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ORIGINAL ARTICLE

FACTORS INFLUENCING COOKING METHOD, FREQUENCY, AND DURATION OF MEAL PREPARATION IN MOROCCAN HOUSEHOLDS

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ABSTRACT

Background. The construction of the consumer's identity is dependent on how they prepare their meals.
Objective. Study the cooking methods, frequency, and duration of meal preparation in Moroccan households as well as the associated factors.
Materials and methods. This work is a part of a study with a validated conceptual and methodological framework that was conducted in 507 households in the region of Rabat-Salé-Kenitra in Morocco. The characteristics of the population and data on the cooking methods, frequency, and duration of meal preparation were collected by a survey. Associations between variables were studied by univariate logistic regression with a significance level of $p<0.05$.
Results. The majority of the population was aged between 35 and 65 years (76%) and lived in urban areas (70%). The univariate analysis showed that the urban area was a factor that hindered stewing ($p=0.009$), while the work status ($p=0.04$) and the marital status "Married" ($p=0.04$) were favorable factors; the household size ($p=0.02$) is a factor favoring steaming method; urban area ($p=0.04$), work status (p 0.03), nuclear family type ($p<0.001$), and household size ($p=0.02$) are factors hindering the use of oven cooking; urban area ($p=0.02$) and higher education level ($p=0.04$) are factors favoring the use of fried food, age category [20-34] years ($p=0.04$), higher education level ($p=0.01$) and work status ($p=0.01$) were factors that favored the use of grilling; nuclear family type, ($p=0.04$) and household size ($p=0.03$) were factors that hindered the preparation of breakfast; urban area ($p=0.03$) and Arab ethnicity ($p=0.04$) are factors hindering snack preparation; urban area ($p<0.001$) is a factor favoring dinner preparation; household size ($p=0.01$) and use of stewing at least four times a week ($p=0.002$) are factors hindering meal preparation time, while use of baking ($p=0.01$) is a favoring factor.
Conclusion. The study results point towards the implementation of a nutritional education strategy based on combining habits, preferences, and good cooking practices.

Key words: *cooking methods, frequency of meal preparation, duration of meal preparation, Morocco*

INTRODUCTION

The culinary environment, a phenomenon even necessary for human evolution, is a factor in the construction of consumer identity [1]. The change of this environment by different factors and to different degrees shapes the culinary pattern of traditional populations. These factors specific to a population can in turn impact its state of health. This is the case of the traditional Mediterranean food model, the evolution of which has led to the emergence of diseases that have hitherto characterized modern societies. The abandonment as well as the beneficial effects of traditional food models of populations health and the environment are impacted by changes in the food system and the acceleration of the pace of life [2]. The culinary environment encompasses, among other things, cooking methods, the frequency and duration of meal preparation.

Cooking is, technically a process consisting in irreversible transformation of raw food to their cooked shape [3], allowing the digestibility of food nutrients such as starch, plant proteins, collagen in meat, and cellulose and woody structures in plants and leading at the same time to a composition different from that of the initial food items and thus promoting the diversification of available foods [4, 5, 6]. Cooking uses several traditional or modern methods, that may improve or alter the food quality and respectively be beneficial or detrimental to the food and therefore

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to health [7, 8]. Among these methods, one can cite cooking in water, in a pressure cooker, steaming, baking, grilling, and frying [9, 10].

In addition, the frequent home meal preparation promotes appropriate dietary intake and weight status [11] with long-term health benefits [12]. Indeed, a high frequency of home meal preparation has already been reported to be associated with higher intakes of vegetables, fruits, dietary fiber, folic acid and vitamins, and low-fat intake [13]. This is also a characteristic demonstrated in populations that are still adhering to traditional healthy diets such as Mediterranean dietary model [2]. Furthermore, scientific evidence has shown that meals require different amounts of time to be prepared, depending on the cooking method and the number of guests, and that spending more time preparing meals is associated with better nutritional quality [14, 15]. It is the case of a study on middle-aged women showing that spending more time on meal preparation had a lesser cardiovascular and metabolic risk profile [16].

The current work aimed, therefore to study the cooking methods, frequency, and duration of meal preparation and the associated factors. As such, it has a theoretical scope, as it contributes to the construction of a culinary identity for the Moroccan population; and an empirical scope, as it opens up perspectives for both quantitative and qualitative research on meal preparation methods.

MATERIAL AND METHODS

This work is a part of a study with a validated conceptual and methodological framework [17] that involved 507 households in the region of Rabat, Salé, Kenitra (RSK) in Morocco.

