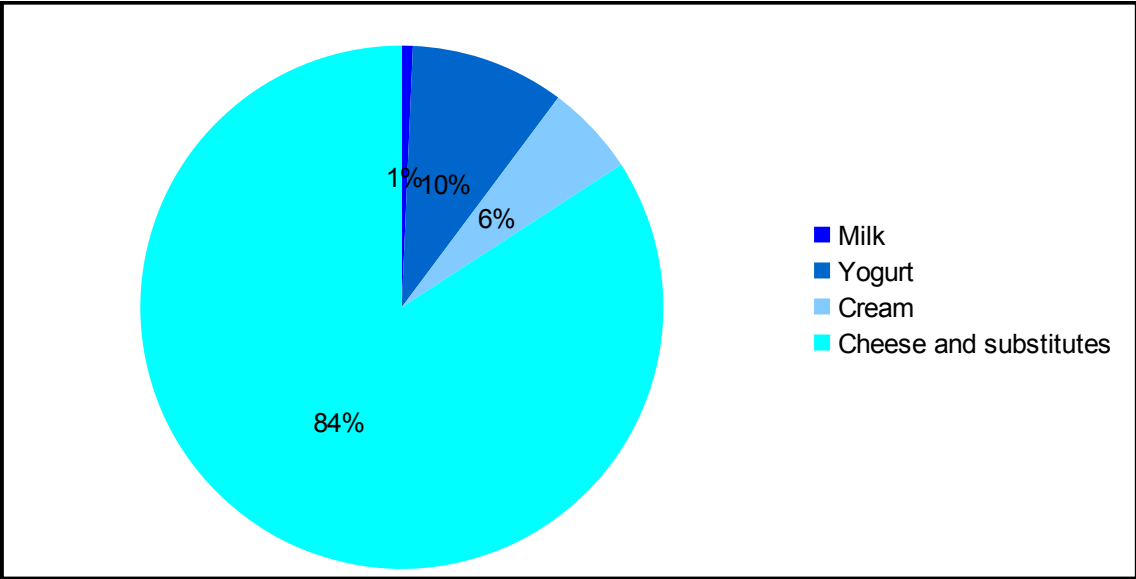


Figure 7.5. Sweet products and substitutes at lunch

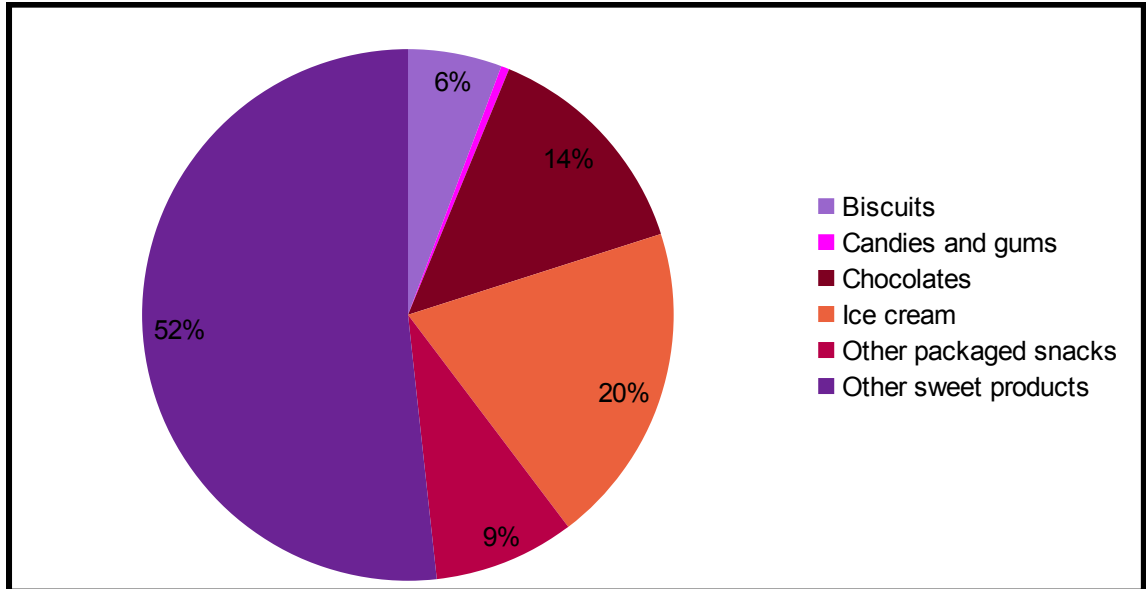


Figure 7.6. Other beverages at lunch

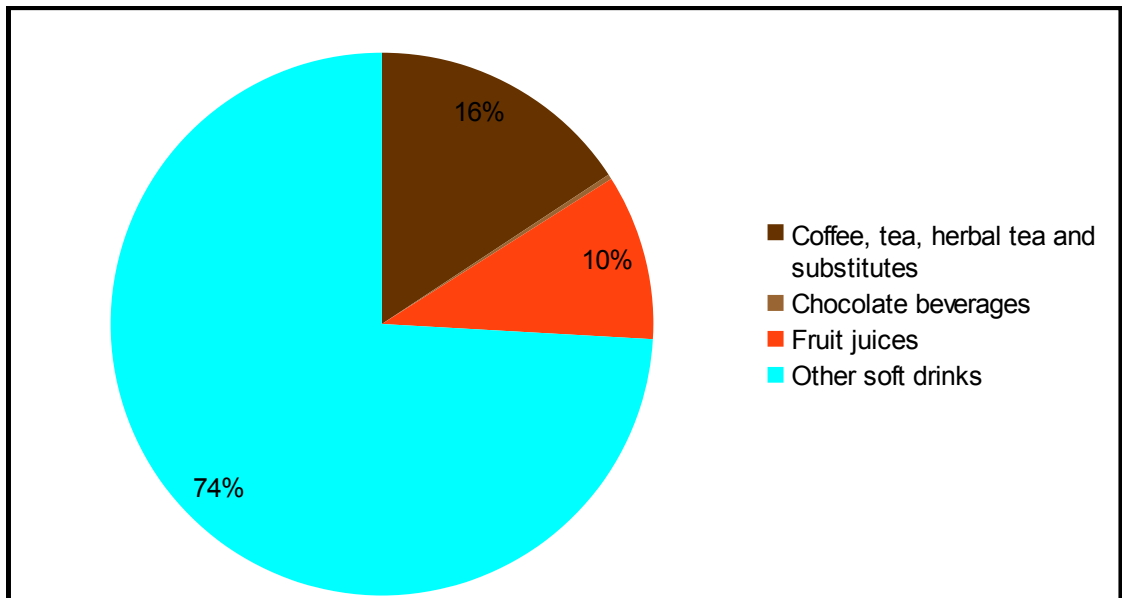


Figure 8. Food and drink pattern at afternoon snack by food category

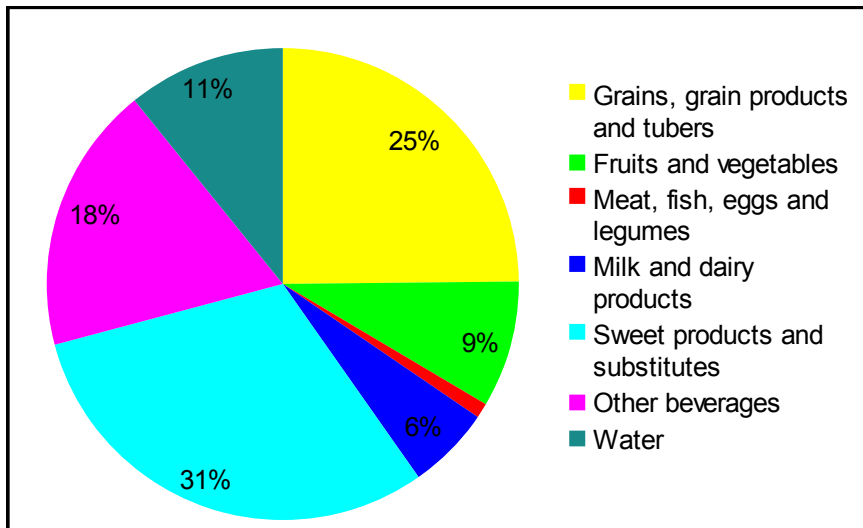


Figure 8.1. Grains, grain products and tubers at afternoon snack

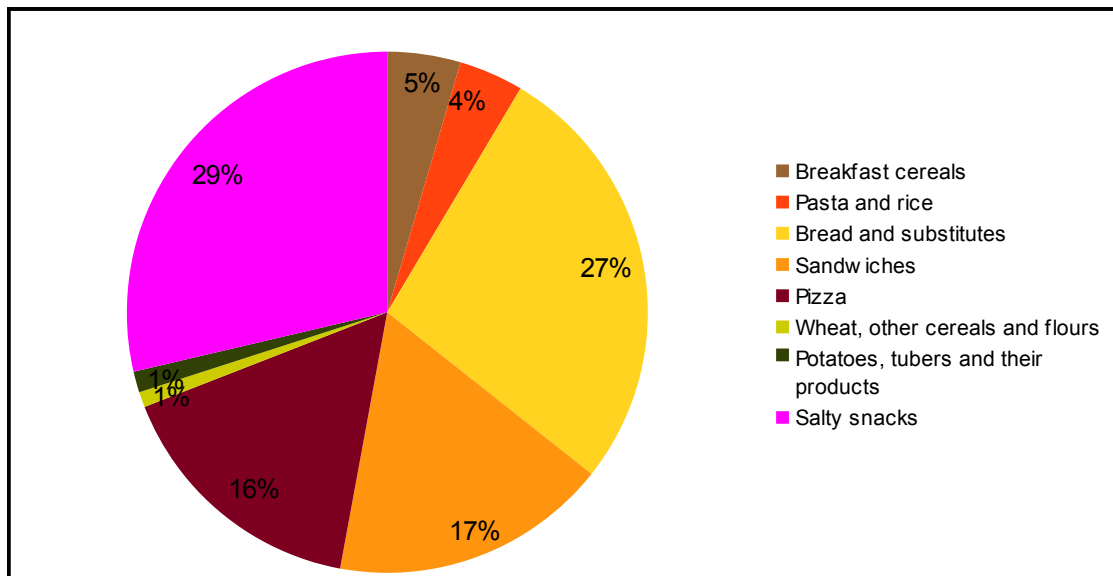


Figure 8.2. Fruit and vegetables at afternoon snack

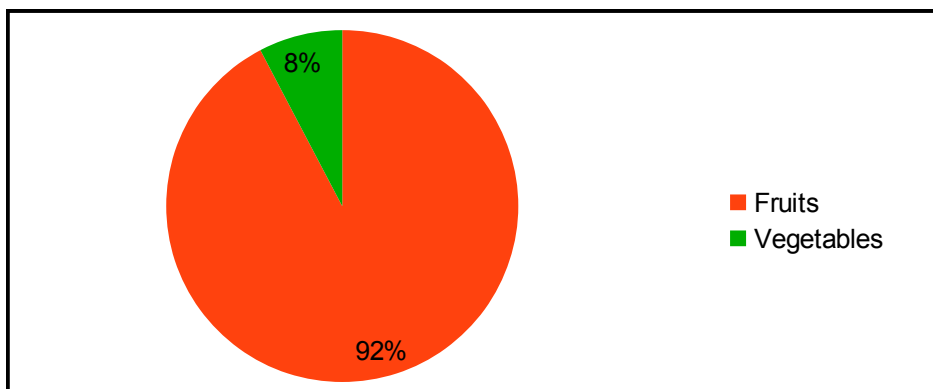


Figure 8.3. Sweet products and substitutes at afternoon snack

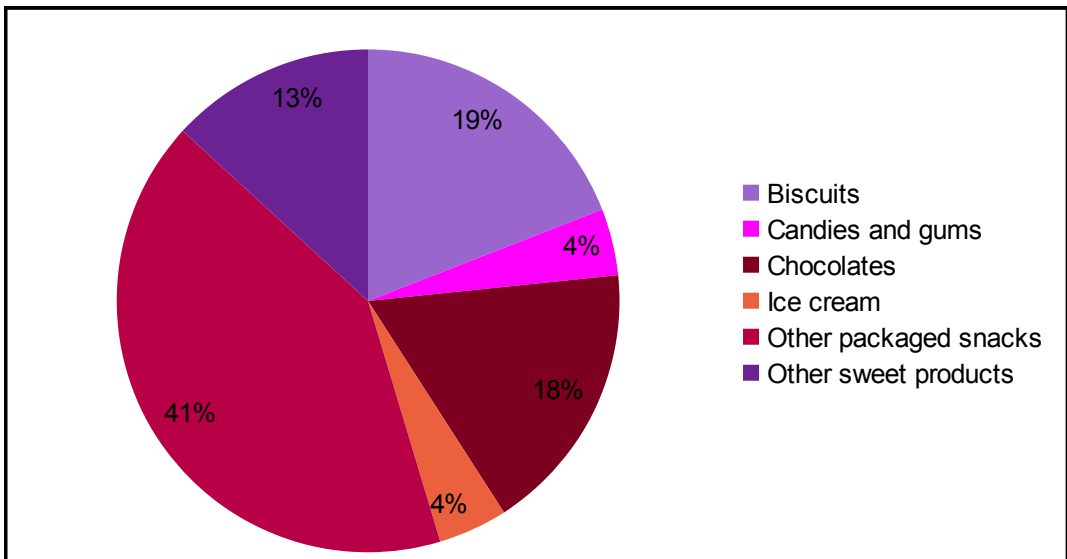


Figure 8.4. Other beverages at afternoon snack

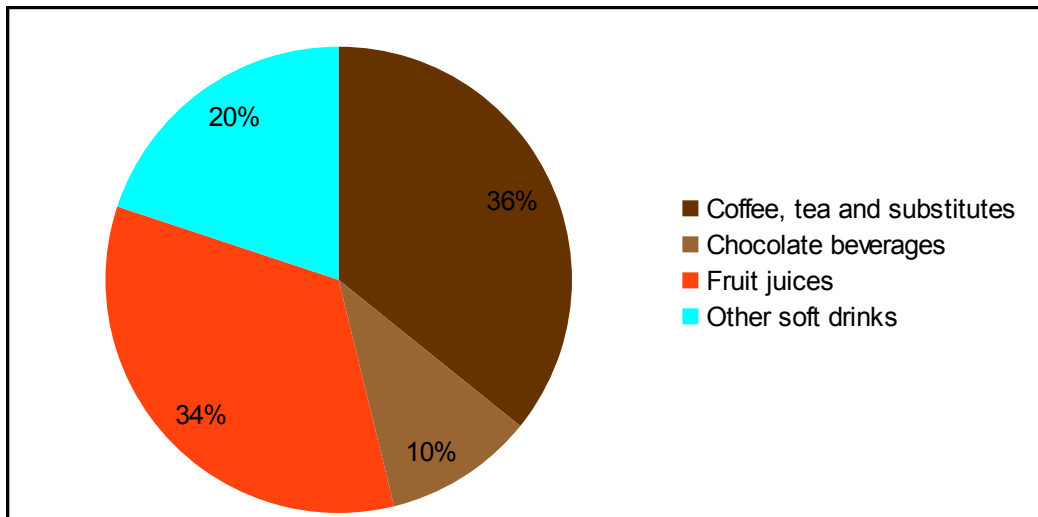


Figure 9. Dietary pattern at dinner by food category

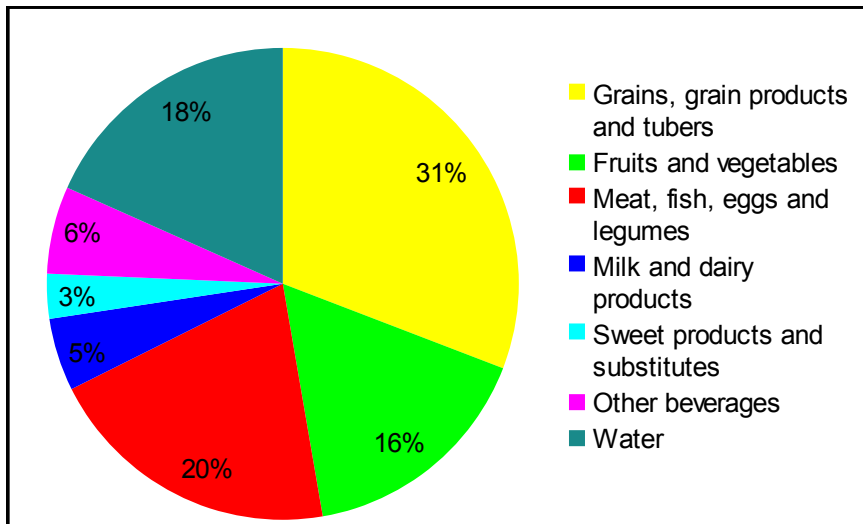


Figure 9.1. Grains, grain products and tubers at dinner

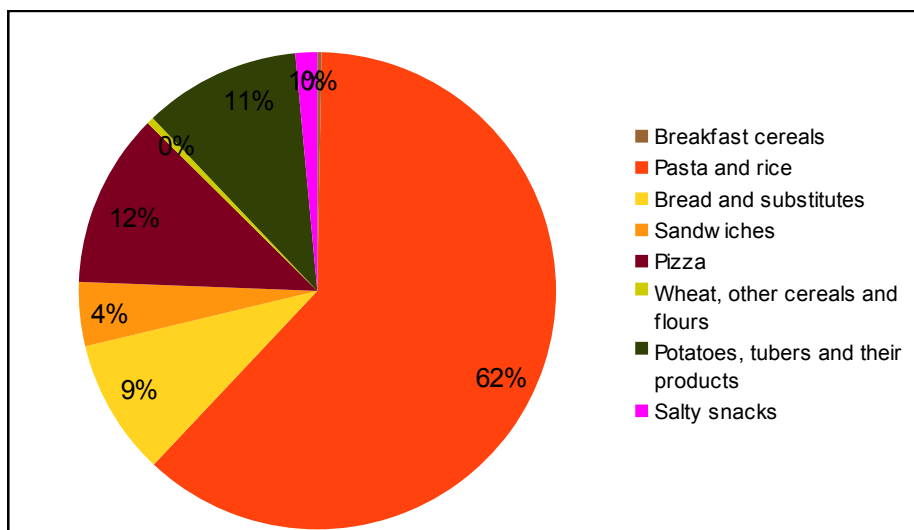


Figure 9.2. Fruit and vegetables at dinner

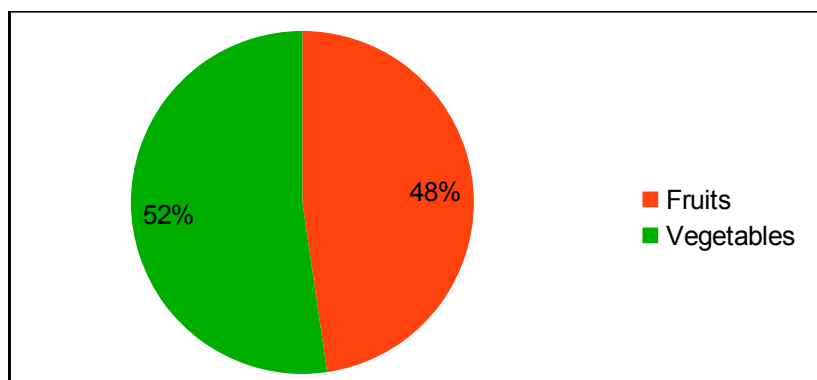


Figure 9.3. Meat, fish eggs and legumes at dinner

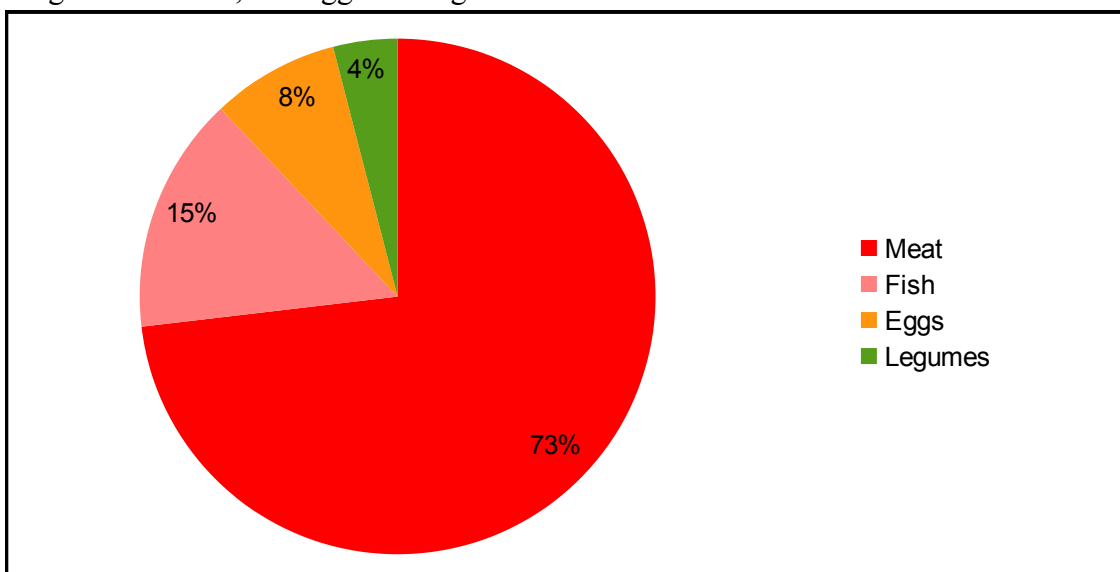


Figure 9.4. Milk and dairy products at dinner

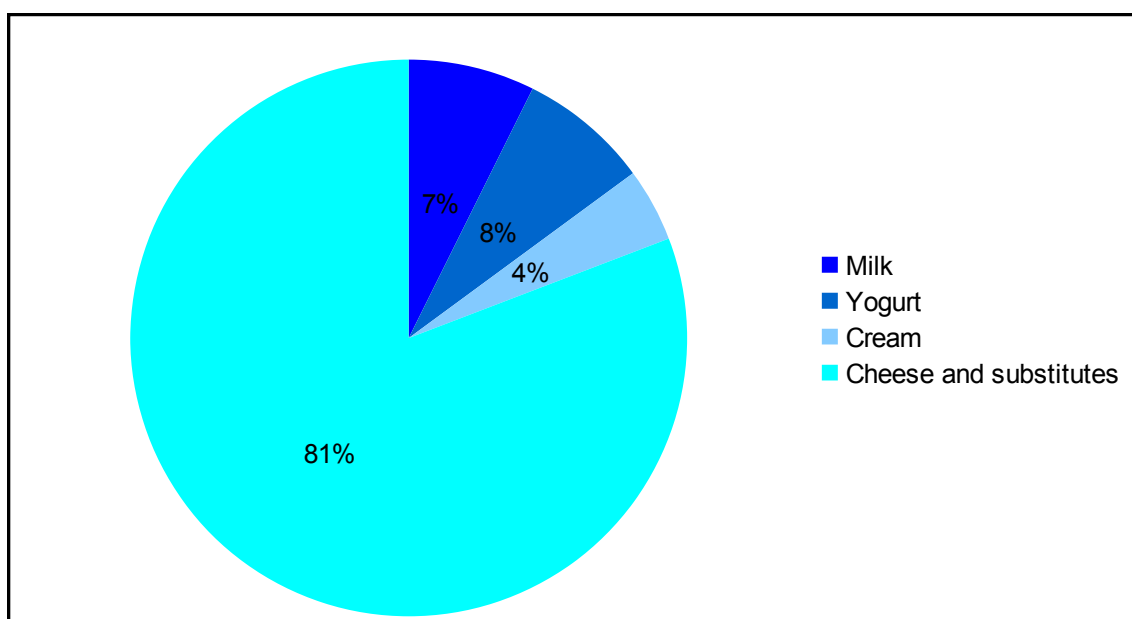


Figure 9.5. Sweet products and substitutes at dinner

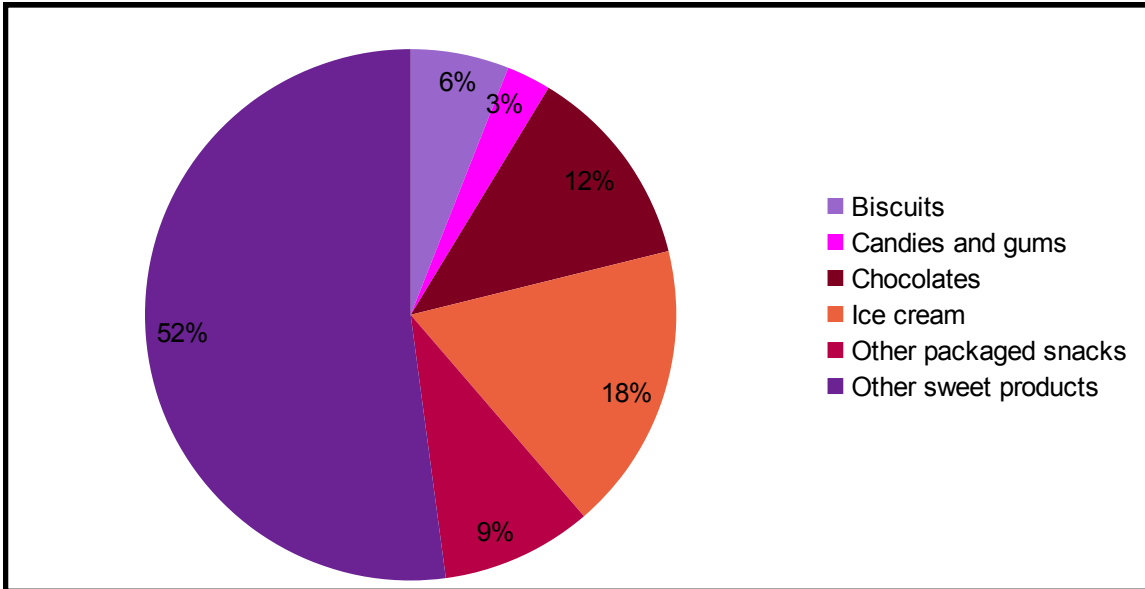


Figure 9.6. Other beverages at dinner

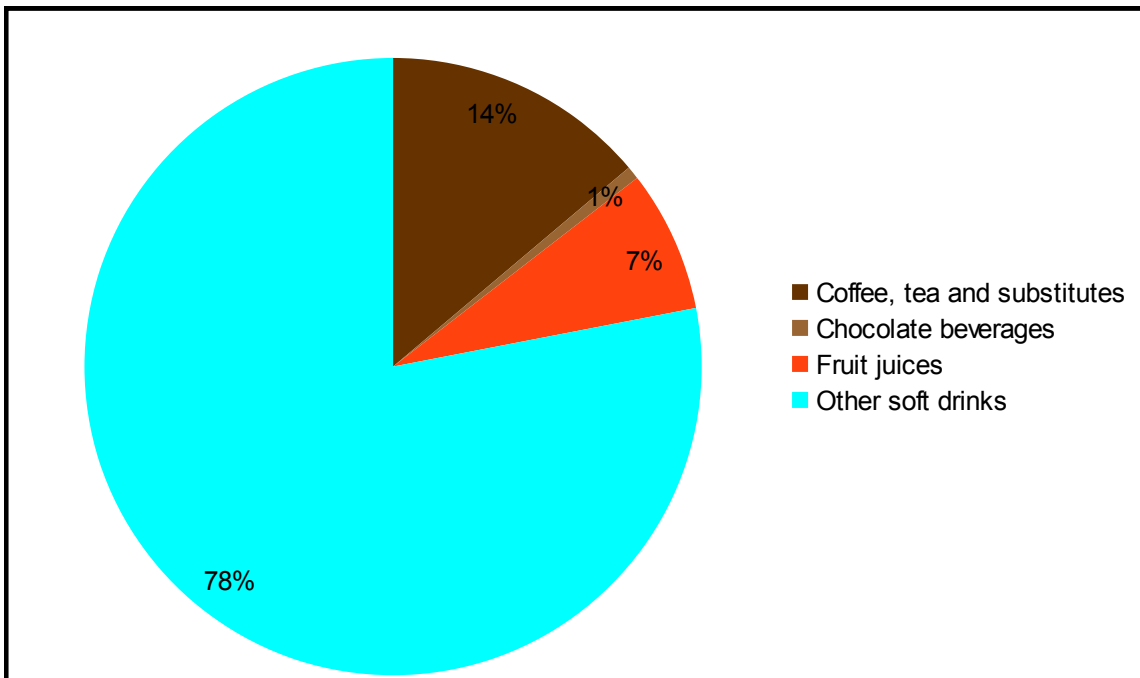


Figure 10. Food and drink pattern as extra snack by food category

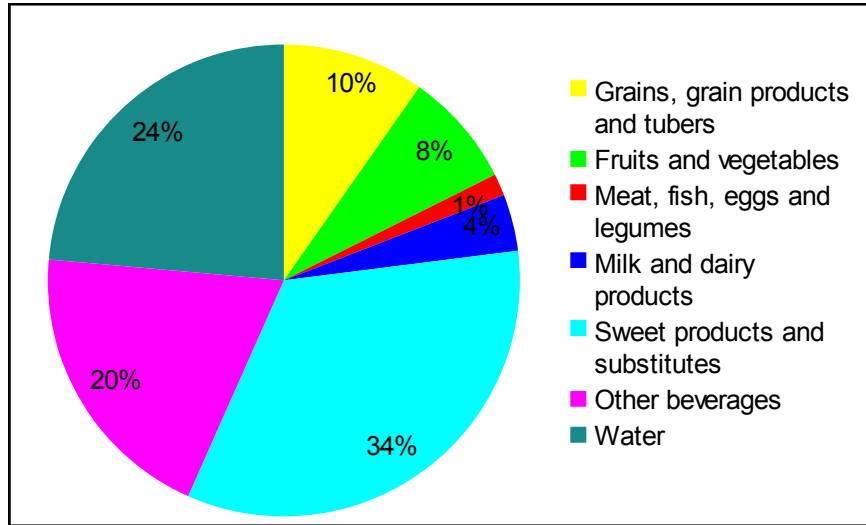


Figure 10.1. Grains, grain products and tubers at extra snack

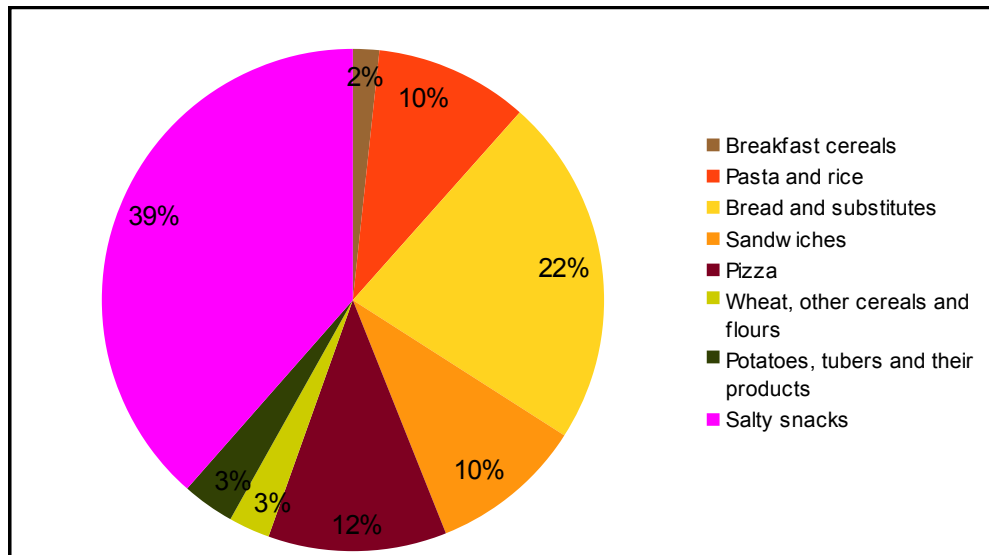


Figure 10.2. Fruit and vegetables as extra snack

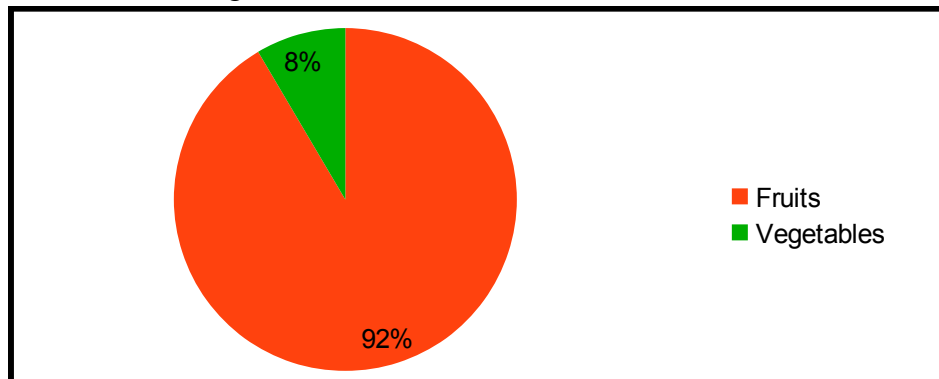


Figure 10.3. Sweet products and substitutes as extra snack

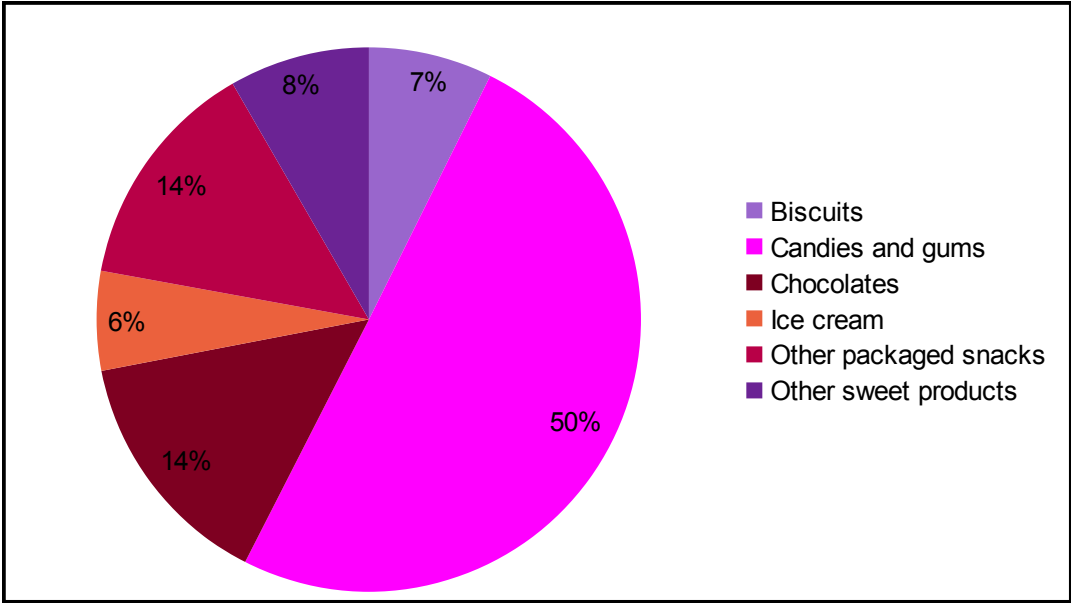


Figure 10.4. Other beverages as extra snack

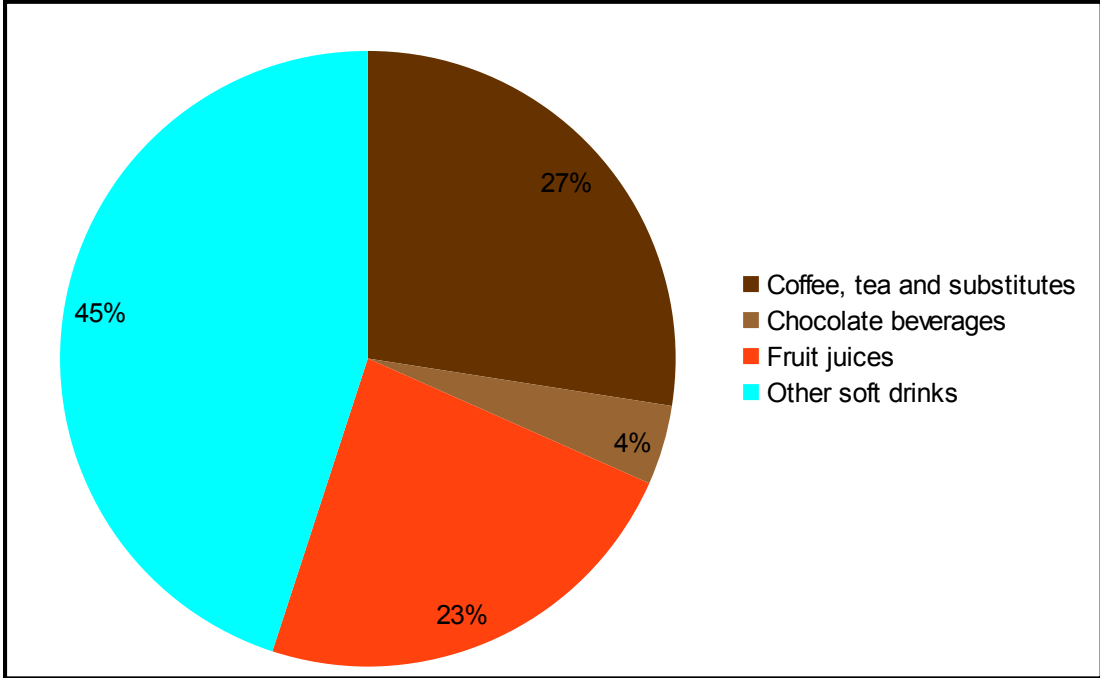


Table 10. Various foods and drinks (in English and in Italian) classified in each food and drink category and sub-category.

Food and drink categories and sub-categories	Food and drink in English	Original food and drink in Italian
Grains, grain products and tubers		
Breakfast cereals	Muesli, puffed rice breakfast cereals, breakfast cereals, cereals	Muesli, riso soffiato da prima colazione, cereali da prima colazione, cereali
Breakfast cereals with chocolate	Breakfast cereals with chocolate	Cereali da prima colazione al cioccolato
Pasta and rice dishes with veg. and/or legumes	Pasta and legumes, rice and legumes, pasta with vegetables, risotto with mushrooms, risotto with vegetables, pizzoccheri, risotto with radicchio, eggplant parmesan, vegetable soup, vegetable soup with pasta or rice	Pasta e legumi, riso e legumi, pasta alle verdure, risotto ai funghi, risotto alle verdure, pizzoccheri, risotto al radicchio, parmigiana di melanzane, minestrone di verdura, minestrone di verdura con pasta o riso
Pasta and rice dishes with meat	Pasta with meat sauce, lasagna or cannelloni with meat sauce, pasta carbonara, egg pasta with meat sauce, risotto with sausage, pasta amatriciana, riceball, gnocchi with meat sauce	Pasta al ragu', lasagne o cannelloni al ragu, pasta alla carbonara, pasta all'uovo al ragu, risotto con salsiccia, pasta all'amatriciana, arancino, gnocchi al ragu
Pasta and rice dishes with tomato sauce	Pasta with tomato sauce, pasta with sauce, gnocchi with tomato sauce, tortellini or ravioli with tomato sauce, rice with tomatoes	Pasta al pomodoro, pasta al sugo, gnocchi al pomodoro, tortellini o ravioli al pomodoro, riso al pomodoro
Other pasta and rice dishes	Pasta, rice, pasta with pesto, milan risotto, pasta with oil, pasta with butter, ravioli, polenta, risotto, oil or butter pasta with cheese, oil or butter pasta, rice with oil, pasta with tuna, egg pasta, tortellini or ravioli with butter or cream, gnocchi, white rice, oil or butter rice with cheese, rice with butter, gnocchi alla romana, cantonese rice, gnocchi with pesto sauce, cous cous, polenta with cheese and butter, oil or butter pasta, rice salad, frozen dish, lasagna with pesto sauce, paella, noodles, gnocchi with butter, crudaiola, pasta without seasoning, pasta in broth, tortellini or ravioli or cappelletti in broth, soup, semolina, rice without seasoning	Pasta, riso, pasta al pesto, risotto alla milanese, pasta all'olio, pasta al burro, ravioli, polenta, risotto, pasta all'olio o burro e formaggio, pasta in bianco, riso in bianco con olio, pasta al tonno, pasta all'uovo, tortellini o ravioli al burro o alla panna, gnocchi, riso in bianco, riso in bianco con olio o burro e formaggio grattugiato, riso in bianco con burro, gnocchi alla romana, riso cantonese, gnocchi al pesto, cous cous, polenta taragna, pasta all'olio o burro, insalata di riso, piatto surgelato, lasagne al pesto, paella, noodles, gnocchi al burro, crudaiola, pasta senza condimento, pastina in brodo, tortellini o cappelletti o ravioli in brodo, minestra, semolino, riso in bianco senza condimento
Bread	Bread	Pane
Crackers and substitutes	Breadsticks, crackers	Grissini, crackers
Wholegrain bread and substitutes	Brown rice, wholegrain grains, wholegrain pasta, wholegrain breadsticks, wholegrain melba toasts, wholegrain bread	Riso integrale, cereali integrali, pasta integrale, grissini integrali, fette biscottate integrali, pane integrale
Sandwiches with preserved meat and/or cheese	Sandwich stuffed with cheese, sandwich tomato and mozzarella, sandwiches with preserved meat products, sandwich with preserved meat products and cheese, sandwiches, sandwich	Panino imbottito di formaggio, panino imbottito pomodoro e mozzarella, panino imbottito con salume, panino imbottito con salume e formaggio, panini, panino
Other sandwiches	Toasts, flatbread	Toast, piadina
Fast food Sandwiches	Hot dogs, kebabs, sandwich fast food	Hot dog, kebab, panino fast food

Food and drink categories and sub-categories	Food and drink in English	Original food and drink in Italian
Pizza	Baker high crust pizza, pizza with tomato and mozzarella cheese, pizza, pizza with tomato, mozzarella and salami, pizza with just mozzarella cheese, pizza with other toppings, "mini pizzas", pizza with just tomato, panzerotto, focaccia, focaccia stuffed focaccia with cheese	Pizza alta del panettiere, pizza con pomodoro e mozzarella, pizza, pizza con pomodoro, mozzarella e salumi, pizza con solo mozzarella, pizza con altre farciture, pizzette, pizza con solo pomodoro, panzerotto, focaccia, focaccia farcita, focaccia al formaggio
Wheat, other cereals and flours	Melba toasts, canned sweet corn, canned, barley, seitan, spelt, malto, cereals or puffed rice cereal bar	Fette biscottate, mais dolce, in scatola, orzo, seitan, farro, malto, barretta di cereali o riso soffiato
French fries	Fried potatoes, French fries	Patate fritte, patatine fritte
