**Research Article**

# Development and Validation of a Questionnaire Semi-Quantitative Food Frequency to Detect Good and Bad Eating Habits among Young Algerians

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**ABSTRACT**

The aim of this study is to validate a food frequency questionnaire (FFQ), used as part of a nutritional survey conducted on young Algerians adults. The investigation has addresses 161 students in faculty of medicine whose age is between 20 and 23 years. The questionnaire contains personal questions such as age, sex and others about food consumption frequency. Questions were kind of yes, no or rarely and portions were estimated by comparison to a type model cup, spoon, gram and milliliter. 11 food groups comprising 81 items were submitted to the test. To estimate its validity the questionnaire was filled in twice five weeks spaces. The answering shall specify its consumption by day, by week and indicate the portions taken from each food group. Statistical analysis was performed with SPSS; the Pearson's correlation coefficient was used as a measure of association. The results obtained show a good combination for most food groups (Pearson's correlation coefficient ≥ 0, 5). A low correlation was observed for certain portions estimated by spoon or gram. The FFQ presents a good validity for most of the questions for the different food groups. It can be used for large sample and allows us to correct bad eating habits to avoid the occurring diseases such as diabetes and cardiovascular diseases.

**Keywords:** Food Frequency Questionnaire, validity, food habits, food survey, nutritional recommendation.

## INTRODUCTION

Dietary surveys are measuring methods that assess specific dietary intakes of individuals or population. They are carried out through questionnaires filled out by respondents, followed by processing and analyzing results. For the study to be reliable and efficient, these questionnaires must be validated.[1,2,3] The aim of this study is to validate a food questionnaire that will be used as part of a nutritional survey conducted on young adults. This survey will measure food consumption of young people and check whether it is consistent with dietary recommendations. This will lead to correct bad eating habits to avoid the long-term onset of diabetes and cardiovascular disease.

## MATERIALS AND METHODS

### Development of the Questionnaire

After several readings of literature[4, 5, 6] a questionnaire was developed to identify good and bad eating habits. This questionnaire includes specific food which is easily accessible to the targeted population. A series of three versions of the questionnaire testing was performed and the formulation of questions has been improved by making the necessary adjustments to attain the final version. The question sheet contains not only personal information (age, sex, weight, height) but also the one about taking different foods. The latter is gathered into 11 groups comprising 81 items. The questionnaire is self-administered and respondents should clarify on the paper version the frequency and taking portions of these foods per day and per week. The questions involve yes, no, rarely and portions are estimated by comparison to a standard format: cup, teaspoon, milliliter and gram.

### Population Studied

The target population is composed of university students in medical sciences whose age is between 20 and 23 years. The opportunity offered by the choice of this population is that these students are not all from the same town, which can give us a broad estimation of the nutritional habits. Their level of education can influence their eating behavior. Initially the number was 200 participants, but after analysis and removal of ambiguous results, only 161 respondents were selected.

### Statistical Methods

The statistical package SPSS was used for all statistical analyses. For the validity assessment, the Pearson's correlation coefficient was used as a measure of association. A *P* value of 0.05 was considered statistically significant[7, 8, 9, 10, 11] the two FFQ administered were filled spaced five weeks to avoid bias and the responses of memory effect.

## RESULTS AND DISCUSSION

Successful participants in Table 1 are aged between 20 and 23 years, 82% are female and 18% male. 77.5% have a body mass index (BMI) normal while 3.97% are lean, 15.89% are overweight and 2.64% are obese. Therefore, 22.5% have a problem BMI relative to the total. The analysis of BMI alone cannot give an assessment of eating habits. [12]

The questionnaire was completed twice spaced five weeks to avoid memorizing answers. The results were collected and processed by SPSS statistical software. The correlations between the two questionnaires are shown in Table 2.

When the question is of type Yes, No or Rarely, a very good correlation can be seen in all food groups (Pearson greater than 0.5). For sugar drinks; dairy products; natural fruit juice and Trade; the respondent had to specify the number of intake per day, per week and the portions with reference to a cup of 250ml. Again a good correlation was observed between the different items (Pearson between 0.5 and 0.8).

For cheese and yogurt both questionnaires respond well to the numbers of times a day, a week and the portions except for the portion of cheese quantified in gram has shown a low correlation (Pearson less than 0.5).

Portions expressed in gram or unit for groups of fruits, vegetables, potatoes have shown a low correlation, unlike that of bread, pasta, cakes and pastries are expressed only in units greater than or equal to 0.5 which represent good correlation.

Concerning Meat in Table 3, a very good correlation was observed for horse meat.

All participants agreed for never eating it. A weak correlation was observed when the size is expressed in gram for other meats and unit for eggs. The low correlations for portions expressed in gram can be explained either by the fact that respondents do not mastered the concept of weight or by a change in the intake of these foods.

Food compounds in Table 4 show good correlation for all items except for burgers. This can be explained by changing dietary needs from one week to another.

Low correlation in Table 5 is observed for margarine or mayonnaise and the portions are estimated by the teaspoon.

