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Breakfast Skipping and Determinant Factors among Moroccan School Adolescents (12–19 Years): The Case of Beni Mellal City

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Keywords
Skipping breakfast consumption · School-aged children · Beni Mellal · Morocco

Abstract

Introduction: Breakfast skipping is an unhealthy eating behavior reportedly common among adolescents. The aim of the present study was to determine the prevalence and factors associated with breakfast skipping among schoolchildren aged 12–19 years in Beni Mellal city, Morocco, and to assist in the design of interventions to improve breakfast consumption habits of school-aged children in this region. ***Methods:*** A school-based cross-sectional study was carried out. A total of 550 children were included in the study. Multivariable logistic regression analysis was used to identify factors associated with skipping breakfast consumption. The association between dependent and independent variables was assessed using an odds ratio (OR) with a 95% confidence interval and p value <0.05 was considered statistically significant. ***Results:*** Among 550 Moroccan adolescents evaluated, 25.6% reported not consuming breakfast every day. Breakfast eating was statistically associated with gender (OR = 7.13 [95% CI 1.32–3.84], $p = 0.008$); mother's low educational level (OR = 2.86 [95% CI 1.89–4.71], $p = 0.091$); nonworking mothers (OR = 13.71 [95% CI 1.16–5.29], $p < 0.001$); not eating between meals (OR = 15.49 [95% CI 2.15–5.49], $p < 0.001$); eating dinner regularly each day (OR = 17.79 [95% CI 2.81–8.01], $p = 0.005$); eating vegetables 1–3 times per week (OR = 10.21 [95% CI 1.44–4.67], $p = 0.001$); consuming milk and dairy product 1–3 times per week (OR = 13.88 [95% CI 1.59–5.56], $p < 0.001$); and never consuming sodas and soft drink in week (OR = 3.12 [95% CI 1.90–4.50], $p = 0.003$). ***Conclusions:*** This study revealed that the prevalence of skipping breakfast consumption among school-aged children in Beni Mellal city was high. Thus, the findings suggest a community health education program, conducted by school nurses, nutritionists, and other health professionals, is needed.

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Fatores determinantes para não tomar o pequeno-almoço entre adolescentes escolares marroquinos (12–19 anos): o caso da cidade de Beni Mellal

Palavras Chave
Pequeno-almoço · Crianças em idade escolar · Beni Mellal · Marrocos

Resumo
Introdução: Não tomar o pequeno-almoço é um comportamento alimentar não saudável supostamente comum entre adolescentes. O objetivo do presente estudo foi determinar a prevalência e os fatores associados com o não consumo do pequeno-almoço entre crianças em idade escolar dos 12 aos 19 anos na cidade de Beni Mellal, Marrocos, e contribuir para o desenho de intervenções para melhorar os hábitos de consumo do pequeno-almoço de crianças em idade escolar em esta região. ***Métodos:*** Foi realizado um estudo transversal de base escolar. Um total de 550 crianças foram incluídas no estudo. A análise de regressão logística multivariada foi usada para identificar os fatores associados à omissão do consumo do pequeno-almoço. A associação entre variáveis dependentes e independentes foi avaliada por meio de odds ratio com intervalo de confiança de 95% e valor de $p < 0.05$ foi considerado estatisticamente significativo. ***Resultados:*** Entre os 550 adolescentes marroquinos avaliados, 25.6% relataram não tomar o pequeno-almoço todos os dias. Tomar o pequeno-almoço foi estatisticamente associado ao sexo (Odds Ratio (OR) = 7.13 [IC 95% 1.32–3.84], $p = 0.008$); à baixa escolaridade da mãe (OR = 2.86 [IC 95% 1.89–4.71], $p = 0.091$); mães não trabalhadoras (OR = 13.71 [IC 95% 1.16–5.29], $p < 0.001$), não comer entre as refeições (OR = 15.49 [IC 95% 2.15–5.49], $p < 0.001$); jantar regularmente todos os dias (OR = 17.79 [IC 95% 2.81–8.01], $p = 0.005$); comer vegetais 1 a 3 vezes por semana (OR = 10.21 [IC 95% 1.44–4.67], $p = 0.001$); consumir leite e derivados de 1 a 3 vezes por semana (OR = 13.88 [IC 95% 1.59–5.56], $p < 0.001$) e nunca beber refrigerantes durante a semana (OR = 3.12 [IC 95% 1.90–4.50], $p = 0.003$). ***Conclusões:*** Este estudo revelou que a prevalência da falta de consumo de pequeno-almoço entre crianças em idade escolar na cidade de Beni Mellal foi alta. Assim, os resultados sugerem que é necessário um programa de educação em saúde da comunidade, conduzido por nutricionistas e outros profissionais de saúde.