Potatoes and other tubers	Baked or roasted potatoes, mashed potatoes, boiled potatoes, potatoes, potato croquettes	Patate al forno o arrosto, pure di patate, patate lesse, patate, crocchette di patate
Salty snacks	Crackers-like salty snacks, popcorn, chips	Crakers tipo snack salati, schiacciatine, taralli, patatine, pop corn, patatine fritte busta
<i>Fruit and vegetables</i>		
Fresh fruit	Pineapple, oranges, bananas, fruit, peaches, pomegranates, lemons, cooked fruit, lynchies, coconut, mango, melon, raspberry, grapefruit, apricots, figs, dates, sour cherries, avocados, india figs, strawberries, fruit smoothie, kiwi, or khaki loti, fruit salad, tangerines, tangerines, apples with peel, peeled apples, apples, pears, plums, fruit crush, grape	Ananas, arance, banane, frutta, pesche, melagrane, limoni, frutta cotta, litchi, cocco, mango, melone, lamponi, pompelmo, albicocche, fichi, datteri, amarene, avocado, fichi-d'india, fragole, frullato di frutta, kiwi, loti o kaki, macedonia di frutta, mandaranci, mandarini, mele con buccia, mele senza buccia, mele, pere, prugne, spremuta di frutta, uva
Nuts, seeds, olives and their products, dried fruits	Chestnuts, peanuts, walnuts, pistachios, almonds, dried fruit, hazelnuts, olives, capers	Castagne, arachidi, noci, pistacchi, mandorle, frutta secca, nocciole, olive capperi
Fresh and frozen vegetables	Beets, broccoli, carrots, cauliflower, cucumbers, green beans, fennel, mushrooms, salad, lettuce, eggplants, peppers, tomatoes, spinach, vegetables, artichokes, endive, squash, asparagus, celery, onions, leeks, rocket or arugula, peaks turnips, onions, sauerkraut, radishes, cabbage, zucchini flowers, red chicory, turnips, zucchini	Barbabietole, broccoli, carote, cavolfiore, cetrioli, fagiolini, finocchi, funghi, insalata, lattuga, melanzane, peperoni, pomodori, spinaci, verdura, carciofi, indivia, zucca, asparagi, sedano, cipolle, porri, rughetta o rucola, cime di rapa, cipolline, crauti, ravanelli, cavolo, fiori di zucca, radicchio rosso, rape, zucchine
Vegetables, processed	Oil-preserved vegetables, vegetables salad with mayonnaise	Verdura sott'olio, insalata russa
<i>Meat, fish eggs, legumes</i>		
Red meat	Roast, steak, beef or veal meat, meat, pork meat, meat in red sauce, lamb meat, rabbit meat, horse meat, kebabs, meat rolls, carpaccio, veal with tuna sauce, cotechino or knuckle, bone hole, caseula, pot roast, mixed meat barbecue, pork, tripe, tomato sauce, filet, hamburger, meatballs, meat loaf, sausage, stew, ascolo stuffed olives	Arrosto, bistecca, carne di manzo o vitello, carne di maiale, carne al sugo, carne di agnello, carne di coniglio, carne di cavallo, spiedini di carne, involtini di carne, carpaccio, vitello tonnato, cotechino o zampone, osso buco, caseula, bon roll, brasato, barbecue di carne mista, porchetta, trippa, pizzaiola, filetto, hamburger o svizzera di manzo o vitello, polpette, polpettone, salsiccia o salamella, spezzatino, olive all'ascolana
White meat	Stuffed chicken cutlet, milan cutlet, turkey, chicken nuggets, fried chicken, roast chicken, chicken, boiled chicken	Cordon bleu, cotoletta alla milanese, tacchino, spinacina, crocchette di pollo, pollo fritto, pollo arrosto, pollo, pollo lesso

Food and drink categories and sub-categories	Food and drink in English	Original food and drink in Italian
Preserved products	Coppa salami, culatello salami, prosciutto, prosciutto cotto, prosciutto crudo, salami, bresaola, preserved meat products, speck, mortadella salami, pancetta salami, lardo salami, carne in scatola, wurstel	Coppa, culatello, prosciutto, prosciutto cotto, prosciutto crudo, salame, bresaola, salumi, speck, mortadella, pancetta, lardo, tenerone, carne in scatola, wurstel
Fish, seafood, fresh and frozen	Fish sticks, fish, sole, prawns or shrimp, salmon, fresh salmon, smoked salmon, cod or hake, trout, squid, swordfish, mussels, fresh anchovies, clams, fresh farmed sea bream fillets, sushi, fried fish, fried mixed, octopus, squid, sea bass, tuna fresh	Bastoncini di pesce, pesce, sogliola, gamberi o gamberetti, salmone, salmone fresco, salmone, affumicato, merluzzo o nasello crudo, trota, calamaro, pesce spada, cozze, acciuga o alice, fresca, vongole, orata fresca d'allevamento, filetti, sushi, pesce fritto, fritto misto, polpo o polipo, seppie, spigola, tonno,
Fish and seafood preserved	Anchovies preserved in oil, tuna, tuna preserved in oil	Acciuga o alice, sott'olio, tonno, tonno, sott'olio, sgocciolato,
Eggs	Eggs quiche, omelets, souffle', casserole	Uova, torta salata, frittata, souffle', sfornato
Legumes	Beans, lentils, legumes, tofu, chickpeas, fava beans, peas	Fagioli, lenticchie, legumi, tofu, ceci, fave, piselli
<i>Milk and dairy products</i>		
Milk	No fat milk, whole milk, low fat milk, milk, rice or soy milk	Latte scremato, latte intero, latte parzialmente scremato, latte, latte di riso o di soia
Yogurt	Yogurt, yogurt with lactic acid bacteria, yogurt with fruit, yogurt, low fat yogurt, greek yogurt	Yogurt, yogurt da bere con fermenti lattici, yogurt alla frutta, yogurt intero, yogurt magro, yogurt greco
Cream	Cream or whip	Panna o crema di latte
Cheese and substitutes	Fontina cheese, cream cheese spread, soft cheese table, brie, scamorza, lowfat spreadable cream cheese, robiola, stracchino, taleggio cheese, fondue, pecorino, caciocavallo, emmental, mascarpone, provolone, soffiacini, cheese, gorgonzola, grana or parmigiano, cow mozzarella, buffalo mozzarella, mozzarella, ricotta, cheese slices	Fontina, formaggio cremoso spalmabile, formaggio molle da tavola, brie, scamorza, formaggio cremoso spalmabile, light, robiola, stracchino, taleggio, fonduta, pecorino, caciocavallo, emmenthal, mascarpone, provolone, soffiacini, formaggio, gorgonzola, grana o parmigiano, mozzarella di vacca, mozzarella di bufala, mozzarella, ricotta, sottilette
<i>Sweet products and substitutes</i>		
Biscuits	Shortbread, biscuits, dry biscuits, pavesini, ladyfingers, shortbread cookies with chocolate, wholegrain biscuits	Biscotti frollini, biscotti, biscotti secchi, pavesini, savoiardi, biscotti frollini al cioccolato, biscotti integrali
Candies and gums	Chewing gum, candies,	Gomme da masticare, lastrine e confetti, caramelle
Chocolates	Chocolate milk, chocolate, chocolate, dark chocolate, milk chocolate with hazelnuts, tinted lenses filled with chocolate, chocolate, kisses Perugia, nutella or other hazelnut cream and cocoa	Cioccolato al latte, cioccolato, cioccolatini, cioccolato fondente, cioccolato al latte con nocciole, lenti colorate ripiene di cioccolato, cioccolata, bacio perugina, nutella o altra crema di nocciole e cacao
Ice cream	Ice cream, ice cream in trays, artisan ice cream, packages ice cream like biscuit, packaged ice cream like cone, artisan ice cream fruit, ice stick, ice cream like magnum,	Gelato, gelato confezionato in vaschetta, gelato artigianale creme, gelato tipo cucciolone, gelato tipo cornetto, gelato artigianale frutta, gelato ghiacciolo, gelato tipo magnum, maxi bon

