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Validation of the Questionnaire Used in the Transnational Study on Lifestyles Adopted in the Era of the COVID-19 Pandemic



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ABSTRACT

Several tools have been developed and used to study health status and the factors associated with the effects of lifestyle changes on health indicators. The Covid-19 pandemic has led to unprecedented measures around the world. Containment measures have been imposed by the government of each country to control the spread of this pandemic. The population adherence to these measures has led to changes in lifestyles such as physical activity, sleep, diet and toxic habits. These measures have also impacted the income of certain categories of employees and households, with repercussions on their food intakes and security. The aim of this transnational work is to test reliability and validity of a developed questionnaire used face-to-face and online to examine the lifestyles adopted in the era of Covid-19 at international level. A questionnaire was prepared in several stages including documentation analysis for the development of the questionnaire project, an experts analysis for the validation of the content, a pre-test face-to-face and online, the validity of the pre-test study results, by the Chi-square test and finlay, the internal consistency study using the Cronbach Alpha reliability test. The study led to the development of a questionnaire including 55 items related to the effects of the Covid-19 pandemic and containment on lifestyle changes and food security. The final version of this questionnaire is valid and reliable to be used to study the characteristics and factors associated with lifestyle changes in containment during the Covid-19 pandemic. The questionnaire is a relevant tool because it could be administered face-to-face and online and could be modified to suit all populations and various situations.

INTRODUCTION

Several studies have highlighted the importance of a healthy lifestyle for the health of individuals. This lifestyle is characterized by a balanced diet, regular physical activity and adequate sleep(1). In addition, the eating behavior of individuals depends on the health situation, the availability of food and food security(2). The appearance of the Covid-19 pandemic due to the coronavirus has had multidimensional consequences on the health of populations around the world(3). To this end, governments have imposed certain measures to limit the spread of this virus. Among these measures, the confinement, as the most effective collective measure, in addition to the ban of collective events, the closure of training and education institutions and social separation(1). These measures have had an impact on the lifestyle of these populations with consequences on health indicators.

Several tools have been developed and used to study health status and to determine factors that affect lifestyles. The quality of the information to be collected is dependent on the validity and reliability of these tools(4). Validity means that the data collected covers the actual survey area(5) and that the tool measures what needs to be measured(6). Reliability means that the tool provides stable and consistent data(7) and also concerns the reproducibility of the reported results(8).

The purpose of this study is to test the validity and reliability of a questionnaire developed to examine the factors associated with lifestyles adopted in the era of the Covid-19 pandemic internationally.

MATERIALS AND METHODS

Conceptual frame

The present study examined several parameters related to the containment due to the Covid-19 pandemic, including, change in body weight, level of physical activity, sun exposure, sleep, toxic habits, food security and food consumption. To this end, the questionnaire developed includes questions covering all of these variables.

Steps

The development of the questionnaire on lifestyles in the era of the Covid-19 pandemic was guided by a literature analysis for the construction of the preliminary questionnaire as well as

an analysis by experts for the validation of the content. Then, a pre-test is carried out with volunteer subjects in face to face and then online ways. Analysis using the Chi-square test was performed to verify that there is no significant difference between the results found in the face-to-face survey and those reported by the online survey. Finally, the Cronbach Alpha reliability test was used to check the internal consistency of the questionnaire (4,9). At each of these stages, the analysis and recommendations led to a reduction in the number of items included in the questionnaire (Figure 1).