Introduction

The provision of energy and nutrients throughout the day is extremely important and breakfast has been considered an important dietary factor for energy regulation [1]. Moreover, in the 1980s, some studies reported that breakfast could play an important role in the prevention of adult chronic diseases such as heart disease, cancer, diabetes, and osteoporosis [2]. Missing breakfast on the other hand has been associated with adverse effects on cognitive function (including memory), academic performance, school attendance, psychosocial function, and mood in children and young people [3]. Furthermore, reduced breakfast energy intake is associated with a higher total daily energy intake [4], and when breakfast is skipped, it can be difficult to properly compensate for it later in the day. For example, those people who skipped breakfast are reported to have higher daily intakes of fat, cholesterol, and energy, and lower intakes of fiber, vitamins, and minerals in comparison to breakfast eaters, thereby increasing the likelihood of gastrointestinal disease later in life [5].

Evidence suggests that breakfast skipping is most prevalent among females, older children, and adolescents [6]. Commonly reported reasons for breakfast skipping among children and adolescents include those related to a lack of time, enjoyment of breakfast, feelings of hunger in the morning, and weight control [7]. Further, as with much health-related behavior, breakfast skipping is socioeconomically patterned and tends to cluster with other unhealthy behaviors such as poor diet, exercise, and sleep habits [8].

Nowadays, in Morocco, the focused agenda is undernutrition, but there is evidence for nutrition transition, particularly in urban areas which might contribute to overnutrition. In Morocco, particularly in the study area, there was no information regarding the prevalence and contributing factors of breakfast skipping among schoolchildren. Hence, the current survey was conducted among schoolchildren in the Beni Mellal city with the aim of documenting the prevalence of skipping breakfast. A longer term goal was to use the survey results to assist with the design of interventions to change breakfast consumption habits to ensure enough energy and nutrient intake in the morning among school-aged children.

Methods

Study Participants and Data Collection

As part of a research program on the health and hygiene of the schoolchildren population of the Beni Mellal-Khenifra region, we conducted, in 2017, a retrospective cross-sectional

Table 1. Anthropometrics and breakfast eating of the study sample

	Boys	Girls	Total	*p* value (χ^2 test)
Subjects	255 (46.4)	295 (53.6)	550 (100)	–
Age group				
12–14 years	27 (10.60)	34 (11.50)	61 (11.10)	
15–17 years	140 (54.9)	175 (59.3)	315 (57.3)	1.816
18–19 years	84 (34.50)	86 (29.20)	174 (31.60)	
Age, years	14.91±1.86	14.59±1.65		0.380
Weight, kg	53.34±10.78	52.19±9.26		0.177
Height, cm	159.58±11.34	156.36±7.46		**0.001**
BMI, kg/m^2	20.82±3.32	21.33±3.36		0.077
Breakfast eating				
Yes	202 (79.20)	207 (70.20)	409 (74.40)	
No	53 (20.80)	88 (29.80)	141 (25.60)	**0.015**

SD, standard deviation. Values are given as *n* (%) or mean ± SD.

survey in some public schools in the Beni Mellal city, and a sample of 550 schoolchildren aged 12–19 years old was established.