Data Collection

One member per household with a primary role in meal preparation was included in this study as a household representative (HR). Thus, data were collected from 507 HR through a survey on socio-demographic characteristics, cooking methods used, the frequency, and the duration of (time spent on) meal preparation within the households.

Variables of the study

(1) Socio-demographic characteristics: age, area of residence, education level, work status, marital status, family type (nuclear or extended), household size, and ethnicity.

(2) Frequency of use of cooking methods, including stewing, steaming, baking, frying, and grilling. This frequency is categorized as 1) <4 times per week; 2) ≥4 times per week.

(3) The frequency of preparation of meals and snacks is categorized as 1) <5 times per week; 2) ≥5 times per week.

(4) Daily preparation time for all meals and snacks is categorized as 1) <3 hours per day, 2) ≥3 hours per day; breakfast and snack preparation time is categorized as 1) <30 min, 2) ≥30 min; lunch preparation time is categorized as 1) <2 hours, 2) ≥2 hours; and dinner preparation time is categorized as 1) <1 hour, 2) ≥1 hour.

Statistical analysis

Statistical analysis was performed by SPSS software for Windows (Statistical Package for the Social Sciences) version 21 and Microsoft Office Excel 2007. The univariate analysis was used to investigate the factors associated with the type of cooking methods, frequency, and duration of meal preparation with a statistical significance level of $p<0.05$.

RESULTS

Characteristics of the population

Socio-demographic characteristics

Table 1 shows that 70% of the households are urban, 51.5% are composed of 5 to 12 members, 62% of the families are nuclear, 76% of the HR are aged between 35 and 65 years, 13% have a higher education, 76% are inactive, 80% are married, and 80% are of Arab ethnic origin.

Frequency of use of different cooking methods

The households surveyed use stewing (88%), frying (49%), steaming (41%), baking (27%), and grilling (18%) at least 4 times per week (Figure 1).

Frequency of preparing meals and snacks

The majority of surveyed households prepare breakfast (78%), lunch (84%), and afternoon snacks (87%) at least five times per week, while just 45% prepare dinner at this frequency (Figure 2).

Duration of meal preparation

72% of households spend a minimum of three hours per day in preparing meals. Figure 4 shows that 64% of the households surveyed spent less than 30 minutes preparing breakfast, 78% spent two hours or more preparing lunch, 57% spent less than 30 minutes preparing snacks, and 62% spent less than one hour preparing dinner (Figure 3).

Factors associated with meal preparation

Factors associated with the cooking method used

Table 2 shows that based on univariate analysis, urban area (OR=0.4; CI [0.18-0.7], p=0.009) is a factor

Table 1. Characteristics of households and their representatives (n=507)

Characteristics *	Values (%)	CI 95%
Age groups (years)		
[20-34]	122 (24)	[20.1-27.8]
[35-65]	385 (76)	[72.2-79.9]
Area of residence		
Urban	355 (70)	[66-74]
Rural	152 (30)	[26-33]
High education level		
Yes	67 (13)	[10.7-16.4]
No	440 (87)	[83.6-89.3]
Professional occupation		
Active	122 (24)	[20.3-27.6]
Inactive	385 (76)	[72.4-79.7]
Marital status ‚married'		
Yes	405 (80)	[76.6-83]
No	102 (20)	[17-23.7]
Family type		
Nuclear	316 (62)	[58-67]
Composed	191 (38)	[33-42]
Household size		
2-4 members	246 (48.5)	[43.8-53.1]
5-12 members	261 (51.5)	[46.9-56.2]
Ethnic origin		
Arabic	403 (80)	[76-83]
Berber	104 (20)	[17-24]

* = Expressed in size (%); CI = Confidence interval

hindering stewing at least four times a week, while work status (OR=2.2; CI [1.02-4.8]; p=0.04) and the Marital status "Married" (OR=1.8; CI [1.02-3.4]; p=0.04) are factors promoting it. The same table also shows that a household size of 2 to 4 members (OR=1.5; CI [1.05-2.1]; p=0.02) is a factor favoring steaming at least four times a week. In addition, the urban area (OR=0.6; CI [0.43-0.9]; p=0.04), work status (OR=0.5; CI [0.43-0.9]; p=0.03), nuclear family type (OR=0.3; CI [0. 21-0.5]; p<0.001), and household size of 2-4 members (OR=0.6; CI [0.42-0.9], p=0.02) are factors hindering the use of baking at least four times a week. Further, urban area (OR=1.6; CI [1.43-1.93], p=0.02) and higher education level (OR=1.6; CI [1.1-2.8]; p=0.04) are factors favoring the use of fried food at least four times a week. Finally, the age category of [20-34] years (OR=1.6; CI [1-2.7]; p=0.04), higher education level (OR=2.1; CI [1.2-3.75]; p=0.01) and work status (OR=1.8; CI [1.1-3.01], p=0.01) were factors that favored the use of fried food at least four times a week.