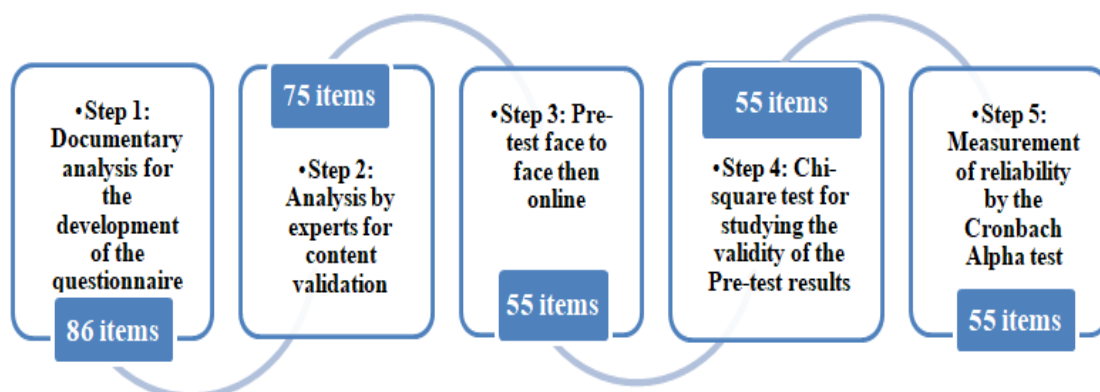


Figure No. 1: Stages of the development of the questionnaire for the study of lifestyles in the era of the Covid-19 pandemic.

– **Step 1:**

The analysis of the documentation allowed identifying the relevant topics for the development of the questionnaire. The lifestyle items were therefore inspired from the documents of reference such the World Health Organization (WHO) (10–12) and have been adapted to the current situation of the Covid-19 pandemics. Food security items are from the Food Access Measurement Scale (HFIAS)(13,14). The items relating to eating practices and food consumption were inspired from the literature on balanced diet and immunonutrition(15–21). In addition, the change in lifestyles in relation to a sedentarity as a determinant of obesity (22) as well as the change in eating habits in relationship with the number of meals taken per day and the consumption of meals prepared outside the home were included (23–25). At the end of this documentation analysis, we identified 86 items grouped into 4 sections that are, section1 including questions on the "Covid-19 Pandemic and containment", section2, on the parameters concerning "Anthropometry and lifestyle", section 3: on "Prevention and treatment of Covid-19 with food" and section 4 on" Food security " (Figure 2).

– **Step 2:**

This developed tool was then submitted to a committee, of nine members, experts in the field of nutrition, eating behavior and lifestyle, in order to check the validity of its content. The expertise(26) carried out allowed us to make significant revisions of the questionnaire.

– **Step 3:**

The validity of the questionnaire was also studied using a pre-test face-to-face survey on 64 volunteers, and one week after, another pre-test was carried out online, with the same subjects.

– **Step 4:**

We have carried out a correlation analysis between the results obtained by the face-to-face and online pre-tests. The Chi-square test was used to check if there any significant difference between the responses obtained by the two methods of the questionnaire administering. The statistical significance threshold was set at the p value of less than 5%.

– **Step 5:**

The internal consistency of the questionnaire was measured by Cronbach's Alpha coefficient reliability test. We adopted the following four reliability thresholds: 1) excellent reliability if $\alpha \geq 0.90$, high reliability if $0.70 \geq \alpha < 0.90$, moderate reliability when $(0.50 \geq \alpha < 0.70)$ and low reliability if $\alpha < 0.50$ (27).

RESULTS

Elaboration of the questionnaire on the basis of littérature review analysis

This analysis allowed the design of the questionnaire draft by examining the relevant elements of the literature. We developed a questionnaire with 86 items grouped into 4 sections (Figure 2).

- The section 1 (Covid-19 pandemic and confinement), elements are measured by the categories "yes" and "no".

- The section 2 (Anthropometry and lifestyles), elements are measured using a 3-point likert scale: 1 = no change; 2 = increase or amplification; and 3 = decrease.

- The section 3 (Prevention and treatment of Covid-19), elements are measured by the categories "yes" and "no".

- The section 4 (Food security), elements are measured using a 4-point likert scale: 1 = no; 2 = rarely; 3 = sometimes; and 4 = often.