Ethics Statement

Written approval was obtained from the Regional Academy for Education in Beni Mellal before the initiation of the study on April 4, 2016 (reference no. 38/16). Permission to approach schools in the study area was also obtained from the school authorities involved. The participation was voluntary and anonymous. Participants were informed about the study objective. All data were confidential and protected at all stages of the study.

Sample Size and Sampling Procedures

A cross-sectional school-based study was conducted among 550 healthy children aged between 12 and 19 years old from urban public schools in Beni Mellal city in the year 2017. The sample size was calculated using a single proportion formula by considering the following assumptions: the prevalence of breakfast skipping among schoolchildren (12–19 years) was unknown and taken as 50%, margin of error of 5%, confidence level of 95%, 10% non-response rate, and a design effect of 1.5. The final sample size was 550.

A multi-stage sampling technique was carried out. Primary sampling units were selected from schools (middle and high schools). By taking 20% of both middle and high schools, which are two middle and two high schools, were included in the study. The lottery method was used to select schools; for each selected school, the samples were allocated proportionally to the number of students with respect to grade level. The secondary sampling unit was randomly selected students from each selected grade and section. Proportional allocation of the sample to the total number of students was made and 315 students from colleges and 235 students from high schools with a total of 550 students were included in the study using a systematic random sampling technique.

Data Quality Control

For data quality control, a pretest on 5% of the samples was performed and regular supervision during data collection was also carried out. The completeness of the questionnaire was checked before data entry too.

Questionnaire and Measures

The questionnaire used in this study was adapted from that of previous studies conducted in Morocco [9–11]. Its validity was examined in a pilot of 25 schoolchildren, which showed that it was acceptable and understandable. The questionnaire contains information on demographic and socioeconomic variables, eating habits, physical activity, and sedentary time.

We defined breakfast per the Student Nutrition Dietary Assessment, which is any food or beverage consumption between awakening and 45 min after the start of school [12, 13]. Subjects who did not consume breakfast on one of 2 days or neither day were categorized as breakfast skippers, while those who consumed breakfast on both days were classified as breakfast eaters [14].

Parents' education level was categorized into three groups. Parents who had never attended school or only koranic or primary school were considered to have a low educational level; a medium level of education corresponded to secondary education (junior to senior high school), and a high educational level corresponded to higher education and university. The monthly income of the family was used as a class variable in the following categories: low socioeconomic level, income <3,000 Moroccan dirhams (MAD; 1 MAD = 0.09 Euro) per month; medium level, income of 3,000–8,000 MAD per month; and high socioeconomic level, a salary above 8000 MAD per month.

Height and body weight were measured for all participants by trained research staff; body weight was measured to the nearest 0.1 kg using a digital scale (Seca 877, Seca, Hamburg, Germany) and height was recorded to the nearest 0.1 cm using a wall-mounted stadiometer (Seca 216). Measurements were taken for each participant with light clothing and without shoes, and body mass index (BMI) was

Table 2. Breakfast consumption prevalence among schoolchildren according to demographic characteristics

	Breakfast eating (n = 550)		p value (χ^2 test)
	yes, N (%)	no, N (%)	
Gender			
Boys	202 (79.20)	53 (20.80)	
Girls	207 (70.20)	88 (29.80)	
Total	409 (74.40)	141 (25.60)	**0.015**
Age group			
12–14 years	47 (77.0)	14 (23.0)	
15–17 years	232 (73.7)	83 (26.30)	
18–19 years	130 (74.70)	44 (25.30)	0.850
Father's educational level			
Low	136 (80.0)	34 (20.0)	
Medium	169 (75.80)	54 (24.2)	
High	104 (66.20)	53 (33.80)	**0.014**
Mother's educational level			
Low	237 (79.80)	60 (20.20)	
Medium	144 (72.70)	54 (27.30)	
High	28 (50.90)	27 (49.10)	<**0.001**
Average family income (MAD per month)			
Low	88 (72.20)	33 (27.30)	
Medium	121 (74.20)	42 (25.80)	
High	200 (75.20)	66 (24.85)	0.875
Mothers' occupation			
Working	28 (47.50)	31 (52.50)	
Housewife	375 (77.60)	108 (22.40)	<**0.001**
Household size			
≤3	34 (68.0)	16 (32.0)	
4–6	301 (72.7)	113 (27.30)	
>6	74 (86.0)	12 (14.0)	**0.020**
Personal room			
Yes	175 (72.50)	65 (27.10)	
No	234 (75.50)	76 (24.50)	0.494
TV or computer in the personal room			
Yes	120 (75.50)	39 (24.50)	
No	289 (74.30)	100 (25.70)	0.774