Food and drink categories and sub-categories	Food and drink in English	Original food and drink in Italian
Other packaged snacks	Packaged snacks stuffed with milk, packaged snacks like croissant, snack, plum cake, packaged snacks like chocolate, finger kinder, kinder, cake, chocolate-covered coconut bar, kinder egg, chocolate bar, cerealix, kinder maxi, tronky, kinder bueno , duplo, fiesta, packaged snacks with jam, oro ciock, packaged snacks like bread and chocolate, packaged snacks like pastry, packaged snacks like sponge cake, ringo	Merendine, farcite di latte, merendine, tipo briosche, merendina, plum cake, merendine tipo cioccolato, barretta kinder, kinder, tortina, barretta al cocco ricoperta di cioccolato, ovetto kinder, barretta al cioccolato, cerealix, kinder maxi, tronky, kinder bueno, duplo, fiesta, merendine, con marmellata, oro ciock, merendine tipo pane e cioccolato, merendine, tipo pasta frolla, merendina, tipo pan di spagna, ringo
Other sweet products	Wafer biscuits, flan, cake, chocolate cake, sweets, pastry shop pie or pastry, chocolate-coated wafers, sponge cake, jam tarts, apple pie, pancakes, muffins, chiacchiere, chocolate cream pie, strudel, comfits, nougat, marzipan, almond nougat mousse, panettone or pandoro, tiramisu', sugar, sucrose, crepes, honey, jam, threat, desserts	Biscotti wafers, budino, torta, torta al cioccolato, dolce, torta di pasticceria o pasticcini, wafer ricoperto di cioccolato, torta margherita, crostata con marmellata, torta di mele, frittelle, muffin, chiacchiere, crostata con crema al cacao, strudel, confetti, torrone, pasta di mandorle, torrone alla mandorla, mousse, panettone o pandoro, tiramisu', zucchero da cucina, saccarosio, crepes, miele, marmellata, dolce, dessert
<i>Non-alcoholic beverages</i>		
Coffee, tea, herbal tea and substitutes	Tea, herbal tea, chamomile tea, iced tea, tea, coffee, milk and coffee or cappuccino	The, tisana, camomilla, the freddo, the, caffè', caffelatte o cappuccino
Chocolate beverages	Hot chocolate, chocolate powder	Ciocolata calda in tazza, cioccolato in polvere
Fruit juices	Fruit juice, juice	Succo di frutta, succo
Soft drinks	Sweetened soft drinks, diet soft drinks, energy drinks like gatorade, energy drinks like redbull	Bevande gasate zuccherate, bevande gasate light, bevande energetiche tipo gatorade, bevande energizzanti tipo redbull
<i>Oils and fats</i>	Extra virgin olive oil, mayonnaise or other sauces, olive oil, seeds oil, butter, oil	Olio di oliva extra vergine, maionese o altre salse, olio di oliva, olio di semi vari, burro, olio
<i>Water</i>	Water, mineral water, sparkling water	Acqua, acqua minerale, acqua naturale, acqua frizzante
<i>Miscellaneous</i>	Tamal, homogenized, supplement, rotisserie, snails, wine, beer, aperitivo, ketchup, vinegar, sauce, salsa, Chinese food, spring roll, broth	Tamal, omogeneizzato, integratore, rosticceria, lumache, vino, birra, aperitivo, salsa tomato ketchup, aceto, sugo, salsa, cinese, involtino primavera, brodo

**CHAPTER 2:
IMPACT OF A NUTRITION EDUCATION
INTERVENTION ON THE DIETARY BEHAVIORS OF
MIDDLE SCHOOL STUDENTS FROM MILAN AND ITS
PROVINCE: THE “PROJECT ALIMENTAZIONE”**

Abstract

Background: Childhood obesity prevalence has been rising worldwide in the last few decades generating concerns about future public health in most developed countries. Observed trends in children and adolescents overweight and obesity prevalence and energy balance related dietary behaviors show that there is a urgent need for nutrition education interventions addressing children and adolescents. Several reviews discussed the determinants (or mediators) of various energy balance related behaviors to examine what factors predict children and adolescents obesity. However, what specific behavior or behaviors were the most effective is still unclear due to the complexity of the disease and the age of the subjects. Therefore the importance of an extensive assessment of the changes in the frequency of intake after participation at The "*Project AlimentAzione*" nutrition education intervention of seven food and drink categories and thirty five food and drink sub-categories in the short term (after 4 months) and in the mid-term (after 1 year). The purpose of the study was to evaluate the impact of a nutrition education intervention on dietary behaviors in the intervention group compared to the control group.

Methods: The "*Project AlimentAzione*" nutrition education intervention was a large study involving 5 middle schools and 5 to 7 classes in each school, resulting in 29 classes and 644 students. The intervention consisted of three-two-hour workshops at school that addressed the following: (1) Bread and grains; (2) Fruit and vegetables; (3) Balancing energy intake and energy expenditure through a healthy diet. Daily student food and drink frequency was assessed through a 7-Day Food Record (7-DFR) completed at school at three time points: Baseline (November 2008), Post-Intervention Assessment (March 2009) and Follow-up (November 2009). Intake frequency (times/day) was calculated for those students who completed at least 4 days (containing at least one weekend day) in the 7-DFR.

Results: For the sample as a whole, the intervention increased children's intakes of the categories of *Fruit and vegetables*, and *Grains, grain products and tubers*; and the individual items of Fish and Water. At follow-up, the results were less definitive: the individual items of Sandwiches, White meat, and Chocolate. Some tendencies were not significant but showed the wide impact of the intervention on important energy balance related behaviors as the intake of *Other beverages*, the intake of *Sweet products and substitutes* and the intake of *Milk and dairy products*.

Conclusions: The nutrition education intervention was effective in the promotion of some energy balance related dietary behaviors, and highlighted interesting differences in the impact of the intervention in boys and girls. Process evaluation underlined the role of the self-assessment component on the positive changes in some energy balance related dietary behavior in control group together with intervention group. Nevertheless, the impact of the "*Project Alimentazione*" in intervention group was higher than control group due to the play approach promoted in the innovative nutrition education intervention combining knowledge, hands-on activities and games.

Introduction

Childhood obesity prevalence has been rising worldwide in the last few decades generating concerns about future public health in most developed countries (^{1,2}).

Unfortunately, Southern Mediterranean countries such as Italy, Spain, Malta and Greece presented the highest prevalence of childhood obesity in Europe (³).

In a recent review by Lobstein and Wang the authors investigated worldwide trends in childhood overweight and obesity and found that they has increased more dramatically in economically developed countries and in urbanized populations (¹).

In a study by Livingstone, the author described the growing concerns about childhood obesity in Europe: prevalence data showed that pediatric obesity was increasing throughout Europe but the patterns varied with time, age, sex and geographical region; the highest rates of obesity were observed in Eastern and Southern Europe (⁴).

The latest available data regarding childhood and adolescent overweight and obesity prevalence in Italy, due to the paucity of data and the use of different definitions of childhood overweight and obesity, are difficult to compare and cannot be interpreted unequivocally (⁵⁻¹¹). Nevertheless, the rapid increase in the prevalence of overweight and obesity of Italian children and adolescents generate concerns for future public health and highlight a urgent need for interventions to prevent obesity (^{5,12}).

The above cited trends in children and adolescents overweight and obesity together with the changes in food and activity patterns have been the subject of extensive research in the latest years (¹³).

Trends in food intake in Europe are rapidly moving toward unhealthier diet styles: in Italy the actual diet is characterized by a consumption of animal protein and fats (both from animals and from plants) higher than recommended and by a consumption of complex carbohydrates lower than recommendations (¹⁴). Several characteristics of the traditional healthy Mediterranean diet, referred to Immaterial Human Heritage by UNESCO in 2010 (¹⁵) have been lost generating concerns about future dietary patterns and, subsequently, public health issues and costs (^{16,17}).

The latest dietary pattern changes in Mediterranean counties have been investigated by other authors: in a study by Kontogianni and colleagues (¹⁸) the authors reported low adherence to a Mediterranean diet in a representative sample of Greek children and adolescents; in a study by Javier Aranceta: the author found that Spanish food patterns underwent a dramatic change between the 1960s and the 1980s and that current food patterns evidence high consumption of animal products such as meat, fish, milk and dairy products and intakes below desirable levels for cereals, potatoes and legumes resulting in a protein intake equal to 200% of the recommended level (¹⁹).

Similar results have been found in Italian students: in a research by Martone and colleagues (¹²) the authors concluded that an unbalanced diet in terms of macro-nutrients and deficient in some micro-nutrients characterized middle school students from Rome: consumption of fruit, vegetables, legumes and fish were lower than recommended. From

a nutrient perspective the diets of the students were low in complex carbohydrates and high in fats and sugars. In another research by Toselli and colleagues, among a sample of middle school students in Bologna, authors found that the overweight and obese adolescents consumed less carbohydrates and less fiber than their normal weight and underweight counterparts (⁹).

In Italy, major reasons for the above cited changes in food consumption patterns were well summarized by Leclercq and colleagues: the evolution of lifestyle, the availability of a large variety of new intensively advertised food products, the progressive aging of the population, and the increase of the meals consumed away from home and of convenience foods. (²⁰).

Observed trends in child and adolescent overweight and obesity prevalence and energy balance related dietary behaviors highlight that there is a urgent need for nutrition education interventions addressing children and adolescents (^{2,4,5,21,22}).

As defined by Contento and colleagues, nutrition education is any set of learning experiences designed to facilitate the voluntary adoption of eating and other nutrition-related behaviors conducive to health and well being (²³). Food choice, especially during early adolescence, is a complex process because it is deeply embedded in culture, is influenced by many factors internal (²⁴⁻²⁷) and external (²⁸⁻³⁷) to the person and carries different meanings (³⁸).

Several reviews have compared different nutrition education interventions targeted at youths to determine the more effective nutrition education strategies to promote more effective nutrition education interventions in this age population (³⁹⁻⁵²).

In these studies, few strategies of intervention have demonstrated to empower the effectiveness of the interventions: in particular, school-setting, behavioral focus, self-assessment of dietary behaviors, provision of adequate time and intensity, multi-component interventions, involvement of families, environmental components and focus on both terms of the energy balance equation (^{41,53-56}).

Some nutrition education interventions have addressed the promotion of energy balance related dietary behaviors in middle school students (^{57,58}), although the impact of these interventions are hard to compare and frequently the results are small or null in food and drink intakes (⁵⁹).

Several reviews discussed the determinants (or mediators) of various energy balance related dietary behaviors to highlight what factors predict children and adolescents obesity (^{43,48,60-65}).

However, what specific behavior or behaviors were the most effective on children and adolescent obesity prevention is still unclear due to the complexity of the disease and the age of the subjects (⁶⁶). Therefore the importance of an extensive assessment of the changes in the frequency of intake of seven food and drink categories and twenty four food and drink sub-categories in the short term (after 4 months) and in the mid-term (after 1 year).

Schools are recognized as positive environments to promote nutrition education interventions among children and adolescents (^{67,68}). Self-assessment of dietary intake

has been demonstrated as being an effective method to estimate food and drink consumption and an important factor in behavior change due to the influence of recording food and drink intake on personal awareness ⁽⁶⁹⁾.

Multimedia technologies such as web-based child and adolescent dietary assessment instruments are promising tools to collect information from young adolescents with relatively low staff resources ⁽⁷⁰⁾. No interventions were found in the available references using a web-based form for data entering purposes only.

In the design of the presented intervention, some of these strategies were implemented: in particular the school-setting, adequate time (1 year), the presence of different components (workshops, web-based assessment, teachers' professional development), the involvement of parents in questionnaire completion, and the collection of physical and sedentary activity data from students together with food and drink consumption in the 7-Day Food Records. Physical activity and inactivity data collected in this research will not be presented in this paper and will be described in future publications.

The original points of the "*Project AlimentAzione*" nutrition education intervention were the method of food and drink assessment combined with an original web-based data entry method and the play approach which promotes the utilization of hands-on activities such as cooking ⁽⁷¹⁾, tasting ^(72,73) and board game playing ⁽⁷⁴⁾.

The intervention described in this research focused on the promotion of the following energy balance related dietary behaviors: (1) increase the intake of complex carbohydrates; (2) increase the intake of whole grains; (3) increase the intake of fruit; (4) increase the intake of vegetables; (5) increase the intake of white meat, fish, and legumes; (6) increase the intake of water; (7) decrease the intake of packaged snacks; (8) decrease the intake of other beverages; (9) decrease the intake of sweets; (10) decrease the intake of red meat. These energy balance dietary behaviors were selected according to the national guidelines for children and adolescents ⁽⁷⁶⁾.

The purpose of the study was to evaluate the impact of the "*Project AlimentAzione*" nutrition education intervention on dietary behaviors in the intervention group compared to the control group.

Methods

Study design

The study used a pre-post, intervention and control condition design.

Three schools in the city of Milan and two schools in its province were selected based upon the socio-economic status of each school's population; this provided a representative sample of 11-12 years old middle school students in Milan and its province. Principals and teachers from the schools all agreed to work for one year on the program and to guarantee approximately 100 students in first and second year middle school. Study design and participants are shown in Table 1.

One teacher coordinator for the project was selected in each school and was asked to identify a minimum of three intervention classes and a minimum of two control classes.

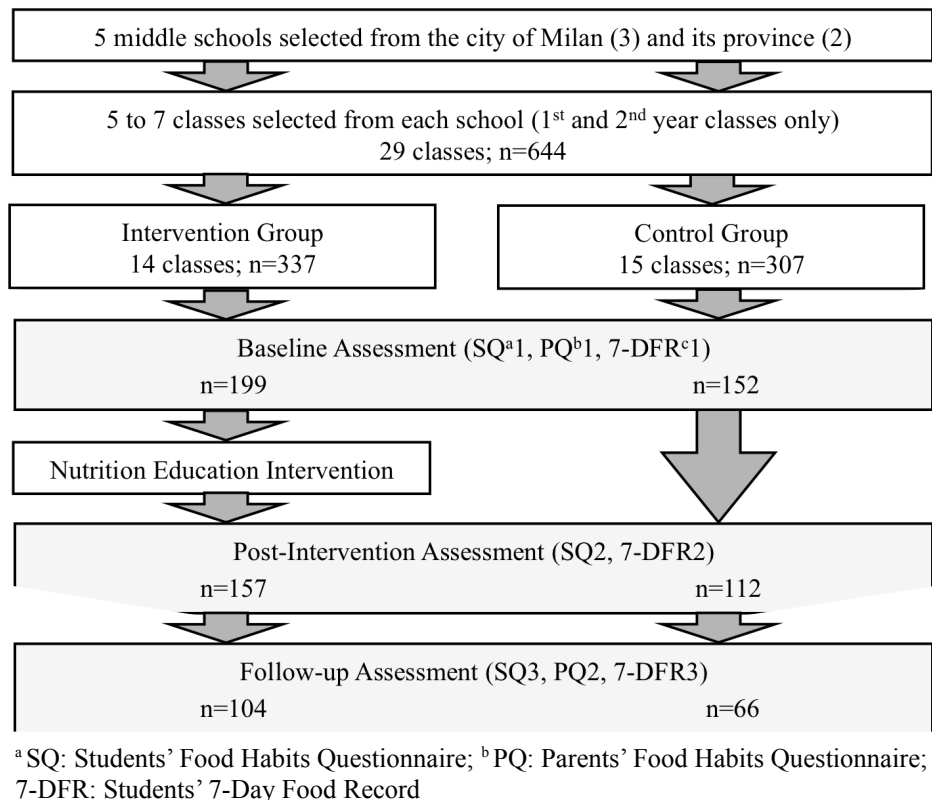


Figure 1. Study design of the “*Project AlimentAzione*”

Nutrition Education Curriculum

The intervention consisted of three two-hour-long workshops at the school conducted by the researcher with the class teacher assisting the activities. All workshops had the purpose of not being conducted as simply a knowledge-based lesson but combined it with the promotion of healthier dietary behaviors and creative hands-on activities. A description of the “*Project AlimentAzione*” nutrition education intervention is summarized in Table 1.

Table 1. Description of the “Project AlimentAzione” nutrition education intervention

Workshops Titles	Objectives	Methods/Activities	Dietary behaviors promoted
Bread and grains	experience bread preparation	make bread dough at school (1 hr)	eat more whole-grains
	explore grains, grain products and fiber	participative lesson on the blackboard (20-40 min)	choose snacks with higher complex carbohydrates and lower simple carbohydrates
	differences between simple and complex carbohydrates	recognition game on grains and grain products (20 min)	
Fruit and vegetables	learn skills to prepare fruit and vegetables dishes	team cooking competition with common tasks and rules (1 hr)	eat more fruit eat more vegetables
	experience a creative cook-off competition	participative lesson on the blackboard (20-30 min)	cook your own fruit and vegetable dish at home
	experience a classroom taste workshop	taste workshop (30 min)	
“MangiaStelle” boardgame	understand importance and role of each nutrient through food groups	participative lesson on the blackboard (20-40 min) rules and characters introduction (10-20 min)	choose healthier foods and drink balance energy intake according to expenditure
	understand balance between energy intake and energy expenditure	individual board game with the class split around 4 to 6 tables (1 hr)	

The first and the second workshop activities were accompanied by a booklet produced by the Province of Milan - Agriculture Sector – Nutrition Education Section distributed to every student. The first two workshops focused on cooking skills and creative hands-on activities: in the bread and grains workshop each student experienced the preparation of bread dough individually from the ingredients to the final product; in the fruit and vegetable workshop students participated in a cooking competition at school with their classmates, expressed their creative side constructing a “masterpiece” with fruit and vegetable leftovers and took part in a taste workshop. Food ingredients and other cooking materials were provided by Esselunga S.P.A.

The third workshop was supported by the “MangiaStelle” board game previously developed by the author which assured that the students experience food groups and energy balance. Each student was introduced to the 7 food groups and to energy balance by a participative lesson. Each student was asked to refer to his/her character card to find out his/her particular goal: each one of the six characters of the game has different energy needs (9 to 17 stars) and different abilities that make it run faster or slower depending on the total amount of stars it needs to collect to win the game.

Eat more and eat less dietary behaviors promoted in the intervention and their relationship with food and drink categories and sub-categories are reported in Table 5 and Table 6 in the Appendix.

Instruments

Students' demographics were collected through the Students' Food Habits

Questionnaire 1 (SQ1) developed by the author. Students' intervention satisfaction and perceived change were collected through the Students' Food Habits Questionnaire 3 (SQ3).

Parents' demographics were collected through the Parents' Food Habits Questionnaire 1 (PQ1), brought home by students and completed by their parents at approximately the time students received the Baseline Assessment. Parents' happiness about their child's dietary habits and perceived change after one year intervention were collected through the Parents' Food Habits Questionnaire 2 (PQ2), brought home by students and completed by their parents about the time students received the Follow-up Assessment.

Daily student food and drink frequency was assessed through a 7-Day Food Record (7-DFR) completed at school at three time points: Baseline (November 2008), Post-Intervention Assessment (March 2009) and Follow-up (November 2009). The 7-DFR consisted of a booklet in which students recorded all foods and beverages consumed throughout the day (breakfast, morning snack, lunch, afternoon snack, dinner, other) for a total of 7 days. Each book contained pictures of 16 food samples from "Atlante Ragionato di Alimentazione" in three portion sizes (small, medium, large). The time-line of the study is shown in Figure 1.

Data collection

The researcher administered SQ1 and 7-DFR1 to students over a 30 minutes period in each classroom at Baseline. Each student was provided a small book containing SQ1, 7-DFR1 and instructions regarding how to record food and portion sizes. Students were asked to refer to the booklet to estimate portion sizes for all the foods they ate. Once the paper copy of the booklet containing SQ1 and 7-DFR1 was completed, each student was instructed to transcribe what was reported on the paper to a web based copy of the 7-DFR.

The web-based copy of 7-DFR1 contained 313 categories of foods and 14 categories of portion sizes. Each student was asked to find the food or portion size recorded in the paper copy within the categories provided by the web instrument. If students were unable to find their selections, they were asked to type in the food or portion category in a separate text box. Foods and portions submitted by students were populated into existing categories in Foods and Portions Database.

The same data collection procedure was implemented for SQ2, SQ3, 7-DFR2 and 7-DFR3. Students were instructed to enter information contained in their parents' questionnaires (PQ1 and PQ2) in the web-based copy of the instruments, they could find on their personal page in the "*MangiaMeglio*" web-site (www.mangiameglio.com).

Outcome measures

Student intake was investigated by how many times per day foods and drinks were consumed. Portion size data were collected but not included due to inconsistency and a large volume of missing data. Daily mean food and drink frequency (times/day) were calculated for those students who completed at least 4 days (containing at least one weekend day) in the 7-DFR. Mean differences in intake frequency between Post-Intervention Assessment and Baseline and between Follow-up and Baseline were calculated to evaluate the impact of the "Project AlimentAzione" nutrition education intervention on selected dietary behaviors in the intervention group compared to the control group. The dietary behaviors and the expected changes in food and drink

categories and sub-categories are reported in Table 5 (macro-nutrients) and Table 6 (foods and drinks) are reported in the Appendix.

Parents' happiness about their child's dietary habits was assessed through the question "*Are you happy of your child's dietary habits?*": this question was used to explore the prevalence of perceived happiness about their child's dietary habits between control and intervention groups at Baseline and Follow-up.

Students' intervention perceived change was measured through the answers to the questions "*In the last year, did you see any change in your dietary habits?*" and "*What change did you see in your dietary habits?*" at Follow-up.

Parents' intervention perceived change was measured through the answers to the questions "*In the last year, did you see any change in your child's dietary habits?*" and "*What change did you see in your child's dietary habits?*" at Follow-up. In the first question students and parents were asked to answer with one of the following options: *absolutely yes, more yes than no, more no than yes and absolutely no*; answers were later recoded as *Yes* and *No*.

In the question "*What change did you see in your dietary habits*" students (and parents) were asked to choose one to seven of the following options: *I (He/she) eat(s) less snacks, I (He/she) drink(s) fewer sweetened beverages; I (He/she) eat(s) more vegetables; I (He/she) eat(s) more fruit; I (He/she) eat(s) more fruit and vegetables; I (He/she) pay(s) more attention to what I (he/she) eat(s); I (He/she) pay(s) more attention to the way I (he/she) eat(s).*

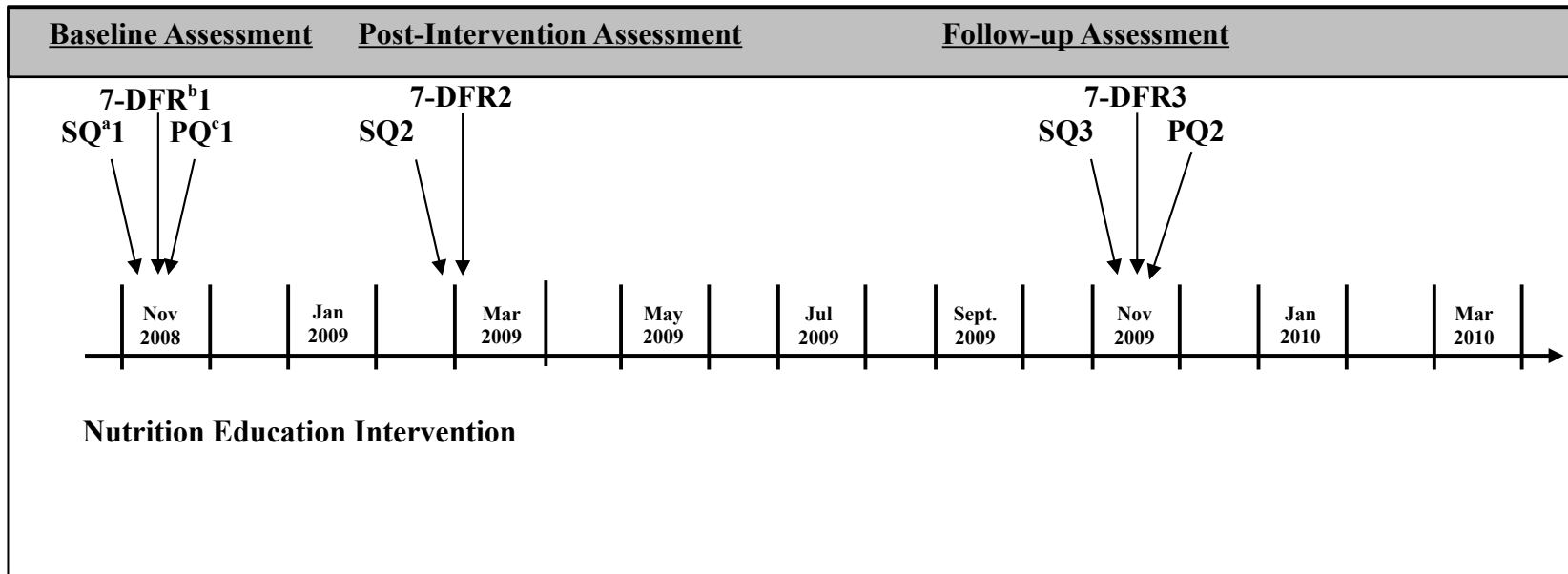
Number of intervention perceived changes were calculated from the answers collected with the question "*What change did you see in your dietary habits*" depending on the number of options chosen by students and parents.