**Table 1:** Characteristics of Participants

| Age | Sex | | BMI | | | |
|---|---|---|---|---|---|---|
| | **Female** | **Male** | **Skinny** | **Normal** | **Overweight** | **Moderate obesity** |
| 20-23 | 82% | 18% | 3,97% | 77,5% | 15,89% | 2,64% |

**Table 2:** Validity assessment correlation of food groups between the two FFQ

| | Yes | | No | | Rarely | | Pearson's correlation coefficient (p-value) | |
|---|---|---|---|---|---|---|---|---|
| | **FFQ1** | **FFQ2** | **FFQ1** | **FFQ2** | **FFQ1** | **FFQ2** | | |
| **Sugar drinks** | 60.88 | 56.53 | 13.04 | 17.39 | 26.08 | 26.08 | 0.7800 | 0.0001 |
| **Dairy products** | 78.26 | 76.40 | 13.04 | 14.91 | 8.70 | 8.69 | 0.8770 | 0.0001 |
| **Fruits** | 96.27 | 95.65 | _ | _ | 3.73 | 4.35 | 0,5520 | 0,0001 |
| **Vegetables** | 95.03 | 95.65 | _ | _ | 4.97 | 4.35 | 0,5517 | 0.0001 |
| **Potato** | 100 | 100 | _ | _ | _ | _ | 1 | 0.0000 |
| **Bread, pasta pastries** | 100 | 100 | _ | _ | _ | _ | 1 | 0.0000 |
| **Pastry and sugar products** | 100 | 100 | _ | _ | _ | _ | 1 | 0.0000 |

**Table 3:** Validity assessment correlation of Proteins between the two FFQ

| | Yes | | No | | Pearson's correlation coefficient (p-value) | |
|---|---|---|---|---|---|---|
| | **FFQ1** | **FFQ2** | **FFQ1** | **FFQ2** | | |
| **Beef** | 52,17 | 67,70 | 47,83 | 32,30 | 0.5690 | 0.0001 |
| **Poultry** | 59,00 | 56,52 | 41,00 | 43,48 | 0.350 | 0.0200 |
| **Fresh fish** | 76,40 | 80,75 | 23,60 | 19,25 | 0.579 | 0.0001 |
| **Cured meats / charcuterie** | 24,22 | 21,74 | 75,78 | 78,26 | 0.738 | 0.0001 |
| **Mutton meat** | 60,87 | 73,91 | 39,13 | 26,09 | 0.596 | 0.0001 |
| **Horse meat** | 0 | 0 | 100 | 100 | 1.00 | 0.0000 |
| **Canned fish** | 24,22 | 32,92 | 75,78 | 67,08 | 0.337 | 0.0270 |
| **Eggs** | 73,91 | 86,96 | 26,09 | 13,04 | 0.320 | 0.0270 |

**Table 4:** Validity assessment correlation of mixed dishes between the two FFQ

|  | Yes | | No | | Pearson's correlation coefficient (p-value) | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FFQ1 | FFQ2 | FFQ1 | FFQ2 | | |
| Hamburger | 41,61 | 26,09 | 58,39 | 73,91 | 0,3720 | 0,0110 |
| Pizza | 86,96 | 82.61 | 13,04 | 17,39 | 0,5800 | 0,0001 |
| Tourte | 21.74 | 24,22 | 78,26 | 75,78 | 0,5900 | 0.0001 |
| Caldis | 43,48 | 34,78 | 56,52 | 65,22 | 0,5120 | 0,0001 |
| Sandwiches | 82,61 | 69,57 | 17,39 | 30,43 | 0,5760 | 0,0001 |

**Table 5:** Validity assessment correlation of Fat between the two FFQ

|  | Yes | | No | | Pearson's correlation coefficient (p-value) | |
| --- | --- | --- | --- | --- | --- | --- |
|  | FFQ1 | FFQ2 | FFQ1 | FFQ2 | | |
| Olive oil | 73,91 | 54,66 | 26,09 | 45,34 | 0,597 | 0,0001 |
| Margarine | 54,66 | 28,57 | 45,34 | 71,43 | 0,397 | 0,0001 |
| Butter | 56,52 | 41,61 | 43,48 | 58,39 | 0,576 | 0,0001 |
| Mayonnaise | 73,92 | 39,13 | 26,08 | 60,87 | 0.325 | 0.0200 |

Our results are consistent with those reports in the literature[13-17] for the most questions we have a good response except for portions expressed in gram or teaspoon were we have a low correlation. This can be explained by the fact that respondents are unable to grasp the portions of gram teaspoon. These individuals are mostly young; they do not prepare for themselves eating and therefore do not master the concepts of measures.

Also, the interval of five weeks between the first and the second questionnaire can influence the change towards some foods behavior. Dietary needs can change with the seasons and emotional state[18-20.]

## CONCLUSION

The food frequency questionnaire, we have developed present good reliability for the majority of food groups. It gives us a good appreciation for nutritional habits of the participants and we can use it for a large population. The limit of this test is still in the concept of certain measures. To remedy, we must include visual comparison for a better understanding on the part of respondents.

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