calculated as weight in kilograms divided by height in meters squared. Children's corpulence was classified according to the WHO reference curves (2007) for children aged 5–19 years [15].

Statistical Analysis

The prevalence of skipping breakfast was determined from one survey item and in relation to demographic characteristics and some lifestyle habits. Multiple logistic regression analysis was used to ascertain factors associated with breakfast eating. In multiple logistic regression analysis, eating breakfast daily was considered the dependent variable, and the following as independent variables: demographic characteristics and dietary behaviors.

Quantitative data were inputted using EpiData (Version 3.1). Statistical analysis was carried out using Statistical Package for Social Sciences, version 19.0 (SPSS, Chicago, IL, USA) software. Data are presented as the mean ± standard deviation for continuous variables and proportions for categorical variables. The χ^2 test was used to assess statistical significance between the dependent variable (breakfast skipping) and potential explanatory variables. All significant variables in the χ^2 test analysis ($p < 0.05$) were considered in the multivariate logistic regression model to determine independent factors associated with breakfast skipping.

Results

We included 550 school-aged children (295 girls and 255 boys) with mean ages of 14.91 ± 1.86 years for boys and 14.59 ± 1.65 years for girls. Table 1 shows the anthropometric characteristics and the breakfast eating habits. No significant differences were found between boys and girls in age and weight. The prevalence of skipping breakfast consumption was 25.6%. Skipping breakfast consumption prevalence among girls was significantly higher compared to boys (29.8% vs. 20.8%) (Table 1).

The prevalence of skipping breakfast consumption in relation to demographic characteristics is shown in Table 2. We found a statistically significant association between the parent's educational level and the habit of breakfast eating by adolescents ($p < 0.001$); the high prevalence of breakfast skipping was more prevalent among adolescents of parents with a higher level of education and working mothers ($p < 0.001$). No significant association was found between the age of schoolchildren, family income, and breakfast skipping habits in adolescents.

Eating habits of breakfast eater adolescents as depicted in Table 3 show a statistically significant relationship between the eating breakfast habit and eating between meals ($p = 0.001$); eating dinner regularly each day ($p = 0.01$); the frequency of consumption of milk and dairy products ($p < 0.001$); the vegetable consumption ($p = 0.001$); the consumption of sodas and soft drinks ($p = 0.046$); the consumption of cake, pastry, and biscuit ($p < 0.001$); and the consumption of fast food ($p = 0.004$).

In the multivariate logistic regression analysis (Table 4), eating breakfast was significantly associated with gender (odds ratio [OR] = 7.13 [95% CI 1.32–3.84], $p = 0.008$); mother's low educational level (OR = 2.8 [95% CI 1.89–4.71], $p = 0.091$); housewife mothers (OR = 13.71 [95% CI 1.16–5.29], $p < 0.001$); not eating between meals (OR = 15.49 [95% CI 2.15–5.49], $p < 0.001$); eating dinner regularly each day (OR = 17.79 [95% CI 2.81–8.01], $p = 0.005$); eating