Data analysis

Independent t-Tests were used to compare mean differences in dietary behaviors at Baseline (November 2008) between intervention and control group.

Independent t-Tests were used to assess mean differences in dietary behaviors in the intervention group compared to the control group at Post-Intervention Assessment (March 2009) and at Follow-up (November 2009).

Descriptive statistics were used to assess students' intervention satisfaction, parents' happiness about their child's dietary habits and students' and parents' intervention perceived change one year after the beginning of the "Project AlimentAzione" nutrition education intervention. Statistical data analysis was performed using SPSS 18.0 for Macintosh.



^a Students' Questionnaire (1, 2, 3)

^b 7-Day Food Record completed by students at school (1, 2, 3)

^c Parents' Questionnaire (1, 2)

Figure 2. Timeline of the “Project AlimentAzione”

Results

Baseline Assessment

The intake of students in the intervention and control conditions at Baseline were very similar for the seven major categories and for sub-categories there were differences only in 4 foods.

Daily intake frequencies (times/day) for selected dietary behaviors comparing differences in intake frequency between intervention and control group at Baseline are reported in Table 2.

Daily intake frequencies of Sandwiches and Yogurt in the intervention group were lower than control group ($.2 \pm .251$ times/day versus $.268 \pm .332$ times/day, $p=.029$; $.062 \pm .136$ times/day versus $.126 \pm .253$ times/day; $p=.003$ respectively). Daily intake frequency of Sandwiches in intervention females was lower than control females ($.182 \pm .211$ times/day versus $.277 \pm .292$ times/day, $p=.017$). Daily intake frequency of Bread and substitutes in intervention males was higher than control males ($.535 \pm .482$ times/day versus $.382 \pm .449$ times/day, $p=.033$). Daily intake frequencies of *Milk and dairy products*, Yogurt, and Chocolate beverages in intervention males were lower than control males ($.93 \pm .552$ times/day versus $1.112 \pm .673$ times/day, $p=.044$; $.046 \pm .108$ times/day versus $.153 \pm .28$ times/day, $p=.002$; $.076 \pm .225$ times/day versus $.161 \pm .293$ times/day, $p=.039$ respectively)

Post-Intervention Assessment

The impact of the “Project AlimentAzione” on total students’ sample dietary behaviors at Post-Intervention Assessment is reported in Table 3. There was a decrease in intakes of most food groups in both conditions.

Intervention students decreased significantly less than control students their intake of *Grains, grain products and tubers*, ($-.567 \pm .909$ times/day versus $-.820 \pm 1.011$ times/day; $p=.033$), *Fruit and vegetables* ($-.197 \pm .669$ times/day versus $-.402 \pm .773$ times/day; $p=.021$), Fish ($-.022 \pm .248$ times/day versus $-.074 \pm .178$ times/day; $p=.023$) and *Water* ($-.192 \pm .710$ times/day versus $-.408 \pm .840$ times/day; $p=.024$).

Other changes at Post-Assessment were not significant between intervention and control group but show several tendencies: intervention students decreased less than control students their intake of Pasta and rice ($p=.050$), Sandwiches ($p=.097$), Fruit ($p=.054$), Fresh fruit ($p=.066$), Milk and dairy products ($p=.078$), Milk ($p=.090$) and increased their intake of Yogurt compared with control students ($p=.088$).

Results by gender

Intervention females decreased significantly less than control females their intake of *Grains, grain products and tubers* ($-.458 \pm .963$ times/day versus $-.829 \pm .924$ times/day; $p=.026$), Fish ($-.012 \pm .197$ times/day versus $-.078 \pm .172$ times/day; $p=.046$), and *Water* ($-.19 \pm .666$ times/day versus $-.530 \pm .889$ times/day; $p=.012$).

Intervention males decreased significantly less than control males their intake of *Fruit and vegetables*, ($-.130 \pm .737$ times/day versus $-.454 \pm .726$ times/day; $p=.008$), Fruit ($-.097 \pm .497$ times/day versus $-.283 \pm .447$ times/day; $p=.033$), Fresh fruit ($-.086 \pm .459$ times/day versus $-.253 \pm .459$ times/day; $p=.040$), Vegetables

($-.006 \pm .403$ times/day versus $-.170 \pm .460$ times/day; $p=.031$), Fresh and frozen vegetables ($-.006 \pm .402$ times/day versus $-.170 \pm .460$ times/day; $p=.031$) and Chocolate beverages ($-.023 \pm .132$ times/day versus $-.108 \pm .267$ times/day; $p=.016$).

Follow-up Assessment

The impact of the “Project AlimentAzione” on total students’ sample dietary behaviors at Follow-up is reported in Table 4. Intervention students decreased significantly less than control students their intake of Sandwiches ($-.003 \pm .274$ times/day versus $-.099 \pm .340$ times/day; $p=.045$) and Chocolates ($-.001 \pm .293$ versus $-.113 \pm .302$ times/day; $p=.017$). Intervention students increased their intake of White meat compared to control students ($.049 \pm .229$ times/day versus $-.037 \pm .261$ times/day). This difference was statistically significant ($p=.025$).

Other changes were not significant at Follow-up between intervention group and control group but showed several tendencies: intervention students decreased less than control students their intake of Potatoes, tubers and their products ($p=.064$), Potatoes and other tubers ($p=.071$), Other sweet products ($p=.070$), Coffee, tea and substitutes ($p=.073$).

Results by gender

Intervention females increased their intake of Potatoes, tubers and their products while it decreased in control females ($.011 \pm .262$ times/day versus $-.108 \pm .212$ times/day; $p=.021$).

Intervention females showed a tendency to increase their intake of Potatoes and other tubers while it decreased in control females ($p=.064$).

Intervention males increased their intake of Sandwiches while it decreased in control males ($.023 \pm .296$ times/day versus $-.155 \pm .403$ times/day; $p=.031$).

Intervention males decreased significantly less than control males their intake of Vegetables ($-.006 \pm .403$ times/day versus $-.170 \pm .460$ times/day; $p=.031$)

Intervention males showed a tendency to decrease their intake of Preserved products, Biscuits and Coffee, tea and substitutes while those sub-categories intake increased in control males ($p=.091$; $p=.090$ and $p=.059$ respectively).

Intervention males showed a tendency toward the increase of their intake of Chocolates while it decreased in control males ($p=.054$).

Table 2. Comparison between intake frequency (times/day) at Baseline for Intervention and Control students by gender

Baseline Food and drink categories	Females					Males					Total Sample				
	I		C		p-value ^a	I		C		p-value ^a	I		C		p-value ^a
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Grains, grain products and tubers	2.865	0.809	3.029	0.85	0.194	2.901	0.812	2.824	0.836	0.54	2.883	0.808	2.926	0.847	0.623
Breakfast cereals	0.107	0.228	0.14	0.288	0.399	0.199	0.318	0.143	0.301	0.247	0.153	0.28	0.142	0.293	0.724
Pasta and rice	1.167	0.402	1.223	0.409	0.365	1.213	0.374	1.295	0.404	0.167	1.19	0.388	1.259	0.407	0.107
Bread and substitutes	0.593	0.489	0.548	0.484	0.547	0.535	0.482	0.382	0.449	0.033*	0.564	0.485	0.465	0.473	0.056
Wholegrain bread and substitutes	0.011	0.048	0.03	0.143	0.271	0.026	0.118	0.006	0.03	0.142	0.019	0.09	0.018	0.103	0.941
Sandwiches	0.182	0.211	0.277	0.292	0.017*	0.219	0.285	0.259	0.37	0.414	0.2	0.251	0.268	0.332	0.029*
Pizza	0.33	0.273	0.322	0.308	0.848	0.281	0.28	0.256	0.254	0.558	0.306	0.277	0.289	0.283	0.587
Wheat, other cereals and flours	0.027	0.106	0.013	0.058	0.273	0.031	0.118	0.025	0.104	0.732	0.029	0.112	0.019	0.084	0.368
Potatoes, tubers and their products	0.202	0.197	0.213	0.218	0.726	0.182	0.179	0.194	0.227	0.692	0.192	0.188	0.204	0.222	0.598
French fries	0.062	0.104	0.076	0.124	0.409	0.062	0.117	0.082	0.15	0.337	0.062	0.11	0.079	0.137	0.199
Potatoes and other tubers	0.14	0.16	0.137	0.162	0.886	0.12	0.144	0.112	0.156	0.75	0.13	0.152	0.124	0.159	0.745
Salty snacks	0.257	0.288	0.292	0.413	0.503	0.242	0.295	0.269	0.352	0.59	0.25	0.291	0.281	0.383	0.39
Fruits and vegetables	1.116	0.916	1.253	1.093	0.369	0.97	0.924	1.077	0.844	0.433	1.044	0.921	1.165	0.977	0.239
Fruits	0.59	0.59	0.767	0.854	0.126	0.535	0.601	0.607	0.561	0.417	0.563	0.594	0.687	0.725	0.079
Fresh fruits	0.559	0.574	0.735	0.842	0.118	0.512	0.586	0.577	0.563	0.46	0.535	0.579	0.656	0.718	0.082
Nuts, olives, dried fruits	0.032	0.079	0.031	0.087	0.966	0.023	0.066	0.03	0.083	0.519	0.027	0.073	0.031	0.084	0.692
Vegetables	0.526	0.486	0.486	0.441	0.578	0.436	0.443	0.47	0.469	0.622	0.481	0.466	0.478	0.454	0.953
Fresh and frozen vegetables	0.523	0.483	0.48	0.428	0.545	0.433	0.439	0.47	0.469	0.591	0.478	0.462	0.475	0.448	0.953
Meat, fish, eggs and legumes	1.174	0.487	1.16	0.555	0.862	1.177	0.57	1.202	0.503	0.76	1.176	0.529	1.181	0.528	0.919
Meat	0.902	0.426	0.857	0.497	0.522	0.918	0.46	0.917	0.451	0.984	0.91	0.442	0.887	0.474	0.64
Red meat	0.435	0.278	0.405	0.345	0.521	0.428	0.301	0.479	0.343	0.296	0.432	0.289	0.442	0.345	0.758
White meat	0.185	0.192	0.219	0.228	0.292	0.203	0.226	0.212	0.209	0.793	0.194	0.209	0.216	0.218	0.357
Preserved products	0.281	0.268	0.233	0.238	0.218	0.287	0.306	0.225	0.275	0.173	0.284	0.286	0.229	0.256	0.065

Baseline	Females					Males					Total Sample					
	I		C		p-value ^a	I		C		p-value ^a	I		C		p-value ^a	
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD		
Food and drink categories																
<i>Meat, fish, eggs and legumes (continued)</i>																
Fish	0.134	0.156	0.143	0.17	0.701	0.142	0.17	0.171	0.21	0.313	0.138	0.163	0.157	0.191	0.298	
Eggs	0.081	0.132	0.106	0.14	0.21	0.076	0.179	0.089	0.137	0.592	0.078	0.157	0.098	0.138	0.223	
Legumes	0.058	0.148	0.054	0.126	0.836	0.041	0.08	0.025	0.086	0.197	0.05	0.119	0.039	0.108	0.398	
<i>Milk and dairy products</i>	0.983	0.593	1.007	0.712	0.806	0.93	0.552	1.112	0.633	0.044*	0.957	0.572	1.059	0.673	0.123	
Milk	0.65	0.471	0.622	0.506	0.705	0.63	0.427	0.742	0.461	0.096	0.64	0.449	0.682	0.486	0.4	
Yogurt	0.078	0.157	0.099	0.222	0.462	0.046	0.108	0.153	0.28	0.002**	0.062	0.136	0.126	0.253	0.003**	
Cheese and substitutes	0.228	0.248	0.277	0.371	0.324	0.247	0.288	0.2	0.247	0.256	0.238	0.268	0.238	0.317	0.979	
<i>Sweet products and substitutes</i>	1.656	0.866	1.714	0.928	0.672	1.355	0.808	1.457	0.806	0.408	1.506	0.849	1.585	0.876	0.394	
Biscuits	0.419	0.417	0.433	0.416	0.815	0.351	0.386	0.349	0.419	0.976	0.385	0.402	0.391	0.419	0.886	
Candies and gums	0.15	0.225	0.156	0.269	0.869	0.042	0.141	0.087	0.184	0.08	0.096	0.195	0.121	0.232	0.27	
Chocolates	0.19	0.242	0.186	0.276	0.903	0.169	0.303	0.142	0.261	0.543	0.18	0.273	0.164	0.269	0.59	
Other packaged snacks	0.483	0.491	0.586	0.644	0.229	0.512	0.517	0.567	0.601	0.509	0.497	0.503	0.577	0.621	0.185	
Other sweet products	0.342	0.43	0.309	0.441	0.618	0.225	0.313	0.264	0.365	0.459	0.284	0.38	0.286	0.404	0.958	
<i>Other beverages</i>	1.085	0.871	1.043	0.778	0.741	1.189	0.868	1.163	0.826	0.845	1.137	0.869	1.103	0.802	0.712	
Coffee, tea, and substitutes	0.359	0.501	0.303	0.441	0.437	0.413	0.509	0.345	0.515	0.387	0.386	0.504	0.324	0.478	0.245	
Chocolate beverages	0.165	0.313	0.14	0.319	0.607	0.076	0.225	0.161	0.293	0.039*	0.121	0.276	0.15	0.305	0.341	
Fruit juices	0.203	0.34	0.212	0.287	0.854	0.359	0.513	0.342	0.452	0.819	0.281	0.44	0.277	0.383	0.935	
Soft drinks	0.358	0.389	0.388	0.562	0.688	0.341	0.456	0.315	0.414	0.706	0.349	0.423	0.352	0.493	0.96	
<i>Water</i>	1.701	0.886	1.747	0.817	0.722	1.333	0.874	1.408	0.888	0.578	1.518	0.897	1.577	0.867	0.53	

^aIndependent t-Test between intake frequency for Intervention and Control students at Baseline.

Table 3. Impact of the “Project AlimentAzione” nutrition education intervention on food and drink intake frequency at Post-Intervention Assessment for the total sample and by gender

Post-Assessment - Baseline Food and drink categories	Females					Males					Total Sample				
	I		C		p-value ^a	I		C		p-value ^a	I		C		p-value ^a
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Grains, grain products and tubers	-0.458	0.963	-0.829	0.924	0.026*	-0.675	0.845	-0.810	1.105	0.426	-0.567	0.909	-0.820	1.011	0.033*
Breakfast cereals	0.041	0.212	-0.019	0.199	0.096	-0.030	0.290	0.031	0.356	0.285	0.006	0.256	0.005	0.285	0.988
Pasta and rice	-0.128	0.396	-0.247	0.439	0.099	-0.218	0.440	-0.309	0.431	0.242	-0.173	0.420	-0.277	0.435	0.050
Bread and substitutes	-0.124	0.566	-0.137	0.429	0.886	-0.172	0.424	-0.168	0.519	0.959	-0.148	0.499	-0.152	0.472	0.953
Wholegrain bread and substitutes	-0.009	0.053	-0.017	0.091	0.542	-0.012	0.071	0.000	0.041	0.251	-0.011	0.063	-0.008	0.072	0.802
Sandwiches	-0.045	0.202	-0.114	0.223	0.064	-0.032	0.308	-0.068	0.288	0.496	-0.039	0.260	-0.092	0.256	0.097
Pizza	-0.111	0.283	-0.118	0.282	0.881	-0.115	0.205	-0.117	0.294	0.963	-0.113	0.246	-0.118	0.286	0.886
Wheat, other cereals and flours	0.009	0.106	0.002	0.109	0.720	-0.003	0.130	-0.006	0.072	0.874	0.003	0.119	-0.002	0.093	0.726
Potatoes, tubers and their products	-0.071	0.223	-0.118	0.250	0.248	-0.055	0.196	-0.068	0.221	0.721	-0.063	0.209	-0.094	0.237	0.257
French fries	-0.029	0.123	-0.037	0.139	0.722	-0.011	0.141	-0.034	0.128	0.344	-0.020	0.132	-0.035	0.133	0.344
Potatoes and other tubers	-0.042	0.188	-0.081	0.189	0.232	-0.044	0.150	-0.035	0.162	0.724	-0.043	0.169	-0.058	0.177	0.467
Salty snacks	-0.030	0.378	-0.078	0.347	0.446	-0.049	0.284	-0.104	0.310	0.295	-0.039	0.333	-0.091	0.329	0.214
Fruits and vegetables	-0.291	0.581	-0.355	0.818	0.598	-0.103	0.737	-0.454	0.726	0.008**	-0.197	0.669	-0.402	0.773	0.021*
Fruits	-0.154	0.436	-0.224	0.723	0.484	-0.097	0.497	-0.283	0.477	0.033*	-0.125	0.467	-0.253	0.614	0.054
Fresh fruits	-0.144	0.404	-0.212	0.729	0.486	-0.086	0.459	-0.253	0.459	0.040*	-0.115	0.432	-0.232	0.611	0.066
Nuts, olives, dried fruits	-0.010	0.071	-0.012	0.089	0.916	-0.011	0.079	-0.030	0.088	0.200	-0.011	0.075	-0.021	0.089	0.327
Vegetables	-0.137	0.401	-0.131	0.330	0.919	-0.006	0.403	-0.170	0.460	0.031*	-0.071	0.406	-0.150	0.396	0.116
Fresh and frozen vegetables	-0.135	0.405	-0.126	0.317	0.880	-0.006	0.402	-0.170	0.460	0.031*	-0.070	0.408	-0.147	0.391	0.123
Meat, fish, eggs and legumes	-0.299	0.538	-0.375	0.475	0.391	-0.239	0.468	-0.313	0.702	0.469	-0.269	0.503	-0.345	0.593	0.256
Meat	-0.234	0.451	-0.252	0.424	0.817	-0.183	0.437	-0.220	0.564	0.667	-0.208	0.443	-0.237	0.495	0.623
Red meat	-0.138	0.279	-0.125	0.291	0.792	-0.026	0.346	-0.103	0.357	0.217	-0.082	0.319	-0.114	0.323	0.411
White meat	0.001	0.211	-0.007	0.201	0.842	-0.043	0.279	-0.026	0.276	0.728	-0.022	0.248	-0.016	0.239	0.857
Preserved products	-0.097	0.279	-0.120	0.214	0.594	-0.113	0.260	-0.091	0.292	0.646	-0.105	0.269	-0.106	0.254	0.973

Post-Assessment - Baseline	Females					Males					Total Sample					
	I		C		p-value ^a	I		C		p-value ^a	I		C		p-value ^a	
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD		
Food and drink categories																
<i>Meat, fish, eggs and legumes (continued)</i>																
Fish	-0.012	0.197	-0.078	0.172	0.046*	-0.032	0.182	-0.071	0.186	0.233	-0.022	0.189	-0.074	0.178	0.023*	
Eggs	-0.020	0.165	-0.027	0.138	0.782	-0.003	0.129	-0.032	0.185	0.292	-0.012	0.148	-0.030	0.162	0.342	
Legumes	-0.033	0.143	-0.019	0.096	0.519	-0.021	0.084	0.011	0.170	0.159	-0.027	0.117	-0.004	0.137	0.154	
<i>Milk and dairy products</i>	-0.215	0.439	-0.315	0.432	0.191	-0.176	0.458	-0.288	0.636	0.238	-0.196	0.448	-0.302	0.538	0.078	
Milk	-0.153	0.321	-0.226	0.358	0.211	-0.110	0.317	-0.178	0.384	0.268	-0.131	0.318	-0.203	0.370	0.090	
Yogurt	-0.008	0.179	-0.033	0.165	0.409	0.016	0.141	-0.050	0.352	0.136	0.004	0.161	-0.041	0.271	0.088	
Cheese and substitutes	-0.038	0.267	-0.057	0.236	0.678	-0.084	0.276	-0.053	0.241	0.504	-0.061	0.272	-0.055	0.237	0.841	
<i>Sweet products and substitutes</i>	-0.449	0.750	-0.579	0.803	0.336	-0.405	0.672	-0.426	0.612	0.859	-0.427	0.710	-0.505	0.718	0.379	
Biscuits	-0.059	0.378	-0.135	0.425	0.270	-0.096	0.327	-0.081	0.330	0.797	-0.077	0.353	-0.109	0.381	0.483	
Candies and gums	-0.049	0.233	-0.040	0.273	0.833	-0.008	0.108	-0.021	0.132	0.516	-0.028	0.182	-0.031	0.216	0.912	
Chocolates	-0.072	0.252	-0.072	0.228	0.999	-0.054	0.268	-0.061	0.290	0.879	-0.063	0.260	-0.067	0.259	0.901	
Other packaged snacks	-0.108	0.477	-0.233	0.421	0.114	-0.157	0.392	-0.091	0.405	0.348	-0.132	0.436	-0.164	0.418	0.545	
Other sweet products	-0.187	0.332	-0.110	0.353	0.194	-0.081	0.318	-0.163	0.366	0.171	-0.134	0.328	-0.135	0.359	0.964	
<i>Other beverages</i>	-0.176	0.546	-0.252	0.623	0.453	-0.346	0.760	-0.460	0.738	0.389	-0.261	0.666	-0.352	0.686	0.277	
Coffee, tea, and substitutes	-0.003	0.322	-0.042	0.388	0.516	-0.138	0.394	-0.095	0.428	0.550	-0.071	0.365	-0.068	0.407	0.948	
Chocolate beverages	-0.072	0.211	-0.054	0.273	0.657	-0.023	0.132	-0.108	0.267	0.016*	-0.047	0.177	-0.080	0.270	0.234	
Fruit juices	-0.055	0.237	-0.069	0.235	0.727	-0.135	0.414	-0.147	0.359	0.863	-0.095	0.339	-0.107	0.302	0.774	
Soft drinks	-0.046	0.350	-0.086	0.411	0.541	-0.050	0.403	-0.111	0.356	0.373	-0.048	0.377	-0.098	0.384	0.289	
<i>Water</i>	-0.192	0.666	-0.530	0.889	0.012*	-0.192	0.756	-0.278	0.770	0.527	-0.192	0.710	-0.408	0.840	0.024*	

^aIndependent t-Test between intake frequency differences (Post-Assessment – Baseline) for Intervention and Control students.