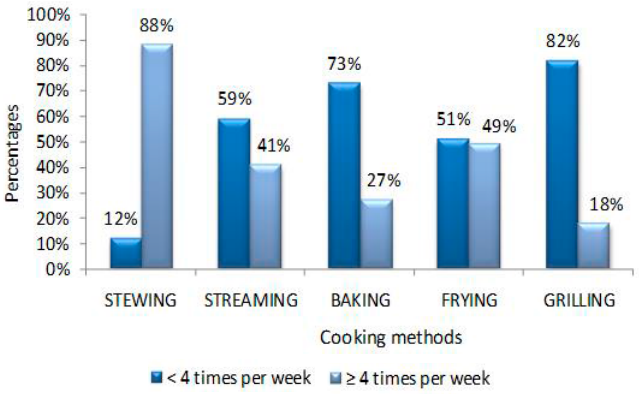

Figure 1. Distribution of households by frequency of use of cooking methods (n=507)

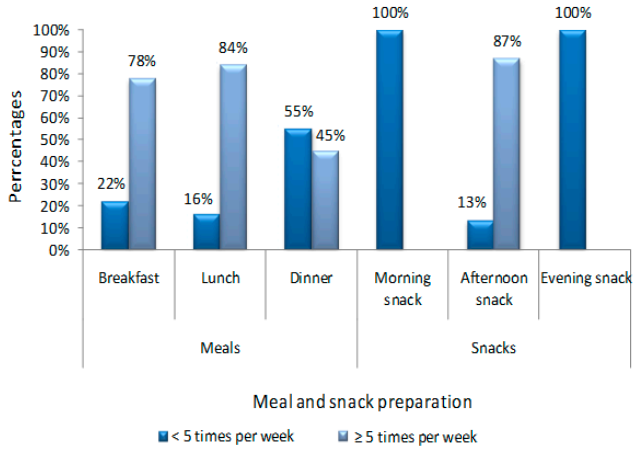

Figure 2. Distribution of households by frequency of meal and snack preparation (n=507)

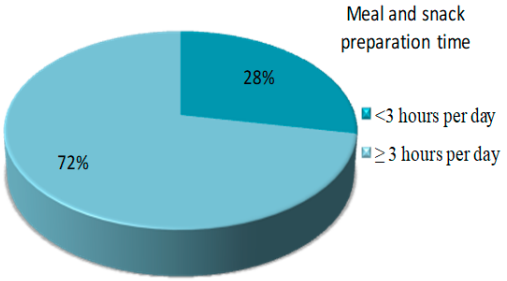

Figure 3. Distribution of households according to daily meal and snack preparation time (n=507)

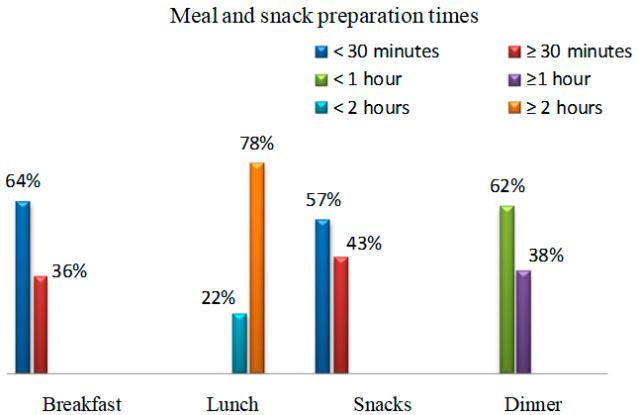

Figure 4. Distribution of households by meal preparation time (n=507)

Table 2. Factors associated with the use of cooking methods ≥4 times per week (n=507)