Table 3. Breakfast eating of participants according to dietary behavior

Dietary behavior	Breakfast eating (n = 550)		p value (χ^2 test)
	yes, N (%)	no, N (%)	
Eat between meals			
Yes	224 (69.30)	99 (30.70)	
No	185 (81.50)	42 (18.50)	**0.001**
Eat dinner regularly each day			
Yes	178 (69.30)	79 (30.70)	
No	231 (78.80)	62 (21.20)	**0.010**
Fruit consumption (days/week)			
Never	18 (81.80)	04 (18.20)	
1–3 times	34 (81.0)	08 (19.0))	
4 times and more	357 (73.50)	129 (26.50)	0.405
Vegetable consumption (days/week)			
Never	102 (71.80)	40 (28.20)	
1–3 times	209 (81.30)	48 (18.70)	
4 times and more	98 (64.90)	53 (35.10)	**0.001**
Milk and dairy product consumption (days/week)			
Never	36 (51.40)	34 (48.60)	
1–3 times	129 (76.30)	40 (23.70)	
4 times and more	244 (78.50)	67 (21.50)	<**0.001**
Sodas and soft drink consumption (days/week)			
Never	177 (81.80)	26 (18.20)	
1–3 times	235 (72.50)	89 (27.50)	
4 times and more	57 (68.70)	26 (31.30)	**0.046**
Sweets and chocolate consumption (days/week)			
Never	45 (76.30)	14 (23.70)	
1–3 times	224 (77.50)	65 (22.50)	
4 times and more	140 (69.30)	62 (30.70)	0.115
Cake, pastry, biscuit consumption (days/week)			
Never	105 (82.70)	22 (17.30)	
1–3 times	105 (66.50)	53 (33.50)	
4 times and more	199 (75.10)	66 (24.90)	**0.007**
Fast-food consumption (days/week)			
Never	349 (78.10)	98 (21.90)	
1–3 times	56 (58.90)	39 (41.10)	
4 times and more	04 (50.0)	04 (50.0)	<**0.001**

vegetables 1–3 times per week (OR = 10.21 [95% CI 1.44–4.67], p = 0.001); taking milk and dairy product 1–3 times per week (OR = 13.88 [95% CI 1.59–5.56], $p < 0.001$); and never taking sodas and soft drink in week (OR = 3.12 [95% CI 1.90–4.50], p = 0.003).

Discussion

The aim of this study was to describe the demographic and dietary patterns associated with breakfast skipping among Moroccan school adolescents (12–19 years). The findings of this study revealed that the prevalence of breakfast consumption was 74.6%, meaning that the prevalence of missing breakfast was nearly 26%. These findings are consistent with other studies carried out worldwide among schoolchildren [16, 17]. However, the prevalence of breakfast consumption in the current study is slightly higher than in other studies conducted among schoolchildren and adolescents of the same age [18–20]. Developed countries, in general, have a prevalence of skipping breakfast among children ranging from 10 to 30% [21–23]. Varied operational definitions and measures

Table 4. Multivariate analysis of factors associated with breakfast eating among schoolchildren participants

Risk factor	Category	AOR (95% CI)	*p* value
Gender	Boys	07.13 (1.321–3.840)	
	Girls	1	**0.008**
Father's educational level	Low	0.06 (0.55–2.15)	0.806
	Medium	0.05 (0.50–1.68)	0.816
	High	1	
Mother's educational level	Low	2.86 (1.89–4.71)	**0.091**
	Medium	1.31 (0.63–1.90)	0.228
	High	1	
Mothers' occupation	Housewife	13.71 (1.16–5.29)	<**0.001**
	Working	1	
Eat between meals	No	15.49 (2.15–5.49)	<**0.001**
	Yes	1	
Eat dinner regularly each day	Yes	7.79 (2.81–8.01)	**0.005**
	No	1	
Vegetable consumption (days/week)	Never	0.493 (0.67–2.27)	0.483
	1–3 times	10.21 (1.44–4.67)	**0.001**
	4 times and more	1	
Milk and dairy product consumption (days/week)	Never	0.07 (0.53–1.61)	**0.788**
	1–3 times	13.88 (1.59–5.56)	<**0.001**
	4 times and more	1	
Sodas and soft drink consumption (days/week)	Never	3.12 (1.90–4.50)	**0.03**
	1–3 times	0.17 (0.43–1.71)	0.67
	4 times and more	1	
Cake, pastry, biscuit consumption (days/week)	Never	0.57 (0.67–2.65)	0.44
	1–3 times	2.21 (0.87–2.64)	0.14
	4 times and more	1	1
Fast-food consumption (days/week)	Never	1.77 (0.57–1.68)	0.18
	1–3 times	0.66 (0.35–1.01)	0.66
	4 times and more	1	