Table 4. Impact of the “Project AlimentAzione” nutrition education intervention on food and drink intake frequency at Follow-up Assessment for the total sample and by gender

Follow-up - Baseline Food and drink categories	Females					Males					Total Sample				
	I		C		p-value ^a	I		C		p-value ^a	I		C		p-value ^a
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Grains, grain products and tubers	-0.099	0.797	-0.372	0.895	0.124	-0.275	0.795	-0.251	1.028	0.909	-0.182	0.797	-0.322	0.946	0.301
Breakfast cereals	-0.013	0.277	-0.030	0.207	0.748	-0.041	0.336	0.058	0.243	0.180	-0.026	0.305	0.006	0.225	0.457
Pasta and rice	0.022	0.347	-0.028	0.328	0.480	-0.051	0.341	-0.100	0.483	0.610	-0.012	0.345	-0.057	0.397	0.434
Bread and substitutes	-0.059	0.488	-0.116	0.469	0.574	-0.099	0.565	0.072	0.553	0.209	-0.078	0.523	-0.039	0.510	0.636
Wholegrain bread and substitutes	-0.004	0.083	-0.023	0.105	0.322	-0.001	0.148	-0.011	0.038	0.744	-0.003	0.117	-0.018	0.084	0.353
Sandwiches	-0.027	0.253	-0.061	0.287	0.550	0.023	0.296	-0.155	0.403	0.031*	-0.003	0.274	-0.099	0.340	0.045*
Pizza	-0.062	0.285	-0.003	0.338	0.363	0.012	0.221	-0.060	0.194	0.160	-0.027	0.258	-0.026	0.288	0.984
Wheat, other cereals and flours	0.060	0.212	0.015	0.064	0.203	-0.026	0.111	0.008	0.113	0.205	0.019	0.177	0.012	0.086	0.757
Potatoes, tubers and their products	0.011	0.262	-0.108	0.212	0.021*	-0.045	0.203	-0.047	0.225	0.974	-0.015	0.237	-0.083	0.217	0.064
French fries	0.008	0.148	-0.036	0.170	0.182	-0.024	0.129	0.000	0.171	0.498	-0.007	0.139	-0.022	0.170	0.546
Potatoes and other tubers	0.003	0.209	-0.071	0.159	0.064	-0.021	0.186	-0.046	0.170	0.560	-0.008	0.198	-0.061	0.163	0.071
Salty snacks	-0.031	0.396	-0.041	0.370	0.902	-0.048	0.263	-0.028	0.373	0.779	-0.039	0.338	-0.036	0.369	0.948
Fruits and vegetables	-0.224	0.670	-0.226	0.898	0.989	0.028	0.663	-0.063	1.181	0.668	-0.105	0.675	-0.159	1.018	0.677
Fruits	-0.100	0.507	-0.164	0.688	0.604	-0.006	0.491	-0.011	0.927	0.975	-0.056	0.499	-0.101	0.791	0.644
Fresh fruits	-0.096	0.485	-0.148	0.682	0.666	-0.009	0.445	0.016	0.912	0.872	-0.055	0.466	-0.081	0.781	0.787
Nuts, olives, dried fruits	-0.004	0.100	-0.016	0.093	0.550	0.004	0.143	-0.026	0.069	0.309	0.000	0.122	-0.020	0.084	0.245
Vegetables	-0.137	0.401	-0.131	0.330	0.919	-0.006	0.403	-0.170	0.460	0.031*	-0.071	0.406	-0.150	0.396	0.116
Fresh and frozen vegetables	-0.119	0.463	-0.062	0.489	0.568	0.037	0.335	-0.057	0.460	0.309	-0.045	0.413	-0.060	0.474	0.832
Meat, fish, eggs and legumes	-0.137	0.449	-0.165	0.561	0.789	-0.054	0.469	-0.107	0.549	0.660	-0.098	0.458	-0.142	0.553	0.581
Meat	-0.106	0.422	-0.194	0.483	0.349	-0.049	0.388	-0.008	0.498	0.689	-0.079	0.406	-0.118	0.494	0.578
Red meat	-0.052	0.256	-0.075	0.375	0.725	-0.008	0.251	-0.017	0.434	0.913	-0.031	0.254	-0.051	0.398	0.692
White meat	0.033	0.239	-0.052	0.214	0.079	0.067	0.219	-0.015	0.320	0.188	0.049	0.229	-0.037	0.261	0.025*
Preserved products	-0.087	0.318	-0.067	0.285	0.757	-0.108	0.359	0.024	0.241	0.091	-0.097	0.337	-0.030	0.270	0.173

Follow-up - Baseline	Females					Males					Total Sample				
	I		C		p-value ^a	I		C		p-value ^a	I		C		p-value ^a
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Food and drink categories															
<i>Meat, fish, eggs and legumes (continued)</i>															
Fish	0.017	0.196	0.008	0.179	0.832	-0.020	0.183	-0.055	0.242	0.487	-0.001	0.190	-0.018	0.208	0.589
Eggs	-0.018	0.139	0.022	0.162	0.204	0.021	0.146	-0.035	0.182	0.150	0.000	0.143	-0.001	0.172	0.951
Legumes	-0.031	0.146	-0.002	0.146	0.349	-0.006	0.146	-0.010	0.131	0.902	-0.019	0.146	-0.005	0.139	0.543
<i>Milk and dairy products</i>	-0.117	0.465	-0.233	0.501	0.255	-0.062	0.494	-0.173	0.420	0.326	-0.091	0.478	-0.208	0.467	0.118
Milk	-0.069	0.341	-0.154	0.359	0.245	-0.019	0.360	-0.073	0.342	0.527	-0.046	0.349	-0.121	0.351	0.172
Yogurt	0.022	0.198	0.003	0.219	0.668	0.019	0.167	-0.034	0.284	0.307	0.020	0.183	-0.012	0.246	0.325
Cheese and substitutes	-0.051	0.271	-0.079	0.299	0.641	-0.057	0.270	-0.059	0.156	0.974	-0.054	0.269	-0.071	0.250	0.686
<i>Sweet products and substitutes</i>	-0.498	0.807	-0.540	0.827	0.806	-0.260	0.871	-0.080	0.889	0.395	-0.386	0.842	-0.352	0.876	0.801
Biscuits	-0.067	0.466	-0.088	0.390	0.816	-0.052	0.388	0.112	0.415	0.090	-0.060	0.429	-0.006	0.409	0.421
Candies and gums	-0.053	0.202	-0.074	0.274	0.671	-0.016	0.101	0.024	0.176	0.218	-0.036	0.163	-0.034	0.242	0.965
Chocolates	-0.018	0.340	-0.113	0.265	0.149	0.019	0.230	-0.112	0.353	0.054	-0.001	0.293	-0.113	0.302	0.017*
Other packaged snacks	-0.153	0.498	-0.203	0.402	0.609	-0.066	0.570	-0.129	0.726	0.674	-0.112	0.532	-0.172	0.554	0.476
Other sweet products	-0.173	0.306	-0.077	0.418	0.199	-0.112	0.392	0.026	0.448	0.168	-0.144	0.348	-0.035	0.430	0.070
<i>Other beverages</i>	-0.128	0.586	-0.011	0.551	0.330	-0.296	0.847	-0.083	1.117	0.354	-0.207	0.722	-0.040	0.823	0.167
Coffee, tea, and substitutes	-0.006	0.427	0.034	0.390	0.642	-0.148	0.529	0.106	0.591	0.059	-0.073	0.481	0.064	0.480	0.073
Chocolate beverages	-0.055	0.342	-0.047	0.202	0.898	-0.012	0.121	0.016	0.339	0.599	-0.035	0.262	-0.021	0.266	0.743
Fruit juices	-0.042	0.266	0.013	0.227	0.302	-0.090	0.524	-0.088	0.536	0.989	-0.065	0.407	-0.029	0.384	0.567
Soft drinks	-0.025	0.380	-0.011	0.482	0.872	-0.046	0.372	-0.117	0.607	0.527	-0.035	0.375	-0.054	0.535	0.782
<i>Water</i>	-0.140	0.680	-0.063	0.843	0.629	0.151	0.880	-0.106	0.660	0.190	-0.003	0.790	-0.081	0.768	0.527

^aIndependent t-Test between intake frequency differences (Follow-up – Baseline) for Intervention and Control students.

Student satisfaction by the program

Intervention satisfaction level for students is shown in Table 5. Eighty nine percent of intervention students reported that they liked participating in the workshops part of the “*Project AlimentAzione*”; ninety three percent of intervention students reported that they liked the Bread and grains workshop, eighty eight percent of intervention students reported that they liked the Fruit and vegetables workshop, eighty four percent of intervention students reported that they liked the “*MangiaStelle*” board game workshop.

Seventy six percent of intervention students and fifty five percent of control students reported that they liked the part of the project where they were asked to record their own food and drink intake (7-DFR).

Table 5. Intervention satisfaction by students participating at the “Project AlimentAzione” nutrition education intervention

Intervention Satisfaction	Intervention		Control	
	Yes	No	Yes	No
Did you like recording your food and drink intake? ^a	90 (76)	28 (24)	51 (55)	42 (45)
Did you like workshops in the “Project AlimentAzione”? ^a	107 (89)	13 (11)		
Workshop n. 1: Bread and grains	111 (93)	9 (7)		
Workshop n. 2: Fruit and vegetables	106 (88)	15 (12)		
Workshop n. 3: “ <i>MangiaStelle</i> ” board game	96 (84)	19 (16)		

^a Values are n, (%)

Parent satisfaction with students’ dietary habits

Parents’ satisfaction with students’ dietary habits was measured through their stated happiness about their child’s dietary habits at Baseline and Follow-up. . The results are shown in Table 6. In both intervention and control parents the perceived happiness about their child’s dietary habits increased after the participation at the “*Project AlimentAzione*” nutrition education intervention. In particular, intervention parents increased their happiness about their children’s dietary habits from 78% to 83% in mothers and from 79% to 84% in fathers; control parents increased their happiness about their children’s dietary habits from 76% to 83% in mothers and 73% to 78% in fathers.

Table 6. Parents’ satisfaction with students’ dietary habits from mothers and fathers participating at the “Project AlimentAzione” nutrition education intervention

Parents' satisfaction with students' dietary habits	Intervention		Control	
	Yes	No	Yes	No
Are you happy of your child’s dietary habits? (Baseline) ^a				
Mothers	133 (78)	37 (22)	98 (76)	31 (24)
Fathers	121 (79)	33 (21)	88 (73)	33 (27)
Are you happy of your child’s dietary habits? (Follow-up) ^a				
Mothers	88 (83)	18 (17)	58 (82)	13 (18)
Fathers	81 (84)	16 (16)	53 (78)	15 (22)

^a Values are n, (%)

Perceived dietary habit changes by students and parents

Perceived changes in students' dietary habits by students themselves and by parents after the participation at the “*Project AlimentAzione*” are shown in Table 7. The majority of intervention students but not of control students (66% and 47% respectively) declared to have perceived one or more changes in their dietary habits after the completion of the intervention.

The majority of intervention mothers but not of control mothers (60% and 50% respectively) claimed to have perceived one or more changes in their children's dietary habits. The majority of intervention and control fathers (56% and 52% respectively) reported that they perceived one or more changes in their children's dietary habits.

Table 7. Perceived dietary habits changes by students and parents participating at The “*Project AlimentAzione*”

Perceived Changes	Students		Mothers		Fathers	
	Intervention	Control	Intervention	Control	Intervention	Control
Did you see any change in your (your child's) dietary habits? ^{a, b}						
Yes	81 (66)	44 (47)	64 (60)	36 (50)	57 (56)	36 (52)
No	42 (34)	50 (53)	42 (40)	36 (50)	44 (44)	33 (48)
What change did you see in your (your child's) dietary habits? ^{a, c, d}						
I (He/she) eat(s) less snacks	28 (23)	26 (28)	14 (13)	16 (22)	21 (21)	11 (16)
I (He/she) drink(s) less sweetened beverages	14 (11)	17 (18)	14 (13)	6 (8)	11 (11)	7 (10)
I (He/she) eat(s) more vegetables	19 (15)	10 (11)	18 (17)	5 (7)	16 (16)	7 (10)
I (He/she) eat(s) more fruit	11 (9)	8 (9)	8 (8)	5 (7)	12 (12)	4 (6)
I (He/she) eat(s) more fruit and vegetables	34 (28)	22 (23)	24 (23)	9 (13)	15 (15)	7 (10)
I (He/she) pay(s) more attention to what I (he/she) eat(s)	59 (48)	38 (40)	31 (29)	20 (28)	25 (25)	19 (28)
I (He/she) pay(s) more attention to the way I (he/she) eat(s)	14 (11)	5 (5)	8 (8)	4 (6)	10 (10)	7 (10)
Number of changes perceived in your (your child's) dietary habits ^{a, c}						
No changes	26 (21)	30 (32)	40 (38)	30 (42)	40 (39)	29 (42)
One change	44 (36)	25 (27)	31 (29)	25 (35)	26 (26)	25 (36)
Two changes	24 (19)	16 (17)	19 (18)	9 (12)	21 (21)	7 (10)
Three changes	29 (24)	23 (24)	16 (15)	8 (11)	14 (14)	8 (12)

^a Values are n, (%)

^b The question asked to students (In the last year, did you see any change in your food habits?) and to parents (In the last year, did you see any change in your kid's dietary habits?) are here presented together

^c Questions asked to students (What change did you see in your dietary habits?) and their answers (7 close-end perceived changes) are reported here ignoring parenthesis content

^d Questions asked to parents (What change did you see in your child's dietary habits?) and their answers (7 close-end perceived changes) are reported here reading contents in parenthesis

^e Number of changes perceived in students' dietary habits was obtained from the analysis of the questions: “What change did you see in your dietary habits?” and “What change did you see in your kid's dietary habits?”

At the question “What change did you see in your (your child's) dietary habits?” the answer options that were chosen more often were: *I (He/she) pay(s) more attention to what I (he/she) eat(s)* chosen by 48% of intervention students, 40% of control students, 29% of intervention mothers, 28% of control mothers 25% of intervention fathers and 28% of control fathers and *I (He/she) eat(s) more fruit and vegetables* chosen by 28% of intervention students, 23% of control students, 23% of

intervention mothers, 14% of control mothers 15% of intervention fathers and 10% of control fathers.

This question was also analyzed in terms of the individual number of changes perceived by students and by parents and is presented in Table 7. Intervention students that perceived one or more changes were 79% (68% in control students); intervention mothers that perceived one or more changes in their child's dietary habits were 68% (62% in control mothers) and intervention fathers that perceived one or more changes in their child's dietary habits were 61% (58% in control fathers).

Discussion

The “*Project AlimentAzione*” nutrition education intervention was a large study involving 5 middle schools and 5 to 7 classes in each school, resulting in 29 classes and 644 students. Very extensive data from students at baseline were collected through the 7-Days Food Record. Students did this at baseline, then right after the intervention (post-intervention assessment) and then 1-year later (follow-up assessment). They then entered the data into the computer. To test whether they accurately completed this task, a sub-sample of students was controlled in the process of report the data from the paper version and the computer version to examine whether they were the same. The results from this analysis found that they were. Because not all students kept the record/diary for all 7 days (very common) all students who completed at least 4 days were used (also common practice in this field).

The intervention consisted of three 2-hour workshops that addressed the following: (1) Bread and grains; (2) Fruit and vegetables; (3) Balancing energy intake and energy expenditure through a healthy diet. Using statistical methods, the impact of the intervention on the total sample and then on girls and boys separately was analyzed, immediately at post-intervention and then at follow-up a year later.

Baseline assessment showed that the intake of *Grains, grain products and substitutes, Fruit and vegetables, Fish, Legumes, Wholegrain and Water* were lower than the recommended intakes for this age population and that the intake of *Meat (especially Red meat and Preserved meat products), Sweets products and substitutes (especially Other packaged snacks) and Other beverages (especially Soft drink)* were higher than maximum recommended amounts for this age population ⁽⁷⁵⁾.

For the sample as a whole, the intervention increased children's intakes of the categories of *Fruit and vegetables*, and *Grains, grain products and tubers*; and the individual items of *Fish and Water*. At follow-up, the results were less definitive: the individual items of *Sandwiches, White meat, and Chocolate*. Differences by gender at post-intervention assessment and at follow-up assessment highlighted the different impacts of the intervention in boys and girls; in the mid term the intervention was effective in the promotion of *Potatoes and other tubers* in girls and in the promotion of *Vegetables and Sandwiches* in males. Some tendencies were not significant but highlighted the wide impact of the intervention on important energy balance related behaviors as the intake of *Other beverages*, the intake of *Sweet products and substitutes* and the intake of *Milk and dairy products*.

The “*Project AlimentAzione*” seemed more effective in the promotion of healthy dietary behaviors in males than in females. The reasons of this differential impact may be due to the gender of the nutrition educator, who was male, and may thus has

served as a role model to males and/or the relatively healthy dietary pattern of girls (overweight and obesity prevalence was 6.7% among females and 17.3% among males) compared to the dietary pattern of boys, presenting undoubtedly more room for improvement.

Gender differences in intervention impact have been reported in similar studies: in a study by Paw and colleagues, aiming to identify the mediating mechanism of a school-based obesity prevention program (DOiT), intervention found no effect in girls on hypothetical mediators or evidence of any mediating mechanisms; the authors concluded that their findings imply that interventions aimed at energy balance related behavior change should be gender-specific⁽⁷⁶⁾.

A process evaluation was designed to examine satisfaction with the program. Results from these analyses highlighted that: about ¾ of intervention students liked completing the 7-day food record (55% of control students); about 90% liked the workshops and 2/3 of intervention students said that they had made changes as a result of the workshops (47% of control students). Furthermore, parents from both groups seemed to be more satisfied with their children's diets after the intervention.

These findings suggest that the dietary self assessment through the 7-Day Food Record was an important component of the nutrition education intervention; students in intervention and control group were aware of dietary recommendations for fruit and vegetables and spent considerable time analyzing their own dietary patterns, a process that has been shown to increase sense of concern and motivation. This method may have impacted control students and seems the more reasonable explanation of the perceived changes in control students (almost one each two control students perceived a change after the intervention) and the general decrease in the number of foods and drinks reported at post-intervention assessment and follow up assessment in the whole sample. Other explanations for the general decrease in food and drink intake frequency may be seasonality (November at Baseline and March at Post-Intervention), contamination of the intervention effect due to control condition inside the same school of the intervention classes, or students becoming more accurate in the completion of the 7-Days Food Record after the first assessment.

The study has many strengths. First, the 7-Days Food Record provided an extensive description of dietary behaviors. Second, the web-based data entry method allowed students to enter their dietary data relatively quickly and accurately. Third, the collection of extensive information on family food habits from students and from parents through parallel questionnaires⁽¹⁵⁾ was fundamental to put dietary behaviors findings from this research in context. Fourth, the study of the dietary patterns by 7 food and drink categories and 35 food and drinks sub-categories required an enormous amount of work but provided a detailed description of foods and drinks consumed by observed students. Fifth, although its short duration (three two-hours-long workshops), the intervention itself used a play approach of combining knowledge, hands-on activities and games that demonstrated to be effective in the promotion of healthier energy balance related behaviors.

The study has some limitations. First, the self-report was selected as the method for assessing dietary behaviors, because of its ease of use with middle school students. This is the standard method used in almost all school-based interventions, but this limitation should be kept in mind⁽⁵⁸⁾. Second, the portion size of foods and drinks consumed were collected but not analyzed, due to inconsistency and to a large volume of missing data. This exclusion resulted in the quantification of intake

frequencies (times per day a certain food or drink is consumed) rather than weight of food consumed (grams or milliliters per day) or servings (servings per day). Although the intake frequency of a certain food or drink is related to its consumption (¹²), the exclusion to the analysis of portion sizes information make difficult to compare the findings from this study to the ones from other researches (frequently reported as grams or servings per day). Third, the average intake frequency of foods and drinks consumed by day decreased in both groups at post-intervention assessment and at follow-up assessment: this unexpected decrease in both groups may have led to an underestimation of the intervention impact.

Conclusions

In conclusion, the nutrition education intervention was effective in the promotion of some energy balance related dietary behaviors, and highlighted interesting differences in the impact of the intervention in boys and girls. Process evaluation underlined the role of the self-assessment component on the positive changes in some energy balance related dietary behavior in control group together with intervention group. Nevertheless, the impact of the intervention in intervention group was higher than control group due to the play approach promoted in the “Project Alimentazione” nutrition education intervention combining knowledge, hands-on activities and games. The present study reached promising results in participants' dietary behaviors and highlighted the change that intervention students did toward healthier energy balance related behaviors; future interventions should keep in mind the following recommendations: focus on both dietary behaviors and physical activity behaviors, longer intervention intensity and longer duration, the use of a goal-setting educational strategy and the implementation of a tailored web-based component, the definition of a theoretical framework and the measurement of other important behavioral outcomes as autonomy, motivation and self-efficacy.

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APPENDIX

Table 5. Eat more and eat less dietary behaviors promoted (macro-nutrients) in the “*Project AlimentAzione*” nutrition education intervention and expected intervention changes by food and drink category and sub-category ^{a, b, c, d}.

	Eat more		Eat less		expected change
	complex carbohydrates	fiber	simple carbohydrates	saturated fats	
<i>Grains, grain products and tubers</i>	X	var		var	++
Breakfast cereals	X	var	var		+
Pasta and rice	X	var		var	+
Bread and substitutes	X	var			+
Sandwiches	X	var		var	+
Pizza	X	var		var	+
Wheat, other cereals and flours	X	var			+
Potatoes, tubers and their products	X	var			+
Salty snacks	X			X	--
<i>Fruit and vegetables</i>		var	var		++
Fruits		var	var		++
Vegetables		X			++
<i>Meat, fish, eggs and legumes</i>				var	-
Meat				X	-
red meat				X	-
white meat				X	+
preserved products				X	-
Fish				var	+
Eggs				X	-
Legumes		var			+
<i>Milk and dairy products</i>			var	var	+
Milk			X	var	+
Yogurt			var	var	+
Cream				X	-
Cheese and substitutes				X	-
<i>Sweet products and substitutes</i>	var		X	var	--
Biscuits	var	var	var	var	-
Candies and gums			var		-
Chocolates			X	X	-
Ice cream			X	X	-
Other packaged snacks	var		X	X	--
Other sweet products	var		X	X	-
<i>Other beverages</i>					--
Coffee, tea, herbal tea and substitutes			X		-
Chocolate beverages			X		-
Fruit juices			X		-
Other soft drinks			X		--
<i>Water</i>					++
<i>Oils and fats</i>				var	-
<i>Miscellaneous</i>	var	var	var	var	-

^a X indicates the dietary behaviors promoted per food and drink category or sub-category

^b var: indicates the variable amounts of the particular macro nutrient by food and drink category or sub-category

^c increase of intake is primary (++) or secondary (+) expected change of the “*Project AlimentAzione*” nutrition education intervention

^d decrease of intake is primary (--) or secondary (-) expected change of the “*Project AlimentAzione*” nutrition education intervention

Table 6. Eat more and eat less dietary behaviors promoted (foods and drinks) in the “*Project AlimentAzione*” nutrition education intervention and expected intervention changes by food and drink category and sub-category ^{a, b, c, d}.

	Eat more							Eat less				expected change ^a	
	whole grains	vegetables	fruit	white meat	fish	legumes	water	packaged snacks	other beverages	sweets	red meat		preserved products
<i>Grains, grain products and tubers</i>	var	var									var	var	++
Breakfast cereals	var												+
Pasta and rice	var	var			var	var					var	var	+
Bread and substitutes	var											var	+
Sandwiches	var	var									var	var	+
Pizza		var										var	+
Wheat, other cereals and flours	var												+
Potatoes, tubers and their products													+
Salty snacks													--
<i>Fruit and vegetables</i>							var						++
Fruit			X				var						++
Vegetables		X					var						++
<i>Meat, fish, eggs and legumes</i>													-
Meat													-
red meat											X		-
white meat				X									+
preserved products												X	-
Fish					X								+
Eggs													-
Legumes						X							+
<i>Milk and dairy products</i>							var						+
Milk							var						+
Yogurt							var						+
Cream													-
Cheese and substitutes													-
<i>Sweet products and substitutes</i>										X			--
Biscuits	var									X			-
Candies and gums										X			-
Chocolates										X			-
Ice cream			var				var			X			-
Other packaged snacks			var					X		X			--
Other sweet products			var							X			-
<i>Other beverages</i>							var		X				--
Coffee, tea, herbal tea and substitutes							var		X				-
Chocolate beverages							var		X				-
Fruit juices			var				var		X				-
Other soft drinks							var		X				--
<i>Water</i>							X						++
<i>Oils and fats</i>													-
<i>Miscellaneous</i>							var			var	var	var	-

^a X indicates the dietary behaviors promoted per food and drink category or sub-category

^b var: indicates the variable amounts of the particular food and drink by food and drink category or sub-category

^c increase of intake is primary (++) or secondary (+) expected change of the “*Project AlimentAzione*” nutrition education intervention

^d decrease of intake is primary (--) or secondary (-) expected change of the “*Project AlimentAzione*” nutrition education intervention

GENERAL DISCUSSION

The purpose of this study was two-fold: first to investigate dietary patterns of first and second year middle school students from Milan and its province, second to evaluate the impact of a nutrition education intervention on the dietary behaviors of the students of the intervention group compared to the control group.

The “*Project AlimentAzione*” was a large study involving five middle schools of Milan and its province and five to seven classes in each school, resulting in 29 classes and 644 students. Humans eat foods in meals. Yet, there is very little information on how children (or adults) are eating in terms of meals and patterns. Therefore the importance of investigate what middle school children were eating (in particular, their *patterns* of eating) not just a list of foods and how much, nor just calculating the amounts of nutrients in their diets.

Intake frequency by day of foods and drinks showed that the intake of *Grains, grain products and substitutes, Fruit and vegetables, Fish, Legumes, Wholegrain and Water* were lower than the recommended intakes for this age population and that the intake of *Meat (especially Red meat and Preserved meat products), Sweets products and substitutes (especially Other packaged snacks) and Other beverages (especially Soft drink)* were higher than maximum recommended amounts for this age population⁽⁸³⁾.

Intake frequency by meal (breakfast, lunch and dinner) highlighted many interesting patterns of food and drink intake and some protective characteristics of these meal structures.