Characteristics	Stew			Steaming			Oven			Frying			Grilling		
	OR	IC (95%)	P*	OR	IC (95%)	P*	OR	IC (95%)	P*	OR	IC (95%)	P*	OR	IC (95%)	P*
Age groups (years)															
20-34	0.7	[0.39-1.3]	0.2 NS	1.008	[0.66-1.5]	0.9 NS	0.6	[0.42-1.1]	0.1 NS	0.4	[0.5-1.09]	0.1 NS	1.6	[1-2.7]	**0.04****
35-65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Area of residence															
Urban	0.4	[0.18-0.7]	0.009**	0.9	[0.65-1.4]	0.8 NS	0.6	[0.43-0.9]	0.04**	1.6	[1.43-1.93]	0.02**	1.4	[0.8-2.34]	0.2 NS
Rural	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
High education level															
Yes	2.3	[0.8-6.5]	0.1 NS	1.1	[0.66-1.8]	0.6 NS	0.6	[0.31-1.2]	0.1 NS	1.6	[1.1-2.8]	0.04**	2.1	[1.2-3.75]	0.01**
No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Professional occupation															
Active	2.2	[1.02-4.8]	0.04**	1.2	[0.8-1.8]	0.3 NS	0.5	[0.35-0.9]	0.03**	1.3	[0.9-1.9]	0.2 NS	1.8	[1.1-3.01]	0.01**
Inactive	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Marital status «married»															
Yes	1.8	[1.02-0.4]	0.04**	0.8	[0.57-1.3]	0.6 NS	1.06	[0.65-1.7]	0.8 NS	0.7	[0.5-1.13]	0.1 NS	0.6	[0.4-1.14]	0.1 NS
No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Family type															
Nuclear	1.5	[0.8-2.6]	0.1 NS	1.1	[0.79-1.6]	0.4 NS	0.3	[0.21-0.5]	<0.001**	0.7	[0.5-1.06]	0.1 NS	1.2	[0.75-1.9]	0.4 NS
Composed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Household size															
2-4 members	0.7	[0.4-0.18]	0.2 NS	1.5	[1.05-2.1]	0.02**	0.6	[0.42-0.9]	0.02**	1.2	[0.88-1.8]	0.2 NS	0.8	[0.5-1.29]	0.4 NS
5-12 members	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ethnic origin															
Arabic	0.8	[0.4-1.7]	0.6 NS	0.8	[0.57-1.3]	0.6 NS	0.8	[0.5-1.3]	0.4 NS	1.08	[0.7-1.66]	0.7 NS	0.8	[0.5-1.5]	0.6 NS
Berber	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*= Univariate analysis with significance level p<0.05; **= Significant; NS = Not Significant. OR = Odds Ratio; CI = 95% confidence interval.

Factors associated with meal preparation frequency

Table 3 shows that based on univariate analysis, nuclear family type (OR=0.7; CI [0.35-0.95]; p=0.04) and household size of 2-4 members (OR= 0.6; CI [0.45-9.31]; p=0.03) are factors hindering the preparation of breakfast at least 5 times a week. This table also shows that urban area (OR=0.5; CI [0.3-0.9]; p=0.03) and Arab ethnicity (OR=0.5; CI [0.23-0.91]; p=0.04) were factors that hindered the preparation of snacks at least 5 times a week. Finally, the urban area (OR=2; [CI 1.4-3]; p<0.001) is a factor that favors the preparation of lunch at least 5 times a week.

Factors associated with meal preparation time

Table 4 shows that based on univariate analysis, household size of 2-4 members (OR=0.6; CI [0.4-

Table 3. Factors associated with meal preparation frequency ≥ 5 times per week (n=507)