of breakfast consumption, and the different age groups studied by researchers, using a variety of study designs, may explain these differences. In the USA, for example, the trend of breakfast consumption declined (from 1965 to 1991) among older adolescents, attributed to their behavioral changes [24].

Our study indicated that missing breakfast is more common in girls. The same pattern was found in studies conducted in France, Norway, and the USA [25–27]. In contrast, other studies showed no differences between boys and girls [28–30]. This variation and inconsistencies between boys and girls may be explained by different cultures, age groups, races, and the variety of study designs [28–31].

In our study, breakfast skipping was more prevalent among children of working and with a high level of education mothers. This was not in line with findings among children and adolescents in the USA [27] and the adult Dutch population [32]. In contrast, no relationship was found between breakfast eating and income level in Canadian children [33, 34].

Another factor found to be significantly associated with breakfast skipping was unhealthy dietary habits including eating between meals, lunch and dinner skipping, and consuming sodas and soft drinks one time or more per week. These findings are consistent with reports in many parts of the world where the "normal" diet is becoming increasingly energy-dense and sweeter, with high-fiber foods being replaced by more highly processed versions [35]. The adoption of such poor dietary practices increases the risk of adolescents developing noncommunicable diseases, as

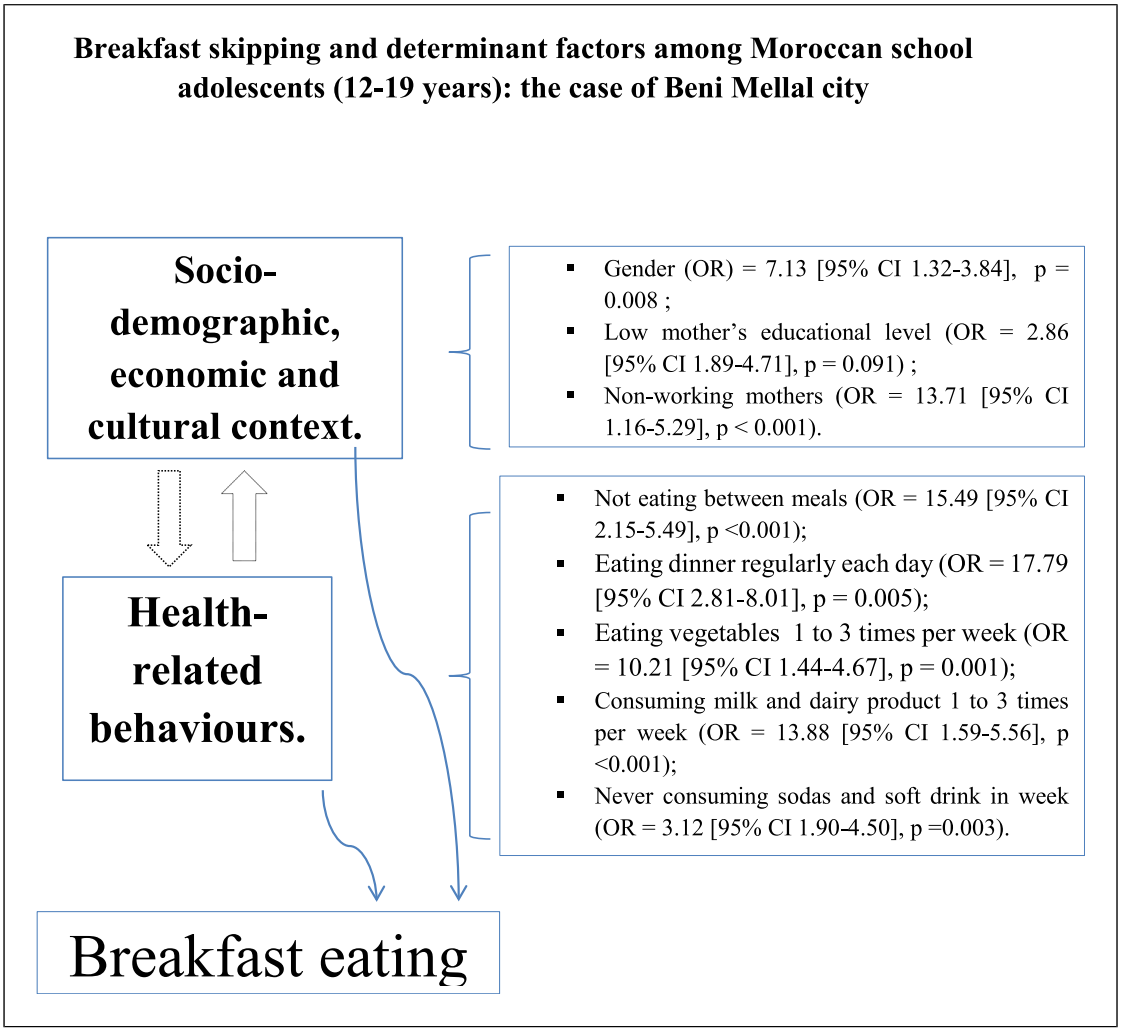

Fig. 1. Framework model for breakfast eating and determinant factors among Moroccan school adolescents (12–19 years): the case of Beni Mellal city.

unhealthy eating is considered one of the main causes [36]. A lot of research points out the relationship between the consumption of sugar-sweetened beverages and positive energy balance leading to the development of obesity. Almost 17,000 children aged 9–14 were asked to note all the beverages consumed during a period of 1 year. There was a linear relationship between the consumption of sugar-added beverages and weight gain, both in boys and girls. For instance, in a group of boys who drank one tin of sugar-sweetened beverage per day, the BMI raised during 1 year by 3%, while in the group of boys not drinking such beverages, their BMI remained stable [37] (Fig. 1).