Investigated breakfast dietary patterns highlighted the importance of breakfast in the daily pattern of intake (18% of foods and drinks consumed throughout the day) and the foods and drinks consumed at breakfast: a good intake of *Milk and dairy products* (34% of breakfast intake), a high intake of *Sweets products and substitutes* (32% of breakfast intake), an high intake of *Other beverages* (16% of breakfast intake) and a low intake *Grains, grain products and substitutes* (14% of breakfast intake).

Lunch and dinner dietary patterns showed their central role in the daily pattern of consumption (29% and 28% of foods and drinks consumed throughout the day respectively) and the variety of foods consumed during main meals: a good intake of grains (30%), a good intake of proteins from the category meat, fish, eggs and legumes (about 19%), a good intake of dairy products (about 5%), few fruit and vegetables (about 15%) and a good consumption of water (about 19%).

Although the variety and healthiness of these dietary patterns, the intake of *Red Meat and Preserved meat products* ($\frac{3}{4}$ of *Meat, fish, eggs and legumes* at main meals) and the consumption of soft drinks ($\frac{3}{4}$ of *Other beverages* at main meals) generate concerns about the high intake of saturated fats, proteins and sugars in the observed students diet. Seems remarkable to underline that the intake of water at lunch and dinner was higher than the intake of *Other beverages*.

Intake frequency by snacks (morning snack, afternoon snack and extra snack) underlined the importance of these 'meals' on the provision of unhealthy foods and drinks to student's diet. Although the intake at snacks was 'just' $\frac{1}{4}$ of daily intake, the intake *Salty snacks*, the intake of *Other packaged snacks* ($\frac{3}{4}$ of *Sweet products and substitutes* at morning snack), the consumption of *Soft drinks* ($\frac{3}{4}$ of *Other beverages* at main meals) and the low consumption of *Fruit and vegetables* generate concerns about the high intake of saturated fats and sugars and the low intake of fiber, vitamins and minerals in the average diet. Seems remarkable to underline that the intake of water at snacks was lower than the intake of *Other beverages* at snacks.

The nutrition education intervention consisted of three 2-hour workshops that addressed the following: (1) Bread and grains; (2) Fruit and vegetables; (3) Balancing energy intake and energy expenditure through a healthy diet. Using statistical methods, the impact of the intervention on the total sample and then on girls and boys separately was analyzed, immediately at post-intervention and then at follow-up a year later.

For the sample as a whole, the intervention increased children's intakes of the categories of *Fruit and vegetables*, and *Grains, grain products and tubers*; and the individual items of Fish and Water. At follow-up, the results were less definitive: the individual items of Sandwiches, White meat, and Chocolate. Differences by gender at post-intervention assessment and at follow-up assessment highlighted the different impacts of the intervention in boys and girls; in the mid term the intervention was effective in the promotion of Potatoes and other tubers in girls and in the promotion of Vegetables and Sandwiches in males.

Some tendencies were not significant but highlighted the wide impact of the intervention on important energy balance related behaviors as the intake of *Other beverages*, the intake of *Sweet products and substitutes* and the intake of *Milk and dairy products*.

The "*Project AlimentAzione*" seemed more effective in the promotion of healthy dietary behaviors in males than in females. The reasons of this differential impact may be due to the gender of the nutrition educator, who was male, and may thus have served as a role model to males and/or the relatively healthy dietary pattern of girls (overweight and obesity prevalence was 6.7% among females and 17.3% among males) compared to the dietary pattern of boys, presenting undoubtedly more room for improvement.

Gender differences in intervention impact have been reported in similar studies: in a study by Paw and colleagues, aiming to identify the mediating mechanism of a school-based obesity prevention program (DOiT), intervention found no effect in girls on hypothetical mediators or evidence of any mediating mechanisms; the authors concluded that their findings imply that interventions aimed at energy balance related behavior change should be gender-specific⁽⁸⁴⁾.

A process evaluation was designed to examine satisfaction with the program. Results from these analyses highlighted that: about ¾ of intervention students liked completing the 7-day food record (55% of control students); about 90% liked the workshops and 2/3 of intervention students said that they had made changes as a result of the workshops (47% of control students). Furthermore, parents from both groups seemed to be more satisfied with their children's diets after the intervention.

These findings suggest that the dietary self assessment through the 7-Day Food Record was an important component of the nutrition education intervention; students in intervention and control group were aware of dietary recommendations for fruit and vegetables and spent considerable time analyzing their own dietary patterns, a process that has been shown to increase sense of concern and motivation⁽⁵⁹⁾. This method may have impacted control students and seems the more reasonable explanation of the perceived changes in control students (almost one each two control students perceived a change after the intervention) and the general decrease in the number of foods and drinks reported at post-intervention assessment and follow up assessment in the whole sample. Other explanations for the general decrease in food and drink intake frequency may be seasonality (November at Baseline and March at Post-Intervention), contamination of the intervention effect due to control condition inside the same school of the intervention classes, or students becoming more accurate in the completion of the 7-Days Food Record after the first assessment.

The study has many strengths. First, the 7-Days Food Record provided an extensive description of dietary behaviors. Second, the web-based data entry method allowed students to enter their dietary data relatively quickly and accurately. Third, the collection of extensive information on family food habits from students and from parents through parallel questionnaires was fundamental to put dietary behaviors findings from this research in context. Fourth, the study of the dietary patterns by 7 food and drink categories and 35 food and drinks sub-categories required an enormous amount of work but provided a detailed description of foods and drinks consumed by observed students.

The study has some limitations. First, the self-report was selected as the method for assessing dietary behaviors, because of its ease of use with middle school students. This is the standard method used in almost all school-based interventions, but this limitation should be kept in mind. Second, the portion size of foods and drinks consumed were collected but not analyzed, due to inconsistency and to a large volume of missing data. This exclusion resulted in the quantification of intake frequencies (times per day a certain food or drink is consumed) rather than weight of food consumed (grams or milliliters per day) or servings (servings per day). Although the intake frequency of a certain food or drink is related to its consumption⁽¹⁵⁾, the exclusion to the analysis of portion sizes information make difficult to compare the findings from this study to the ones from other researches (frequently reported as grams or servings per day). Third, the average intake frequency of foods and drinks consumed by day decreased in both groups at post-intervention assessment and at follow-up assessment: this unexpected decrease in both groups may have led to an underestimation of the intervention impact.

In conclusion, consistently with other studies^(5,42), the dietary patterns of the observed students show that certain characteristics of the Mediterranean diet as a good intake of complex carbohydrates are confirmed while other characteristics as a low consumption of meat, saturated fats and sugars and a high consumption of fruit and vegetables, whole grains, fish and legumes are being lost. The findings from our students from Milan and its province show that the influence of these trends in children and adolescents dietary patterns of intake justify the increasing concerns on future public health and underline the urgent need for nutrition education interventions, even where a strong food culture (the traditionally healthy Mediterranean lifestyle) should have protected youth dietary patterns from the developing *obesogenic* environment our societies are facing nowadays.

Furthermore, the nutrition education intervention was effective in the promotion of some energy balance related dietary behaviors, and highlighted interesting differences in the impact of the intervention in boys and girls. Process evaluation underlined the role of the self-assessment component on the positive changes in some energy balance related dietary behavior in control group together with intervention group. The present study reached promising results in participants' dietary behaviors and highlighted the change that intervention students did toward healthier energy balance related behaviors; future interventions should keep in mind the following recommendations: focus on both dietary behaviors and physical activity behaviors, longer intervention intensity and longer duration, the use of a goal-setting educational strategy, the implementation of a tailored web-based component, the definition of a theoretical framework and the measurement of dietary, activity and inactivity behaviors.

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GENERAL APPENDIX

QUESTIONARIO RAGAZZI INIZIALE

Ricordati che **non ci sono risposte giuste e risposte sbagliate**. Se hai dei dubbi sulla compilazione chiedi pure spiegazioni all'insegnante. Cerca di **rispondere sinceramente** a tutte le domande che ti vengono poste. Se proprio non sai come rispondere ad una domanda lasciala pure in bianco ma cerca di rispondere a più domande che puoi.

1) Scrivi il tuo codice di riferimento:.....(A+B+C).

- A) COD - Scuola:
- B) Classe:
- C) Numero registro:

2) Indica con una croce se sei maschio o femmina.

- maschio
- femmina

3) Quanti anni hai?.....anni

4) Se lo ricordi, indica quanto sei alto/a? cm

5) Se lo ricordi, indica quanto pesi? kg

6) Indica i tre alimenti che ti piacciono di più

- | | | | | |
|--|----------------------------------|------------------------------------|-----------------------------------|--|
| <input type="checkbox"/> pasta | <input type="checkbox"/> frutta | <input type="checkbox"/> pesce | <input type="checkbox"/> pane | |
| <input type="checkbox"/> dolci o merendine | <input type="checkbox"/> verdura | <input type="checkbox"/> legumi | <input type="checkbox"/> uova | |
| <input type="checkbox"/> latte o yogurt | <input type="checkbox"/> carne | <input type="checkbox"/> riso | <input type="checkbox"/> minestra | |
| <input type="checkbox"/> pizza o focaccia | <input type="checkbox"/> salumi | <input type="checkbox"/> formaggio | <input type="checkbox"/> gelato | |

7) Indica i tre alimenti che ti piacciono di meno

- | | | | | |
|--|----------------------------------|------------------------------------|-----------------------------------|--|
| <input type="checkbox"/> pasta | <input type="checkbox"/> frutta | <input type="checkbox"/> pesce | <input type="checkbox"/> pane | |
| <input type="checkbox"/> dolci o merendine | <input type="checkbox"/> verdura | <input type="checkbox"/> legumi | <input type="checkbox"/> uova | |
| <input type="checkbox"/> latte o yogurt | <input type="checkbox"/> carne | <input type="checkbox"/> riso | <input type="checkbox"/> minestra | |
| <input type="checkbox"/> pizza o focaccia | <input type="checkbox"/> salumi | <input type="checkbox"/> formaggio | <input type="checkbox"/> gelato | |

8) Sei mai andato/a a far la spesa con i tuoi genitori?

- si
- no

9) Se lo hai fatto, ti piace?

- si
- no

10) Hai mai aiutato a cucinare?

- si
- no

11) Se lo hai fatto, ti piace ?

- si
- no

12) Scrivi una ricetta che sai cucinare da solo/a.....

.....

.....

.....

.....

13) Scrivi una ricetta che sai cucinare con l'aiuto di un adulto.....

.....

.....

.....

.....

14) I tuoi genitori mangiano frutta fresca tutti i giorni?

- ◇ assolutamente sì
- ◇ più sì che no
- ◇ più no che sì
- ◇ assolutamente no

15) I tuoi genitori fanno colazione tutte le mattine?

- ◇ assolutamente sì
- ◇ più sì che no
- ◇ più no che sì
- ◇ assolutamente no

16) Nella tabella sottostante indica con delle crocette dove fai colazione abitualmente e con che frequenza?

DOVE?	CON CHE FREQUENZA?				
	Una volta al giorno	Due/tre volte alla settimana	Una volta alla settimana	Una volta ogni tanto	Mai
A casa					
Nel tragitto casa-scuola					
Al bar					
A scuola					
Altro luogo(*):					

(*) puoi aggiungere in questa casella altri luoghi in cui fai colazione che non sono stati precedentemente elencati. Ricorda di segnare anche la frequenza con cui vi fai colazione.

17) Nella tabella sottostante indica con delle crocette dove abitualmente pranzi e con che frequenza?

DOVE?	CON CHE FREQUENZA?				
	Una volta al giorno	Due/tre volte alla settimana	Una volta alla settimana	Una volta ogni tanto	Mai
Casa					
Scuola					
Bar o pizzeria					
Casa dei nonni					
Casa di amici					
Altro luogo(*):					

(*) puoi aggiungere in questa casella altri luoghi in cui pranzi che non sono stati precedentemente elencati. Ricorda di segnare anche la frequenza con cui vi pranzi.

18) Con chi pranzi abitualmente e con che frequenza?

CON CHI?	CON CHE FREQUENZA?				
	Una volta al giorno	Due/tre volte alla settimana	Una volta alla settimana	Una volta ogni tanto	Mai
Con i compagni di classe					
Con i miei genitori					
Con fratelli/sorelle					
Con nonni					
Da solo					
Altro(*):					

(*) puoi aggiungere in questa casella altre persone con cui pranzi abitualmente che non sono state precedentemente elencate. Ricorda di segnare anche la frequenza con cui pranzate insieme.

19) Che cosa fai, in genere, mentre mangi la merenda del pomeriggio?

- ◇ guardo la televisione
- ◇ gioco a computer o console
- ◇ parlo con i miei familiari
- ◇ mangio e basta
- ◇ gioco a casa
- ◇ cammino o gioco fuori da casa
- ◇ altro:.....

20) Che cosa fate tu e la tua famiglia, in genere, mentre mangiate?

- ◇ guardiamo la televisione e parliamo poco tra di noi
- ◇ parliamo tra di noi con la televisione accesa
- ◇ parliamo tra di noi con la televisione spenta
- ◇ leggiamo il giornale
- ◇ mangiamo e basta
- ◇ altro:.....

21) Come passi di solito il tuo tempo libero? (rispondi con massimo tre crocette).

- ◇ gioco all'aria aperta
- ◇ faccio sport (calcio, basket, nuoto,.....)
- ◇ guardo la televisione
- ◇ faccio passeggiate e giri in bicicletta
- ◇ gioco al computer o console (play station, game cube,.....)
- ◇ mando messaggi agli amici e gioco col cellulare
- ◇ leggo libri e giornalini
- ◇ altro:.....

22) Prova a pensare al tempo che hai dedicato ad attività fisica vigorosa negli ultimi 7 giorni. Le attività fisiche vigorose sono quelle comportano uno sforzo fisico duro e che ti fanno respirare con un ritmo molto più veloce rispetto al normale. Pensa soltanto a quelle attività che hai svolto per più di 10 minuti consecutivamente. Durante gli ultimi 7 giorni, in quanti giorni hai svolto attività fisica vigorosa?

- ◇ giorni
- ◇ Nessuna attività fisica vigorosa → vai alla domanda 24

23) In media, quanto tempo hai trascorso ogni giorno in questo tipo di attività?

- ore
- minuti
- ◇ Non ricordo → vai alla domanda 24

24) Prova a pensare al tempo che hai dedicato ad attività fisica moderata negli ultimi 7 giorni. Le attività fisiche moderate sono quelle comportano uno sforzo fisico moderato e che ti fanno respirare con un ritmo un po' più veloce rispetto al normale. Pensa soltanto a quelle attività che hai svolto per più di 10 minuti consecutivamente. Escludendo camminare, negli ultimi 7 giorni, quanti giorni hai svolto attività fisica moderata?

- ◇ giorni
- ◇ Nessuna attività fisica moderata → vai alla domanda 26

25) In media, quanto tempo hai trascorso ogni giorno in questo tipo di attività?

- ore
- minuti
- ◇ Non ricordo → vai alla domanda 26

26) Prova a pensare al tempo che hai dedicato a camminare negli ultimi 7 giorni. Pensa soltanto a quei giorni in cui hai camminato per più di 10 minuti consecutivamente. Negli ultimi 7 giorni, quanti giorni hai camminato?

◇ giorni

◇ Nessun giorno per più di 10 minuti consecutivamente → vai alla domanda 28

27) In media, quanto tempo hai trascorso ogni giorno camminando?

..... ore

..... minuti

◇ Non ricordo → vai alla domanda 28

28) Escludendo le ore di sonno, prova a pensare al tempo che hai passato seduto o sdraiato negli ultimi 7 giorni. In media quanto tempo al giorno hai passato seduto o sdraiato?

..... ore

..... minuti

◇ Non ricordo → fine del questionario

GRAZIE PER LA COLLABORAZIONE

Introduzione al DIARIO ALIMENTARE SETTIMANALE

Per compilare correttamente il diario devi fare molta attenzione a:

- ricordare tutto quello che hai mangiato il giorno precedente a quello della compilazione (per non rischiare di dimenticarti puoi **scriverti su un foglietto le cose che hai mangiato** e ricopiarle quando arrivi a scuola)
- se è possibile chiedere a chi cucina per te di dirti **tutti gli ingredienti** di quello che stai mangiando: è molto diverso mangiare la pasta condita con un filo d'olio e mangiarla con ragù, besciamella e formaggio grattugiato.
- ricordarti anche la **quantità** che hai consumato per ogni alimento.

Guarda le immagini riportate nelle prossime pagine per capire cosa si intende con **porzioni GRANDI (G), MEDIE (M) e PICCOLE (P)**. Ricordati che le immagini servono a quantificare quello che hai mangiato: cerca di indicare se la porzione da te consumata di un dato alimento è più simile alla porzione piccola, a quella media o a quella grande dell'alimento di riferimento.

Purtroppo **non è stato possibile riportare le immagini di tutti gli alimenti** esistenti; devi usare le immagini che hai a disposizione come esempio anche per quei piatti che non hanno l'immagine.

Per aiutarti nell'assegnare la dimensione alla porzione consumata ai tuoi piatti puoi fare riferimento alla tabella sottostante che riporta il quantitativo in grammi per le porzioni medie delle principali tipologie di alimenti. Rispetto alle porzioni medie, le porzioni piccole saranno un po' più piccole (circa 20% del peso in meno) e quelle grandi saranno un po' più grandi (circa 20% del peso in più).

GRUPPO DI ALIMENTI	ALIMENTI	PORZIONI	PESO (g)
CEREALI, LORO DERIVATI E TUBERI	Pane	Una rosetta piccola/una fetta media	50
	Prodotti da forno	2-4 biscotti/2-3 fette biscottate	20
	Pasta o riso(*)	1 piatto medio	80
	Pasta fresca all'uovo(*)	1 piatto piccolo	120
	Patate	2 patate piccole	200
FRUTTA E VERDURA	Frutta o spremuta	1 frutto medio (arance, mele)	150
		2 frutti piccoli (prugne, mandarini)	150
	Insalate	1 piatto medio	50
	Ortaggi	1 finocchio/due carciofi	150
CARNE, PESCE, UOVA E LEGUMI	Carne fresca	1 bistecca piccola	70
	Carne stagionata (salumi)	3-4 fette medie di prosciutto	50
	Pesce	1 porzione piccola	100
	Uova	n°1 uovo	60
	Legumi secchi	Una porzione media	30
	Legumi freschi	Una porzione media	80-120
LATTE E DERIVATI	Latte	Un bicchiere	125
	Yogurt	Un vasetto	125
	Formaggio fresco	1 porzione media	100
	Formaggio stagionato	1 porzione media	50
GRASSI DA CONDIMENTO	Olio	Un cucchiaino	10
	Burro	Una porzione	10

(*) in minestra metà porzione

Per quegli alimenti di cui non puoi vedere la foto e non trovi indicazioni nella tabella cerca di stimare tu se la porzione che hai consumato è grande, media o piccola facendo riferimento alle immagini delle pagine seguenti.

Se la quantità di cibo da te mangiata è molto più piccola di una porzione puoi aiutarti con il cucchiaino o con il cucchiaino. Un cucchiaino è pari a circa 10 grammi mentre un cucchiaino è pari a circa 5 grammi. Questi possono servirti in particolare a quantificare l'olio, il burro, lo zucchero, la crema di cacao e noccioline, la marmellata, il miele, etc.

Per le bevande puoi aiutarti col bicchiere: un bicchiere di medie dimensioni è pari a circa 200 ml.

In altri casi, puoi indicare il quantitativo dell'alimento che hai mangiato utilizzando direttamente il peso. Quando puoi utilizza la porzione o il cucchiaino per indicare la quantità ma, in alcuni casi, può risultarti più comodo indicare direttamente i grammi di alimento da te consumato: quando mangi un pacchetto intero di un alimento puoi scrivere sul diario alimentare il nome dell'alimento e il peso da te consumato espresso in grammi utilizzando il peso scritto sulla confezione al posto di utilizzare la porzione o il cucchiaino.

Per esempio, se ieri a cena hai mangiato e bevuto:

1) minestrone di verdura con pasta

quanto era grande il tuo piatto? vedi foto **porzione minestra**; G, M o P?

cosa c'era nel tuo minestrone? (ingredienti: **verdure miste, olio, pasta, parmigiano grattugiato**)

allora riporta nella tabella del diario gli ingredienti e il loro quantitativo: per esempio scrivi una porzione grande di verdure, una media di olio, una piccola di pasta, un cucchiaino di parmigiano grattugiato

2) un pollo arrosto con patate

quanto era grande il tuo piatto? vedi foto **pollo** e **porzione patate**; G, M o P?

cosa c'era nel tuo piatto?(ingredienti: **pollo, olio, patate**)

allora riporta nella tabella del diario gli ingredienti e il loro quantitativo: per esempio scrivi una porzione grande di pollo, un cucchiaino di olio e una porzione grande di patate

3) una mela

quanto era grande la tua mela? vedi tabella porzioni: **porzione frutta**; G, M o P?

cosa c'era nel tuo piatto? (ingredienti: **mela**)

allora riporta nella tabella del diario gli ingredienti e il loro quantitativo: per esempio scrivi una porzione media di mela.

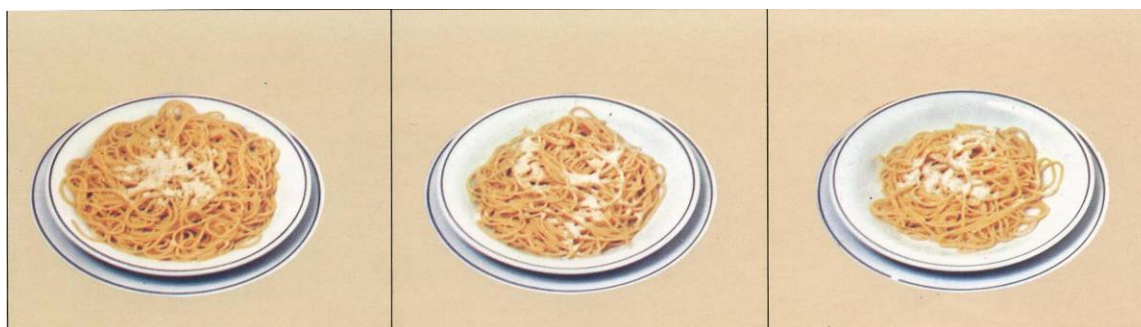
4) 3 bicchieri di acqua

quanto era grande il tuo bicchiere? vedi indicazioni sulle **porzioni bevande**; G, M o P?

per esempio scrivi 3 bicchieri medi d'acqua medi.