Characteristics	Breakfast			Lunch			Snaks			Dinner		
	OR	IC (95%)	P*	OR	IC (95%)	P*	OR	IC (95%)	P*	OR	IC (95%)	P*
Age groups (years)												
20-34	1.07	[0.65-1.7]	0.7 NS	1.1	[0.6-1.9]	0.7 NS	1.04	[0.5-1.9]	0.9 NS	1.1	[0.8-1.7]	0.5 NS
35-65	-	-	-	-	-	-	-	-	-	-	-	-
Area of residence												
Urban	0.9	[0.56-1.4]	0.6 NS	1	[0.6-1.6]	0.9 NS	0.5	[0.3-0.9]	0.03**	2	[1.4-3]	<0.001**
Rural	-	-	-	-	-	-	-	-	-	-	-	-
High education level												
Yes	0.6	[0.4-1.2]	0.2 NS	1.2	[0.6-2.6]	0.5 NS	0.8	[0.3-1.6]	0.5 NS	0.9	[0.5-1.5]	0.6 NS
No	-	-	-	-	-	-	-	-	-	-	-	-
Professional occupation												
Active	0.8	[0.5-1.4]	0.4 NS	1.5	[0.8-2.9]	0.1 NS	1.2	[0.6-2.1]	0.6 NS	0.7	[0.5-1.1]	0.1 NS
Inactive	-	-	-	-	-	-	-	-	-	-	-	-
Marital status «married»												
Yes	0.8	[0.5-1.4]	0.4 NS	1.4	[0.8-2.4]	0.2 NS	1.2	[0.7-2.3]	0.5 NS	0.8	[0.5-1.3]	0.6 NS
No	-	-	-	-	-	-	-	-	-	-	-	-
Family type												
Nuclear	0.7	[0.35-0.95]	0.04**	1.2	[0.7-1.9]	0.4 NS	1.1	[0.7-1.9]	0.6 NS	0.9	[0.6-1.4]	0.7 NS
Composed	-	-	-	-	-	-	-	-	-	-	-	-
Household size												
2-4 members	0.6	[0.45-9.31]	0.03**	1.2	[0.7-2.3]	0.3 NS	1.2	[0.6- 2]	0.5 NS	0.99	[0.7-1.4]	NS
5-12 members	-	-	-	-	-	-	-	-	-	-	-	-
Ethnic origin												
Arabic	1.05	[0.6-1.7]	0.8 NS	1.2	[0.7-2.2]	0.4 NS	0.5	[0.23-0.91]	0.04**	0.97	[0.6-1.5]	0.9 NS
Berber	-	-	-	-	-	-	-	-	-	-	-	-

*= Univariate analysis with significance level p<0.05; **= Significant; NS = Not Significant. OR = Odds Ratio; CI = 95% confidence interval.

Table 4. Factors associated with meal preparation time ≥3 hours per day (n=507)

Characteristics	Meal preparation time ≥3 h/d		
	OR	IC (95%)	P*
Age groups (years)			
20-34	0.7	[0.48-1.2]	0.2 NS
35-65	-	-	-
Area of residence			
Urban	0.6	[0.43-1.05]	0.08 NS
Rural	-	-	-
High education level			
Yes	0.7	[0.43-1.3]	0.3 NS
No	-	-	-
Professional occupation			
Active	0.7	[0.46-1.1]	0.1 NS
Inactive	-	-	-
Marital status «married»			
Yes	1.3	[0.8-2.13]	0.2 NS
No	-	-	-
Family type			
Nuclear	0.9	[0.62-1.4]	0.7 NS
Composed	-	-	-
Household size			
2 - 4 members	0.6	[0.4-0.88]	0.01**
5 - 12 members	-	-	-
Ethnic origin			
Arabic	0.9	[0.58-1.55]	0.8 NS
Berber	-	-	-
Stewing			
<4 times/week	-	-	-
≥4 times/week	0.5	[0.35-0.79]	0.002**
Steaming			
<4 times/week	-	-	-
≥4 times/week	0.8	[0.55-1.2]	0.3 NS
Baking			
<4 times/week	-	-	-
≥4 times/week	1.8	[1.14-2.9]	0.01**
Frying			
<4 times/week	-	-	-
≥4 times/week	0.9	[0.5-1.7]	0.8 NS
Grilling			
<4 times/week	-	-	-
≥4 times/week	0.8	[0.53-1.43]	0.6 NS

* = Univariate analysis with significance level p<0.05; ** = Significant; NS = Not Significant. OR = Odds Ratio; CI = 95% confidence interval; h/d= hours per day.

0.88], p=0.01) and use of stewing at least four times per week (OR=0.5; CI [0.35-0.79], p=0.002) were factors hindering meal preparation time greater than or equal to three hours per day, whereas the use of baking at least four times per week (OR=1.8; CI [1.14-2.9], p=0.01) was a contributing factor.

DISCUSSION

There is no single national cuisine of a country as a whole. Traditional cuisine, for example, is actually made up of many regional cuisines depending on several factors including the climate, history and customs of a region, while having characteristics common to all the cuisine of a country. This includes the basic ingredients and cooking methods used in the preparation of regional recipes [18].