Limitations

First, the study is not free from the pitfalls of the cross-sectional study design. Consequently, the result of the study did not show the temporal cause-and-effect relationship between the outcome and the independent variables. Recall bias may be the second limitation of the study, mainly in measuring the child's dietary habits.

Conclusion

The current survey has revealed that 25.6% of school-aged children reported not consuming breakfast every day. In addition, our study indicated that missing breakfast is

more common in girls, and breakfast skipping was more prevalent in children of working and having a high level of education mothers. Another factor found to be significantly associated with breakfast skipping was unhealthy dietary habits including eating between meals, lunch and dinner skipping, and consuming sodas and soft drinks one time or more per week. Health education programs are therefore needed to encourage breakfast eating, targeted at special groups at risk. These programs should consider the different reasons for skipping breakfast.

Statement of Ethics

Written informed consent was obtained from parents of children prior to the study. This consent procedure was reviewed and approved by the Institutional Ethical Committee of the faculty of sciences and techniques, Sultan Moulay Slimane University, Beni Mellal, with the approval number of FST/LGB/2016/14-OCT./006-JAN.2017-SEPT.2017 and the authorizations of the Regional Academy for Education in Beni Mellal on April 4, 2016 (reference no. 38/16).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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Author Contributions

All authors prepared the manuscript and approved the final version of the manuscript.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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