Ecco la tabella dell'esempio precedente compilata correttamente

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
VERDURE	G	M	P	PATATE ARROSTO	G	M	P
1 CUCCH. OLIO EXTRA VERGINE D'OLIVA	G	M	P	1 CUCCH. OLIO EXTRA VERGINE D'OLIVA	G	M	P
PASTA	G	M	P	1 MELA	G	M	P
1 CUCCH. PARMIGIANO GRATTUGIATO	G	M	P	3 BICCHIERI D'ACQUA	G	M	P



G

M

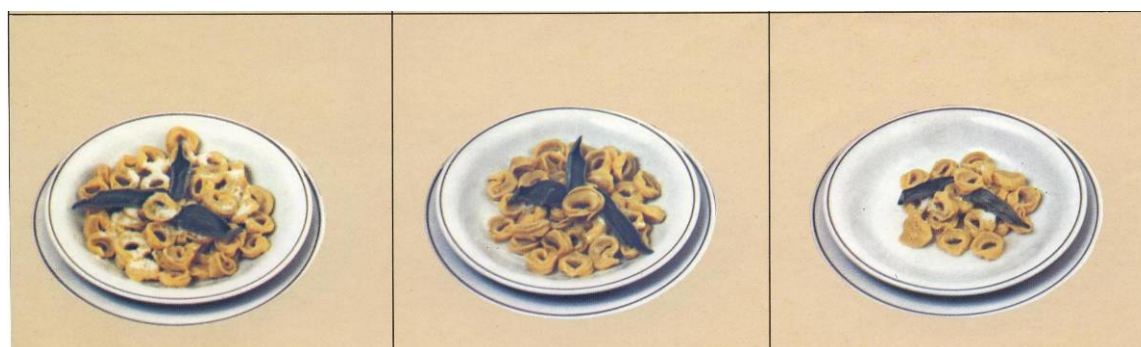
P



G

M

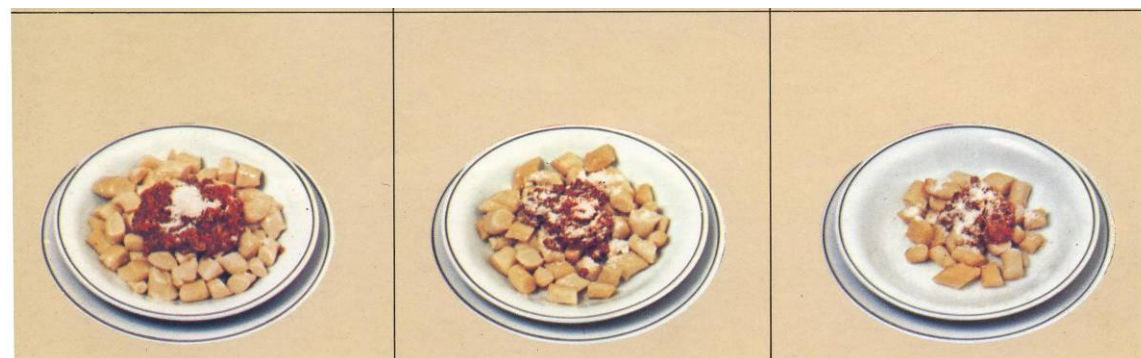
P



G

M

P



G

M

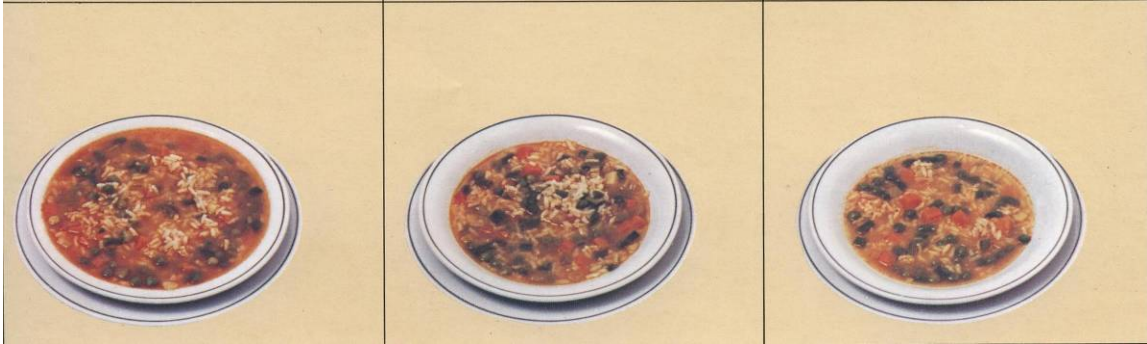
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G

M

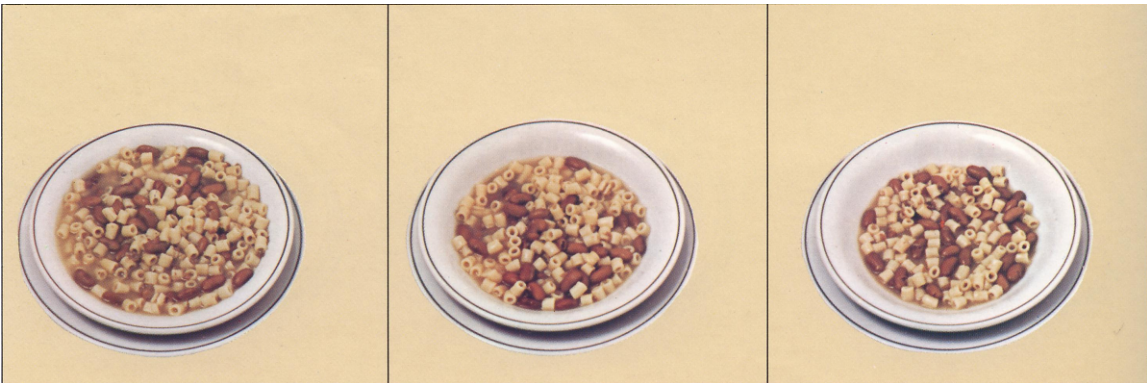
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G

M

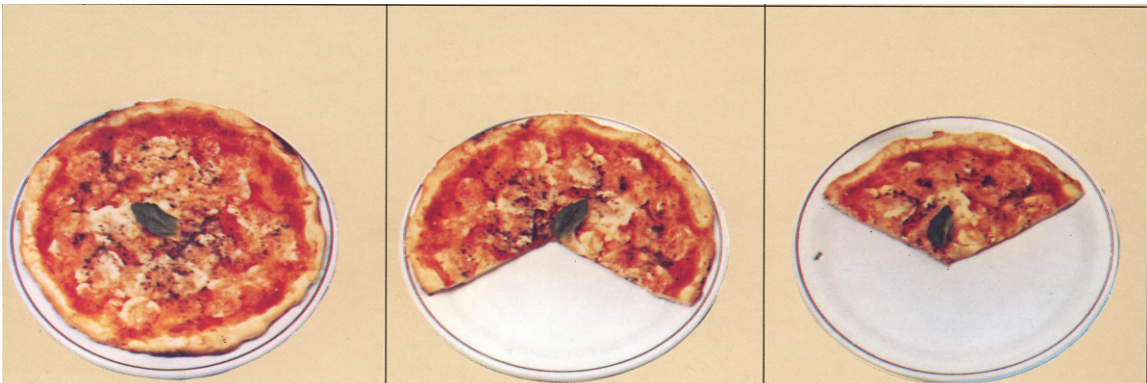
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G

M

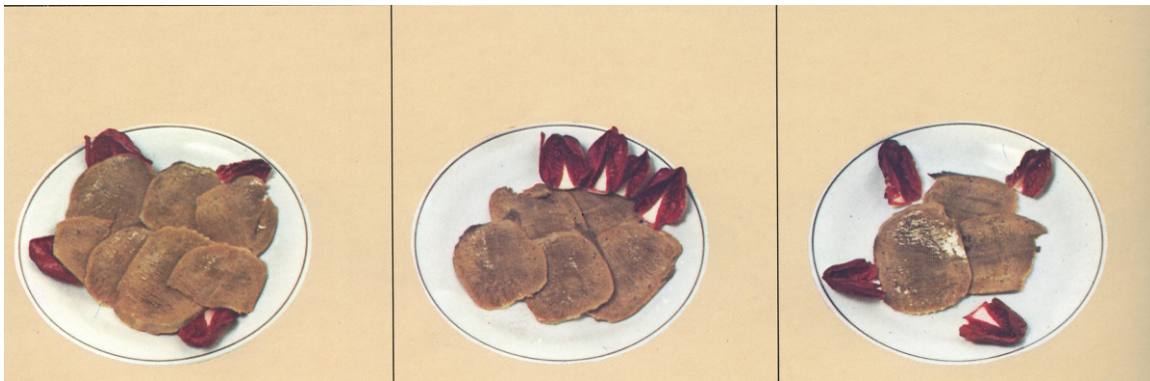
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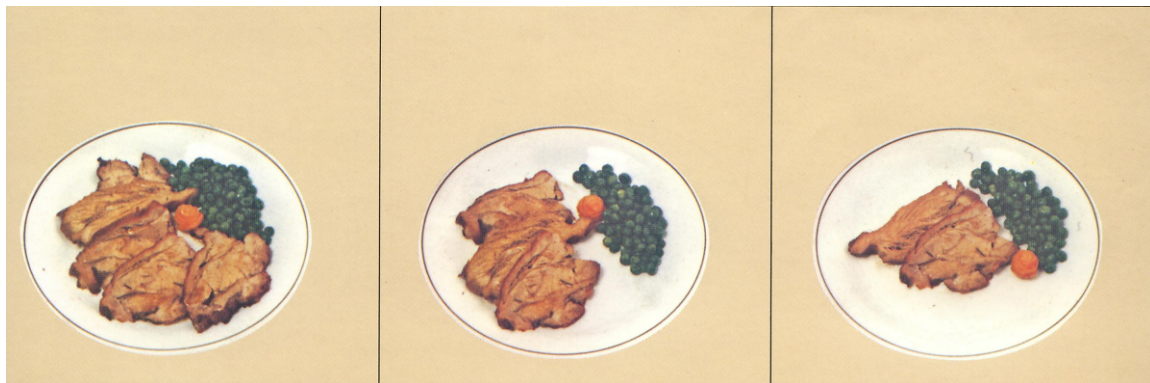
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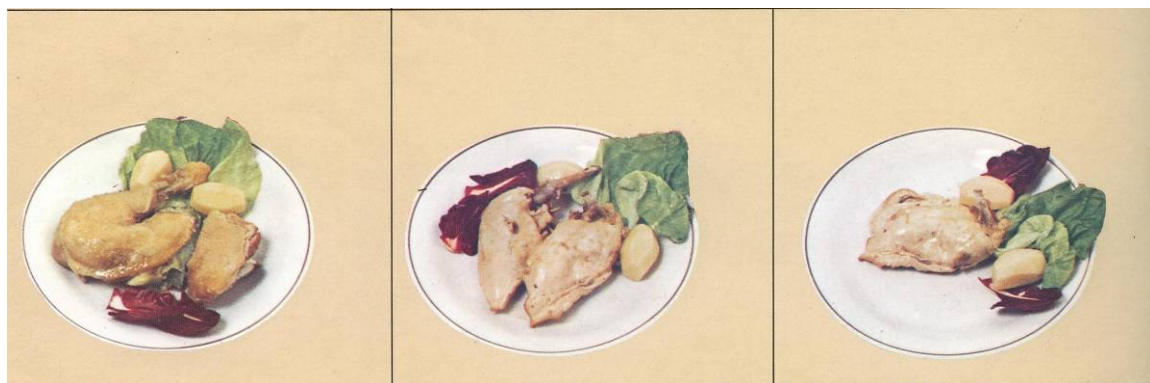
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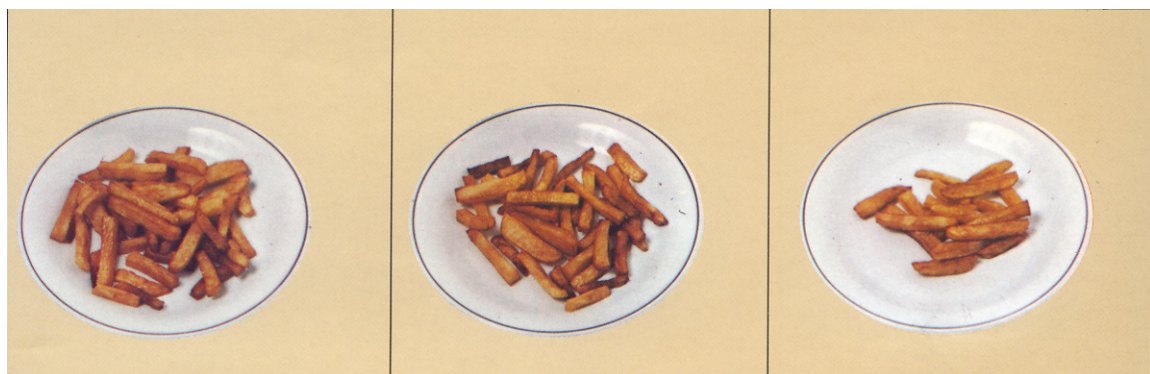
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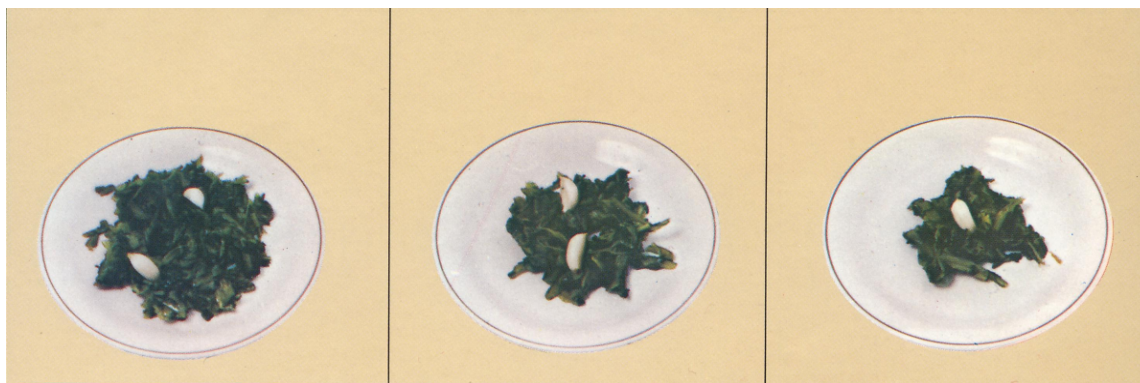
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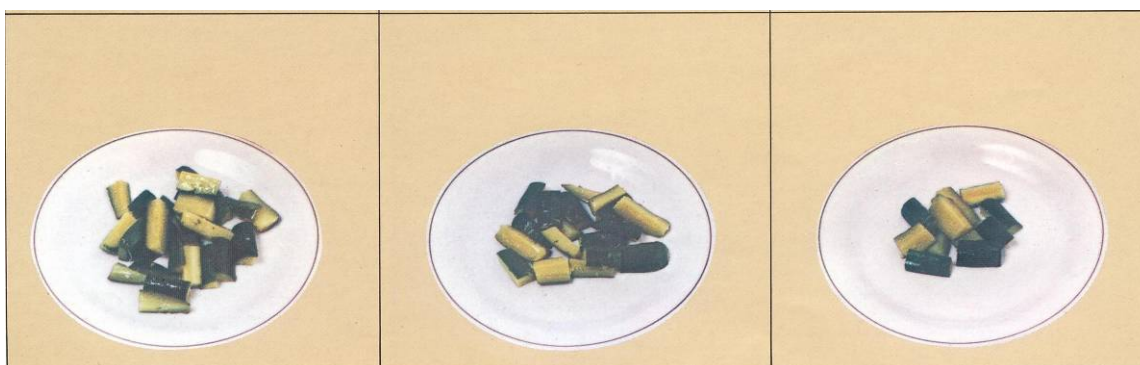
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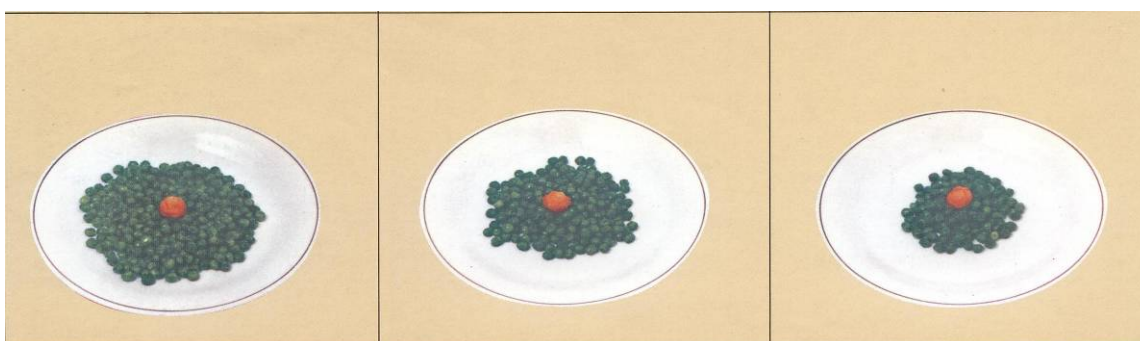
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G

M

P

COSA HAI MANGIATO IERI?

Codice di riferimento.....Giorno: / / 200..

Prova a pensare cosa e quanto hai mangiato e bevuto ieri e a descriverlo più nel dettaglio che puoi: ricordati di non tralasciare niente, neanche se lo ritieni di poco interesse (gomme da masticare, caramelle, bevande di ogni genere e spuntini effettuati ad ogni ora).

1) Cosa e quanto hai mangiato e bevuto a colazione?

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P

2) Cosa e quanto hai mangiato e bevuto nell'intervallo della mattina?

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P

3) Cosa e quanto hai mangiato e bevuto a pranzo?

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P

4) Cosa e quanto hai mangiato e bevuto a merenda?

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P

5) Cosa e quanto hai mangiato e bevuto a cena?

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P

6) Oltre a questi momenti che hai elencato, ti ricordi se hai mangiato qualcos'altro?

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P

7) Oltre a questi momenti che hai elencato, ti ricordi se hai bevuto qualcos'altro?

ALIMENTI e BEVANDE	Porzione			ALIMENTI e BEVANDE	Porzione		
.....	G	M	P	.....	G	M	P
.....	G	M	P	.....	G	M	P

8) Quanto tempo in totale hai dedicato ad attività fisiche vigorose?

..... ore minuti

9) Quanto tempo in totale hai dedicato ad attività fisiche moderate?

..... ore minuti

10) Quanto tempo in totale hai dedicato camminare?

..... ore minuti

11) Escludendo le ore di sonno, quanto tempo in totale hai passato stando seduto o sdraiato?

..... ore minuti

QUESTIONARIO GENITORI INIZIALE

Codice di riferimento (A+B+C):

Si ricordi che **non ci sono risposte giuste e risposte sbagliate**. Cerchi di rispondere sinceramente a tutte le domande che le vengono poste. Il questionario è assolutamente anonimo. La prima parte del questionario dovrebbe essere compilata da entrambi i genitori la seconda parte può essere compilato anche solamente da chi in casa si occupa di cucinare e di fare la spesa. Per ogni domanda indicate una sola risposta, tranne quando espressamente richiesto dalla domanda.

Parte di questionario per la madre dell'alunno:

M1) Et :..... anni

M2) Peso:..... kg

M3) Altezza:..... cm

M4) E' nata in Italia?

s  no

M5) Le piace cucinare?

assolutamente s 

pi  s  che no

pi  no che s 

assolutamente no

M6) Indichi con una croce il massimo titolo di studio da lei conseguito:

scuola elementare

scuola media inferiore

scuola media superiore (diploma)

laurea

altro:.....

M7) Indichi con una croce la sua professione:

dirigente o quadro

impiegato o insegnante

operaio

libero professionista

casalinga

commerciante

altro:.....

M8) Abitualmente mangia frutta fresca tutti i giorni?

assolutamente s 

pi  s  che no

pi  no che s 

assolutamente no

M9) Abitualmente mangia verdura tutti i giorni?

assolutamente s 

pi  s  che no

pi  no che s 

assolutamente no

M10) Abitualmente mangia carne fresca o salumi tutti i giorni?

assolutamente s 

pi  s  che no

pi  no che s 

assolutamente no

M11) Abitualmente fa colazione tutte le mattine?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

M12) Abitualmente, quanti dei tre pasti principali (colazione pranzo e cena) mangia a casa ogni giorno?

- 3 su 3
- 2 su 3
- 1 su 3

M13) Nel complesso, è contenta delle abitudini alimentari di suo/a figlio/a?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

Parte di questionario per il padre dell'alunno:

P1) Età:..... anni

P2) Peso:..... kg

P3) Altezza:..... cm

P4) E' nato in Italia?

- si
- no

P5) Le piace cucinare?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

P6) Indichi con una croce il massimo titolo di studio conseguito:

- scuola elementare
- scuola media inferiore
- scuola media superiore (diploma)
- laurea
- altro:.....

P7) Indichi con una croce la sua professione:

- dirigente o quadro
- impiegato o insegnante
- operaio
- libero professionista
- casalinga
- commerciante
- altro:.....

P8) Abitualmente mangia frutta fresca tutti i giorni?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

P9) Abitualmente mangia verdura tutti i giorni?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

P10) Abitualmente mangia carne fresca o salumi tutti i giorni?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

P11) Abitualmente fa colazione tutte le mattine?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

P12) Abitualmente quanti dei tre pasti principali (colazione pranzo e cena) mangia a casa ogni giorno?

- ◇ 3 su 3
- ◇ 2 su 3
- ◇ 1 su 3

P13) Nel complesso, è contento delle abitudini alimentari di suo/a figlio/a?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

Parte di questionario per chi si occupa di cucinare e di fare la spesa

C1) Vostro figlio/a è nato/a in Italia?

- ◇ si
- ◇ no

C2) Indichi i tre alimenti che piacciono di più a suo figlio/a

- | | | | | |
|---------------------|-----------|-------------|------------|--|
| ◇ pasta | ◇ frutta | ◇ pesce | ◇ pane | |
| ◇ dolci o merendine | ◇ verdura | ◇ legumi | ◇ uova | |
| ◇ latte o yogurt | ◇ carne | ◇ riso | ◇ minestra | |
| ◇ pizza o focaccia | ◇ salumi | ◇ formaggio | ◇ gelato | |

C3) Indichi i tre alimenti che piacciono di meno a suo figlio/a

- | | | | | |
|---------------------|-----------|-------------|------------|--|
| ◇ pasta | ◇ frutta | ◇ pesce | ◇ pane | |
| ◇ dolci o merendine | ◇ verdura | ◇ legumi | ◇ uova | |
| ◇ latte o yogurt | ◇ carne | ◇ riso | ◇ minestra | |
| ◇ pizza o focaccia | ◇ salumi | ◇ formaggio | ◇ gelato | |

C4) Chi si occupa principalmente di fare la spesa e cucinare in casa ?*

- ◇ Mamma
- ◇ Papà
- ◇ Altro:.....

*(la persona indicata nella risposta è tenuta a compilare la parte restante del questionario)

C5) Vostro/a figlio/a si ferma a pranzo alla mensa della scuola?

- ◇ Sì
- ◇ No → vada alla domanda C7

C6) Nei giorni in cui vostro/a figlio/a si ferma a pranzo alla mensa della scuola, nella preparazione della cena tenete in considerazione quello che vostro/a figlio/a ha mangiato a pranzo?

- ◇ Si, gli/le chiedo cosa ha mangiato a pranzo
- ◇ Si, so cosa ha mangiato a pranzo tramite una tabella fornita dal servizio mensa
- ◇ No
- ◇ Altro:

C7) Cosa fate voi e la vostra famiglia, in genere, mentre mangiate?

- ◇ guardiamo la televisione e parliamo poco tra di noi
- ◇ parliamo tra di noi con la televisione accesa
- ◇ parliamo tra di noi con la televisione spenta
- ◇ leggiamo il giornale
- ◇ mangiamo e basta
- ◇ altro:.....

C8) Tra le tipologie di frutta elencate nella tabella sottostante, indichi con una croce quale/i vengono offerte o sono a disposizione di suo figlio/a nella vostra casa e con che frequenza.

TIPOLOGIA DI FRUTTA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Frutta fresca di stagione						
Frutta fresca di stagione sbucciata						
Frutta fresca non di stagione						
Spremuta di frutta						
Frullato di frutta						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di frutta che consuma ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C9) Tra le tipologie di frutta elencate nella tabella sottostante, indichi con una croce quale/i consuma suo figlio/a e con che frequenza.

TIPOLOGIA DI FRUTTA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Frutta fresca di stagione						
Frutta fresca di stagione sbucciata						
Frutta fresca non di stagione						
Spremuta di frutta						
Frullato di frutta						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di frutta che consuma ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C10) Tra le tipologie di verdura elencate nella tabella sottostante, indichi con una croce quale/i vengono offerte o sono a disposizione di suo figlio/a e con che frequenza.

TIPOLOGIA DI VERDURA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Verdura CRUDA da preparare						
Verdura CRUDA pronta da mangiare (già lavata)						
Verdura COTTA						
Verdura SURGELATA						
Verdura sott'olio o sott'aceto						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di verdura che consuma ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C11) Tra le tipologie di verdura elencate nella tabella sottostante, indichi con una croce quale/i consuma suo figlio/a e con che frequenza.

TIPOLOGIA DI VERDURA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Verdura CRUDA da preparare						
Verdura CRUDA pronta da mangiare (già lavata)						
Verdura COTTA						
Verdura SURGELATA						
Verdura sottolio o sottaceto						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di verdura che consuma ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C12) Normalmente, il vostro pranzo e la vostra cena a casa come sono strutturati?

PORTATA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Aperitivo						
Antipasto						
Primo						
Secondo						
Contorno						
Frutta						
Dolce						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di portata che consumate ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C13) Tra le tipologie di condimento elencate nella tabella sottostante, indichi con una croce quale/i utilizza abitualmente in cucina e con che frequenza.

TIPOLOGIA DI PREPARAZIONE	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Olio di oliva extravergine						
Olio di oliva						
Burro						
Olio di seme (monoseme)						
Olio di semi (semi vari)						
Altro: (*)						

(*) è possibile aggiungere in questa casella altre tipologie di condimento che consumate ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C14) Provi a pensare quanti cucchiaini o quanti grammi di condimento (olio o burro) sono contenuti nei piatti che consuma abitualmente suo/a figlio/a a casa. Nella tabella sottostante riporti la quantità di condimento indicativamente presente nel piatto di suo/a figlio/a per le pietanze più comunemente preparate in casa.

PIETANZA	QUANTITA' CONDIMENTO			PIETANZA	QUANTITA' CONDIMENTO		
	1 cucchiaino	2 cucchiaini	3 cucchiaini		1 cucchiaino	2 cucchiaini	3 cucchiaini
Pasta				Insalata			
Riso				Minestra			
Carne				Patate			
Altro: (*)				Altro: (*)			
Altro: (*)				Altro: (*)			

(*) è possibile aggiungere in queste caselle altre tipologie di pietanze che utilizzate ma che non sono stati precedentemente elencati. **Tenga presente che 1 cucchiaino è pari a circa 10 grammi.**

C15) Tra le tipologie di prodotti elencate nella tabella sottostante, indichi con una croce quale/i usa preferibilmente e con quale frequenza.