In this study, the stew is the frequently used method of cooking in the majority of the investigated population while almost half of it uses fried food frequently (at least 4 times a week). This result corroborates a previous study conducted in the province of El Jadida [19]. In fact, the food consumption pattern in Morocco is largely dominated by basic dishes, notably vegetable and/or legume-based stews, prepared with or without meat, and by fried potatoes, which become very popular among young people [20]. Regarding the frequency of meals and snacks preparation, breakfast and lunch are the main meals prepared at least 5 times a week by the population surveyed, while only a minority prepares dinner at this same rate. The snack most frequently prepared by the studied population is the afternoon snack. Snacks have an important part in Moroccan dietary habits and tend to replace dinner in some households given their frequency as well as the diet and nutritional composition.

Moreover, the beneficial implications of the frequency of meal preparation on the health status of individuals have been the subject of several studies [11, 12]. In addition, home meals preparation have been correlated with less frequent consumption of fast food, less fat use, and adequate intake of calcium, and whole grain vegetables, all of which promote healthy eating [21]. Furthermore, spending a significant amount of time preparing meals has been associated with better diet quality, including significantly higher consumption of vegetables, salads, fruits, and fruit juices [22]. On the other hand, the majority of the present study population spent three or more hours per day preparing meals and snacks, including less than 30 minutes for breakfast and snacks, two or more hours for lunch, and less than one hour for dinner. These durations are longer than those reported in a consumer survey conducted in Belgium, which found that the average time for the preparation of breakfast is 7 minutes, 15 minutes for lunch, and 33

minutes for dinner [23]. In this regard, a correlation of high cooking time with low cardiovascular and metabolic risks has been reported [16]. This could be related to the fact that home food preparation involves the use of primary foods that are beneficial in terms of nutritional value and quality far superior to processed foods known for their high contents in calories, saturated fatty acids, and sodium associated with health problems [14, 24].

Statistical analysis showed that the frequency of stewing method use is related to the urban area, work status, and married status. Among the many factors likely to influence the use of stewing as a method of cooking, includes indeed the lack of availability due to other social occupations including work. Similarly, marital status generally results in food choices that are appropriate for the entire family. In the Moroccan context, stew whether prepared in a tagine, in a pot, or in a pressure cooker, represents generally a dish that suits the dietary habits of the family. Further, the area of residence was also revealed as a factor associated with this cooking method. In this respect, the urban areas would be a hindering factor and the rural areas would be a factor favoring the use of this cooking method. The study also revealed that urban areas and high education level were associated with the use of fried foods, while another study showed that, further to urban areas, young age was associated with the use of this cooking method [19]. These last two factors have been recognized as associated with the modernization of food practices [25, 26]. Taking into account the frequency of different used cooking methods, it appears that generally, despite urbanization and work status, the study population adopts heterogeneous cooking methods, marked by a return to the traditional.

The statistical analysis also showed that urban area, household size, nuclear family type, and ethnic origin are factors associated with the frequency of meal preparation. Urban residency could have an impact on the frequency of meal preparation, given the specific living and working conditions that may lead to certain unavailability and lack of time, which may reduce the frequency of meals preparation. One of the most common obstacles to meal preparation is the lack of time. The type of family and the household size represent factors favoring the preparation of meals at home, on the one hand. This is related to the convivial aspect of this practice, which will be further promoted by the number of participating people. On the other hand, it is related to the low economic cost that this practice generates compared to out-of-home dining. In addition, ethnicity could promote food of good quality in households. Accordingly, a previous study, reported that participants declared that home-cooked meals were often prepared using traditional ingredients and that food preparation behavior is learned from family [27]. Furthermore, it has been reported that societies' choice of food practices may be influenced by their culture and identity [28].

In addition, statistical analysis has shown that among the factors associated with daily meal preparation time; there are household size, use of stewing, and use of baking. Indeed, the larger is the size of a household, the more food will be prepared, and the more time will be required for cooking. Baking is also a time-consuming process, especially for certain protein foods and vegetables that are rich in cellulose. It should be noted that the cooking time depends on the desired effect of the temperature on the different components of the food such as the increase of their digestibility [29, 30], the softening of the cellulosic and woody structures of the plants [31], or the guarantee of the hygienic aspects [32].

Although subjects with less education level and lower incomes have been reported to spend more time in preparing meals daily than those with more education and higher incomes [33], the present study did not reveal any association between education level and standard of living with meal preparation time. Likewise, while not in accordance with previous research data reporting that spending the least amount of time on meal preparation are generally working individuals who value convenience [22], the present study data did not find any association between work status and meal preparation time.

CONCLUSION

This work investigated factors influencing the cooking method, frequency, and duration of meal preparation in Moroccan households. The findings point to the necessity of the implementation of a nutritional education strategy based on combining habits, preferences, and good cooking practices.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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