TIPOLOGIA DI PREPARAZIONE	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Piatti già pronti SURGELATI (Pizza, lasagne, piatti precucinati, surgelati)						
Piatti già pronti FRESCHI o GASTRONOMIA (pizza lasagne o altri piatti refrigerati ma non surgelati)						
Piatti PREPARATI in casa (anche partendo da prodotti SURGELATI)						
Piatti PREPARATI in casa utilizzando soltanto prodotti FRESCHI						
Altro: (*).....						

(*) è possibile aggiungere in questa casella altre tipologie di prodotti che consuma ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C16) Quando acquistate un piatto pronto (surgelato o refrigerato) di solito cosa aggiungete? (massimo due risposte)

- ◇ Olio o burro
- ◇ Formaggi o salumi o altra farcitura (sottaceti, salse, etc.)
- ◇ Sale
- ◇ Acqua
- ◇ Niente
- ◇ Altro:.....

C17) Oltre alle ore di educazione fisica a scuola, vostro figlio/a svolge regolarmente qualche attività fisica o sportiva?

- ◇ assolutamente si → vada alla prossima domanda
- ◇ più sì che no → vada alla prossima domanda
- ◇ più no che sì → fine del questionario
- ◇ assolutamente no → fine del questionario

C18) Oltre alle ore di educazione fisica a scuola, vostro figlio/a che tipo di attività fisica o sportiva svolge regolarmente? (massimo 3 risposte)

- ◇ calcio, basket, pallavolo, nuoto, atletica o altri sport
- ◇ camminate della durata di almeno 10 minuti ciascuna
- ◇ giri in bicicletta, monopattino o simili
- ◇ giochi all'aria aperta in cui si muove molto
- ◇ giochi in casa in cui non si sta seduti o sdraiati
- ◇ altro:.....

Grazie per la collaborazione

QUESTIONARIO RAGAZZI FINALE

Ricordati che **non ci sono risposte giuste e risposte sbagliate**. Se hai dei dubbi sulla compilazione chiedi pure spiegazioni all'insegnante. Cerca di **rispondere sinceramente** a tutte le domande che ti vengono poste. Se proprio non sai come rispondere ad una domanda lasciala pure in bianco ma cerca di rispondere a più domande che puoi.

1) **Scrivi qui il tuo codice di riferimento:**.....

2) **Scrivi qui la tua scuola?**.....

3) **Scrivi qui la tua classe?**.....

4) **Scrivi qui il tuo numero sul registro di classe?**.....

5) **Indica con una croce se sei maschio o femmina.**

maschio

femmina

6) **Quanti anni hai?**.....anni

7) **Se lo ricordi, indica quanto sei alto/a?** cm

8) **Se lo ricordi, indica quanto pesi?** kg

9) **Indica i tre alimenti che ti piacciono di più (massimo 3 crocette)**

pasta frutta pesce pane

dolci o merendine verdura legumi uova

latte o yogurt carne riso minestra

pizza o focaccia salumi formaggio gelato

10) **Indica i tre alimenti che ti piacciono di meno (massimo 3 crocette)**

pasta frutta pesce pane

dolci o merendine verdura legumi uova

latte o yogurt carne riso minestra

pizza o focaccia salumi formaggio gelato

11) **Abitualmente, vai a far la spesa con i tuoi genitori?**

si no

12) **Se ci vai, ti piace?**

si no

13) **Abitualmente, aiuti a cucinare?**

si no

14) **Se lo fai, ti piace ?**

si no

15) **Scrivi una ricetta che sai cucinare da solo/a**

.....
.....
.....
.....

16) **Scrivi una ricetta che sai cucinare con l'aiuto di un adulto**

.....
.....
.....
.....

17) I tuoi genitori mangiano frutta fresca tutti i giorni?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

18) I tuoi genitori fanno colazione tutte le mattine?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

19) Nella tabella sottostante indica con delle crocette dove fai colazione abitualmente e con che frequenza?

DOVE?	CON CHE FREQUENZA?				
	Una volta al giorno	Due/tre volte alla settimana	Una volta alla settimana	Una volta ogni tanto	Mai
A casa					
Nel tragitto casa-scuola					
Al bar					
A scuola					
Altro luogo(*):					

(*) puoi aggiungere in questa casella altri luoghi in cui fai colazione almeno una volta alla settimana che non sono stati precedentemente elencati. Ricorda di segnare anche la frequenza con cui vi fai colazione.

20) Nella tabella sottostante indica con delle crocette dove abitualmente pranzi e con che frequenza?

DOVE?	CON CHE FREQUENZA?				
	Una volta al giorno	Due/tre volte alla settimana	Una volta alla settimana	Una volta ogni tanto	Mai
Casa					
Scuola					
Bar o pizzeria					
Casa dei nonni					
Casa di amici					
Altro luogo(*):					

(*) puoi aggiungere in questa casella altri luoghi in cui pranzi almeno una volta alla settimana che non sono stati precedentemente elencati. Ricorda di segnare anche la frequenza con cui vi pranzi.

21) Con chi pranzi abitualmente e con che frequenza?

CON CHI?	CON CHE FREQUENZA?				
	Una volta al giorno	Due/tre volte alla settimana	Una volta alla settimana	Una volta ogni tanto	Mai
Con i compagni di classe					
Con i miei genitori					
Con fratelli/sorelle					
Con nonni					
Da solo					
Altro(*):					

(*) puoi aggiungere in questa casella altre persone con cui pranzi almeno una volta alla settimana che non sono state precedentemente elencate. Ricorda di segnare anche la frequenza con cui pranzate insieme.

22) Che cosa fai, in genere, mentre mangi la merenda del pomeriggio? (massimo 2 crocette)

- ◇ guardo la televisione
- ◇ gioco a computer o console
- ◇ parlo con i miei familiari
- ◇ mangio e basta
- ◇ gioco a casa
- ◇ cammino o gioco fuori da casa
- ◇ altro:.....

23) Che cosa fate tu e la tua famiglia, in genere, mentre mangiate? (massimo 2 crocette)

- ◇ guardiamo la televisione e parliamo poco tra di noi
- ◇ parliamo tra di noi con la televisione accesa
- ◇ parliamo tra di noi con la televisione spenta
- ◇ leggiamo il giornale
- ◇ mangiamo e basta
- ◇ altro:.....

24) Come passi di solito il tuo tempo libero? (massimo 3 crocette).

- ◇ gioco all'aria aperta
- ◇ faccio sport (calcio, basket, nuoto,.....)
- ◇ guardo la televisione
- ◇ faccio passeggiate e giri in bicicletta
- ◇ gioco al computer o console (play station, game cube,....)
- ◇ mando messaggi agli amici e gioco col cellulare
- ◇ leggo libri e giornalini
- ◇ altro:.....

25) Nell'ultimo periodo hai partecipato all'intervento di educazione alimentare: ti è piaciuto partecipare al progetto compilando i questionari e il diario alimentare?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no
- ◇ non ho partecipato a questa parte del progetto

26) Nell'ultimo periodo hai partecipato all'intervento di educazione alimentare: ti sono piaciuti i laboratori pratici di educazione alimentare (pane e cereali, frutta e verdura, gioco)?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no
- ◇ la mia classe non ha partecipato a questa parte del progetto

27) Se lo hai fatto, ti è piaciuto partecipare al laboratorio pane e cereali?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no
- ◇ la mia classe non ha partecipato a questa parte del progetto

28) Se lo hai fatto, ti è piaciuto partecipare al laboratorio frutta e verdura?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no
- ◇ la mia classe non ha partecipato a questa parte del progetto

29) Se lo hai fatto, ti è piaciuto partecipare al laboratorio in cui è stato fatto il gioco "MangiaStelle" sui 5 gruppi di alimenti?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no
- ◇ la mia classe non ha partecipato a questa parte del progetto

30) Nell'ultimo anno, hai notato dei cambiamenti nelle tue abitudini alimentari?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

31) Se ci sono stati cambiamenti, quali differenze hai notato?

- ◇ faccio più attenzione a quello che mangio
- ◇ faccio più attenzione al modo in cui mangio
- ◇ mangio più frutta
- ◇ mangio più verdura
- ◇ mangio più frutta e più verdura
- ◇ mangio meno snacks (patatine, merendine, etc.)
- ◇ bevo meno bevande zuccherate (cola, aranciata, etc.)
- ◇ altro:.....
-
-

32) Prova a pensare al tempo che hai dedicato ad attività fisica vigorosa negli ultimi 7 giorni. Le attività fisiche vigorose sono quelle che comportano uno sforzo fisico duro, che ti fanno respirare con un ritmo molto più veloce rispetto al normale e che ti fanno sudare. Pensa soltanto a quelle attività che hai svolto per più di 10 minuti consecutivamente. Durante gli ultimi 7 giorni, in quanti giorni hai svolto attività fisica vigorosa?

- giorni
- ◇ Nessuna attività fisica vigorosa → vai alla domanda 34

33) In media, quanto tempo hai trascorso ogni giorno in questo tipo di attività?

- ore
- minuti
- ◇ Non ricordo → vai alla domanda 34

34) Prova a pensare al tempo che hai dedicato ad attività fisica moderata negli ultimi 7 giorni. Le attività fisiche moderate sono quelle che comportano uno sforzo fisico moderato e che ti fanno respirare con un ritmo un po' più veloce rispetto al normale. Pensa soltanto a quelle attività che hai svolto per più di 10 minuti consecutivamente. Escludendo camminare, negli ultimi 7 giorni, quanti giorni hai svolto attività fisica moderata?

- giorni
- ◇ Nessuna attività fisica moderata → vai alla domanda 36

35) In media, quanto tempo hai trascorso ogni giorno in questo tipo di attività?

- ore
- minuti
- ◇ Non ricordo → vai alla domanda 36

36) Prova a pensare al tempo che hai dedicato a camminare negli ultimi 7 giorni. Pensa soltanto a quei giorni in cui hai camminato per più di 10 minuti consecutivamente. Negli ultimi 7 giorni, quanti giorni hai camminato?

- giorni
- ◇ Nessun giorno ho camminato per più di 10 minuti consecutivi → vai alla domanda 38

37) In media, quanto tempo hai trascorso ogni giorno in questo tipo di attività?

- ore
- minuti
- ◇ Non ricordo → vai alla domanda 38

38) Escludendo le ore di sonno, prova a pensare al tempo che hai passato seduto o sdraiato negli ultimi 7 giorni. In media quanto tempo al giorno hai passato seduto o sdraiato?

- ore
- minuti
- ◇ Non ricordo → fine del questionario

GRAZIE PER LA COLLABORAZIONE

QUESTIONARIO GENITORI FINALE

Codice di riferimento:

Si ricordi che **non ci sono risposte giuste e risposte sbagliate**. Cerchi di rispondere sinceramente a tutte le domande che le vengono poste. La prima parte del questionario dovrebbe essere compilata da entrambi genitori prima dalla madre e poi dal padre. La seconda parte del questionario, dalla domanda C1 in poi, dovrebbe essere compilata da chi maggiormente si occupa di cucinare in casa. Siete pregati di indicare una sola risposta per ogni domanda a meno che non venga espressamente indicata nel testo della domanda la possibilità di fornire più di una risposta.

Parte di questionario per la madre dell'alunno:

M1) Et :..... anni

M2) Peso:..... kg

M3) Altezza:..... cm

M4) E' nata in Italia?

- ◇ si
- ◇ no

M5) Le piace cucinare?

- ◇ assolutamente si
- ◇ pi  si che no
- ◇ pi  no che si
- ◇ assolutamente no

M6) Indichi con una croce il massimo titolo di studio da lei conseguito:

- ◇ scuola elementare
- ◇ scuola media inferiore
- ◇ scuola media superiore (diploma)
- ◇ laurea
- ◇ altro:.....

M7) Indichi con una croce la sua professione:

- ◇ dirigente o quadro
- ◇ impiegato o insegnante
- ◇ operaio
- ◇ libero professionista
- ◇ casalinga
- ◇ commerciante
- ◇ altro:.....

M8) Abitualmente mangia frutta fresca tutti i giorni?

- ◇ assolutamente si
- ◇ pi  si che no
- ◇ pi  no che si
- ◇ assolutamente no

M9) Abitualmente mangia verdura tutti i giorni?

- ◇ assolutamente si
- ◇ pi  si che no
- ◇ pi  no che si
- ◇ assolutamente no

M10) Abitualmente mangia carne fresca o salumi tutti i giorni?

- ◇ assolutamente si
- ◇ pi  si che no
- ◇ pi  no che si
- ◇ assolutamente no

M11) Abitualmente fa colazione tutte le mattine?

- ◇ assolutamente si
- ◇ pi  si che no
- ◇ pi  no che si
- ◇ assolutamente no

M12) Abitualmente, durante i giorni lavorativi, quanti dei tre pasti principali (colazione pranzo e cena) mangia a casa ogni giorno?

- ◇ 3 su 3
- ◇ 2 su 3
- ◇ 1 su 3

M13) Nel complesso, è contenta delle abitudini alimentari di suo/a figlio/a?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

M14) Nell'ultimo anno, ha notato dei cambiamenti nelle abitudini alimentari di suo/a figlio/a?

- ◇ assolutamente si → vada alla prossima domanda
- ◇ più si che no → vada alla prossima domanda
- ◇ più no che si → fine del questionario
- ◇ assolutamente no → fine del questionario

M15) Se ci sono stati dei cambiamenti, quali differenze ha notato?

- ◇ fa' più attenzione a quello che mangia
- ◇ fa' più attenzione al modo in cui mangia
- ◇ mangia più frutta
- ◇ mangia più verdura
- ◇ mangia più frutta e più verdura
- ◇ mangia meno snacks (patatine, merendine, etc.)
- ◇ beve meno bevande zuccherate (cola, aranciata, etc.)
- ◇ altro:.....
-
-

Parte di questionario per il padre dell'alunno:

P1) Età:..... anni

P2) Peso:..... kg

P3) Altezza:..... cm

P4) E' nato in Italia?

- ◇ si
- ◇ no

P5) Le piace cucinare?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

P6) Indichi con una croce il massimo titolo di studio conseguito:

- ◇ scuola elementare
- ◇ scuola media inferiore
- ◇ scuola media superiore (diploma)
- ◇ laurea
- ◇ altro:.....

P7) Indichi con una croce la sua professione:

- ◇ dirigente o quadro
- ◇ impiegato o insegnante
- ◇ operaio
- ◇ libero professionista
- ◇ pensionato
- ◇ commerciante
- ◇ altro:.....

P8) Abitualmente mangia frutta fresca tutti i giorni?

- ◇ assolutamente si
- ◇ più si che no
- ◇ più no che si
- ◇ assolutamente no

P9) Abitualmente mangia verdura tutti i giorni?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

P10) Abitualmente mangia carne fresca o salumi tutti i giorni?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

P11) Abitualmente fa colazione tutte le mattine?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

P12) Abitualmente, durante i giorni lavorativi, quanti dei tre pasti principali (colazione pranzo e cena) mangia a casa ogni giorno?

- 3 su 3
- 2 su 3
- 1 su 3

P13) Nel complesso, è contento delle abitudini alimentari di suo/a figlio/a?

- assolutamente si
- più si che no
- più no che si
- assolutamente no

P14) Nell'ultimo anno, ha notato dei cambiamenti nelle abitudini alimentari di suo/a figlio/a?

- assolutamente si → vada alla prossima domanda
- più si che no → vada alla prossima domanda
- più no che si → fine del questionario
- assolutamente no → fine del questionario

P15) Se ci sono stati dei cambiamenti, quali differenze ha notato?

- fa' più attenzione a quello che mangia
- fa' più attenzione al modo in cui mangia
- mangia più frutta
- mangia più verdura
- mangia più frutta e più verdura
- mangia meno snacks (patatine, merendine, etc.)
- beve meno bevande zuccherate (cola, aranciata, etc.)
- altro:.....
-
-

Parte di questionario per chi si occupa di cucinare e di fare la spesa

C1) Vostro figlio/a è nato/a in Italia?

- si
- no

C2) Indichi i tre alimenti che piacciono di più a suo figlio/a

- | | | | |
|--|----------------------------------|------------------------------------|-----------------------------------|
| <input type="checkbox"/> pasta | <input type="checkbox"/> frutta | <input type="checkbox"/> pesce | <input type="checkbox"/> pane |
| <input type="checkbox"/> dolci o merendine | <input type="checkbox"/> verdura | <input type="checkbox"/> legumi | <input type="checkbox"/> uova |
| <input type="checkbox"/> latte o yogurt | <input type="checkbox"/> carne | <input type="checkbox"/> riso | <input type="checkbox"/> minestra |
| <input type="checkbox"/> pizza o focaccia | <input type="checkbox"/> salumi | <input type="checkbox"/> formaggio | <input type="checkbox"/> gelato |

C3) Indichi i tre alimenti che piacciono di meno a suo figlio/a

- | | | | |
|--|----------------------------------|------------------------------------|-----------------------------------|
| <input type="checkbox"/> pasta | <input type="checkbox"/> frutta | <input type="checkbox"/> pesce | <input type="checkbox"/> pane |
| <input type="checkbox"/> dolci o merendine | <input type="checkbox"/> verdura | <input type="checkbox"/> legumi | <input type="checkbox"/> uova |
| <input type="checkbox"/> latte o yogurt | <input type="checkbox"/> carne | <input type="checkbox"/> riso | <input type="checkbox"/> minestra |
| <input type="checkbox"/> pizza o focaccia | <input type="checkbox"/> salumi | <input type="checkbox"/> formaggio | <input type="checkbox"/> gelato |

C4) Chi si occupa principalmente di fare la spesa e cucinare in casa ?*

- mamma
- papà
- altro:.....

*(la persona indicata nella risposta è tenuta a compilare la parte restante del questionario)

C5) Vostro/a figlio/a si ferma a pranzo alla mensa della scuola?

- ◇ si
- ◇ no → vada alla domanda C7)

C6) Nei giorni in cui vostro/a figlio/a si ferma a pranzo alla mensa della scuola, quando preparate la cena siete a conoscenza di quello che vostro/a figlio/a ha mangiato a pranzo?

- ◇ si, gli/le chiedo cosa ha mangiato a pranzo
- ◇ si, so cosa ha mangiato a pranzo tramite una tabella fornita dal servizio mensa o dalla scuola
- ◇ no, non ne sono a conoscenza
- ◇ altro:

C7) Cosa fate voi e la vostra famiglia, in genere, mentre mangiate?

- ◇ guardiamo la televisione e parliamo poco tra di noi
- ◇ parliamo tra di noi con la televisione accesa
- ◇ parliamo tra di noi con la televisione spenta
- ◇ leggiamo il giornale
- ◇ mangiamo e basta
- ◇ altro:

C8) Tra le tipologie di frutta elencate nella tabella sottostante, indichi con una croce quale/i sono a disposizione di suo figlio/a nella vostra casa e con che frequenza.

TIPOLOGIA DI FRUTTA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Frutta fresca di stagione						
Frutta fresca di stagione sbucciata						
Frutta fresca non di stagione						
Spremuta di frutta fresca						
Frullato di frutta fresca						
Altro(*):						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di frutta che consuma almeno una volta alla settimana ma che non sono state precedentemente elencate. Si ricordi di segnare anche la frequenza con cui li consuma.

C9) Tra le tipologie di frutta elencate nella tabella sottostante, indichi con una croce quale/i consuma suo figlio/a e con che frequenza.

TIPOLOGIA DI FRUTTA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Frutta fresca di stagione						
Frutta fresca di stagione sbucciata						
Frutta fresca non di stagione						
Spremuta di frutta fresca						
Frullato di frutta fresca						
Altro(*):						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di frutta che consuma almeno una volta alla settimana ma che non sono state precedentemente elencate. Si ricordi di segnare anche la frequenza con cui li consuma.

C10) Tra le tipologie di verdura elencate nella tabella sottostante, indichi con una croce quale/i sono a disposizione di suo figlio/a nella vostra casa e con che frequenza.

TIPOLOGIA DI VERDURA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Verdura CRUDA						
Verdura CRUDA pronta all'uso (comprata già lavata)						
Verdura COTTA						
Verdura SURGELATA						
Verdura sott'olio o sott'aceto						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di verdura che consuma almeno una volta alla settimana ma che non sono state precedentemente elencate. Si ricordi di segnare anche la frequenza con cui li consuma.

C11) Tra le tipologie di verdura elencate nella tabella sottostante, indichi con una croce quale/i consuma suo figlio/a e con che frequenza.

TIPOLOGIA DI VERDURA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Verdura CRUDA						
Verdura CRUDA pronta all'uso (comprata già lavata)						
Verdura COTTA						
Verdura SURGELATA						
Verdura sottolio o sottaceto						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di verdura almeno una volta alla settimana che consuma ma che non sono state precedentemente elencate. Si ricordi di segnare anche la frequenza con cui li consuma.

C12) Abitualmente, il vostro pranzo e la vostra cena a casa come sono strutturati?

PORTATA	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Aperitivo						
Antipasto						
Primo						
Secondo						
Contorno						
Frutta						
Dolce						
Altro(*):						

(*) è possibile aggiungere in questa casella altre tipologie di portata che consumate almeno una volta alla settimana ma che non sono state precedentemente elencate. Si ricordi di segnare anche la frequenza con cui li consuma.

C13) Quale/i condimenti utilizzate abitualmente in cucina e con che frequenza?

TIPOLOGIA DI PREPARAZIONE	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Olio di oliva extravergine						
Olio di oliva						
Burro						
Olio di seme (monoseme)						
Olio di semi (semi vari)						
Altro: (*)						

(*) è possibile aggiungere in questa casella altre tipologie di condimento che consumate almeno una volta alla settimana ma che non sono state precedentemente elencate. Si ricordi di segnare anche la frequenza con cui li consuma.

C14) Provi a pensare quanti cucchiaini o quanti grammi di condimenti (oli o burro) sono contenuti nei piatti che consuma abitualmente suo/a figlio/a a casa. Nella tabella sottostante riporti la quantità di condimento indicativamente presente nel piatto di suo/a figlio/a per le pietanze più comunemente preparate in casa.

PIETANZA	QUANTITA' CONDIMENTO				PIETANZA	QUANTITA' CONDIMENTO			
	NESSUN CONDIMENTO	1 CUCCHIAIO	2 CUCCHIAIO	3 CUCCHIAIO		NESSUN CONDIMENTO	1 CUCCHIAIO	2 CUCCHIAIO	3 CUCCHIAIO
Pasta					Insalata				
Riso					Minestra				
Carne					Patate				
Altro: (*)					Altro: (*)				
Altro: (*)					Altro: (*)				

(*) è possibile aggiungere in queste caselle altre tipologie di pietanze che preparate spesso nella vostra casa ma che non sono stati precedentemente elencati. **Tenga presente che 1 cucchiaino è pari a circa 10 grammi di condimento.**

C15) Tra le tipologie di prodotti elencate nella tabella sottostante, indichi con una croce quale/i usa preferibilmente e con quale frequenza.

TIPOLOGIA DI PREPARAZIONE	CON CHE FREQUENZA?					
	Più di una volta al giorno	Una volta al giorno	Una volta ogni 2/3 giorni	Una volta alla settimana	Una volta ogni tanto	Mai
Piatti già pronti SURGELATI (Pizza, lasagne, piatti precucinati, surgelati)						
Piatti già pronti FRESCHI o GASTRONOMIA (pizza lasagne o altri piatti refrigerati ma non surgelati)						
Piatti PREPARATI in casa (anche partendo da prodotti SURGELATI)						
Altro: (*).....						

(*) è possibile aggiungere in questa casella altre tipologie di prodotti che consuma almeno una volta alla settimana ma che non sono stati precedentemente elencati. Si ricordi di segnare anche la frequenza con cui li consuma.

C16) Quando acquistate un piatto pronto (surgelato o refrigerato) di solito cosa aggiungete? (massimo 3 risposte)

- ◇ Olio o burro
- ◇ Formaggi o salumi o altra farcitura (sottaceti, salse, etc.)
- ◇ Sale
- ◇ Acqua
- ◇ Niente
- ◇ Altro:.....

C17) Oltre alle ore di educazione fisica a scuola, vostro figlio/a svolge regolarmente qualche attività fisica o sportiva?

- ◇ assolutamente si → vada alla prossima domanda
- ◇ più si che no → vada alla prossima domanda
- ◇ più no che si → fine del questionario
- ◇ assolutamente no → fine del questionario

C18) Oltre alle ore di educazione fisica a scuola, vostro figlio/a che tipo di attività fisica o sportiva svolge regolarmente? (massimo 3 risposte)

- ◇ calcio, basket, pallavolo, nuoto, atletica o altri sport
- ◇ camminate della durata di almeno 10 minuti ciascuna
- ◇ giri in bicicletta, monopattino o simili
- ◇ giochi all'aria aperta in cui si muove molto
- ◇ giochi in casa in cui non si sta seduti o sdraiati
- ◇ altro:.....

Grazie per la collaborazione