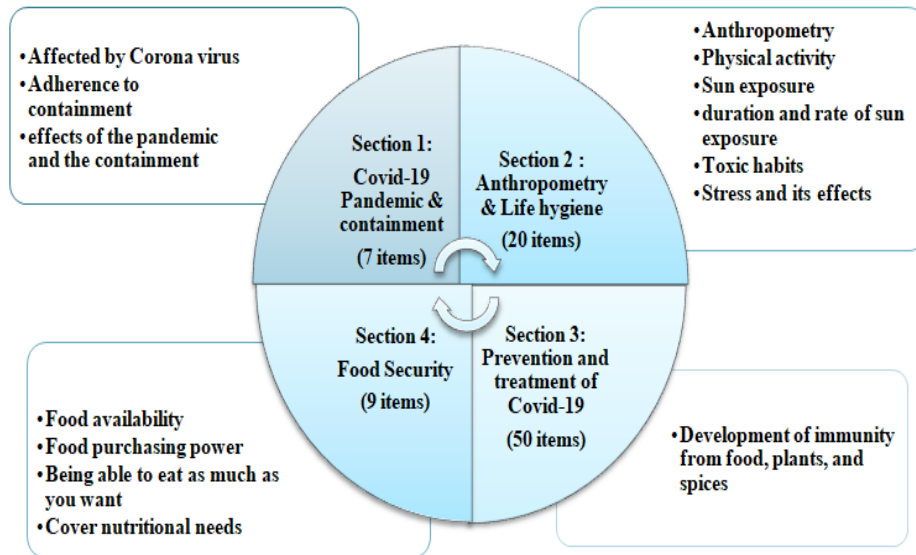


Figure No. 2: The questionnaire components retained following the review literature analysis, to be used in the transnational study on lifestyles adopted in the era of the Covid-19 pandemic

Modification of the questionnaire following the experts analysis

The expert group concluded that of the 86 items, 75 met the 0.80 criterion of the Content Validity Index (CVI). In addition, the committee suggested moving the stress-related questions from Section 2 (Anthropometry and Lifestyles) to Section 1 (Pandemic and Containment).

Modification of the questionnaire based on the pre-test results

The questionnaire pre-tests administered face-to-face and online allowed us to check the questions clarity and the time required to complete the questionnaire. Indeed, the participants' responses as well as their opinions made it possible to reveal the questions that are precise, clear and understandable and those which are not. This resulted in reformulating certain questions and reducing the list of foods in section 3. The variables retained at this stage are therefore 55 (Table 1 and 2). Finally, and following these modifications, we were able to reach an average questionnaire filling time of 15 ± 7 minutes.

Correlation of the face-to-face and online pre-test results

Tables 1 and 2 showed that there are no significant differences between the results of the face-to-face survey and those of the online one. Indeed, for all the items, we obtained a $p \geq 0.9$.

Table No. 1: Correlation of the results of section 1 and 2 obtained in the face-to-face and in the online surveys

Sections et Items	P value*	
Section 1: Pandemic et containment		
Infected by Covid-19	- Respondent	0,99NS
	- Someone from his/her family or Acquaintances	0,99NS
Respect of containment		0,95NS
Effect of the containment	- Better yield	0,9NS
	- Availability for the family	0,93NS
	- Better organization	0,95NS
	- Boredom	0,9NS
	- Violence	0,91NS
Sensation of Stress		0,97NS
Causes of stress	Financial problems	0,99NS
	Health concerns	0,9NS
	Afraid of the unknown	0,97NS
Section 2: Anthropometry & healthy living		
Effects of the Covid-19 pandemic and containment on		
- Body weight		0,99NS
- Physical activity level		0,93NS
- Sun exposure		0,9NS
- The duration of sleep		0,91NS
- The rhythm of sleep		0,91NS
- Smoking		0,99NS
- Alcoholism		0,99NS
- Balanced diet		0,99NS
- The number of meals or snacks		0,99NS
- Snacking		0,96NS
- Orders/delivery of meals from outside		0,95NS

Note *= khi 2 test : significant at $p < 0,5$, NS = Not Significant

Table No. 2: Correlation of the results of sections 3 et 4 obtained in the face-to-face and the online surveys

Sections et Items	P *
Section 3: Food prevention and treatment	
– Freshwater	0,9NS
– Lukewarm water	0,93NS
– Cofee	0,95NS
– Tea	0,96NS
– Hot drinks	0,93NS
– Onion	0,91NS
– Garlic	0,96NS
– Lemon	0,99NS
– Olive oil	0,99NS
– Dates	0,99NS
– Honey	0,99NS
– Royal jelly	0,99NS
– Propolis	0,99NS
– Pollen	0,99NS
– Nigella	0,99NS
– Fenugreek	0,99NS
– Cloves	0,99NS
– Cinnamon	0,99NS
– Curcuma	0,99NS
– Ginger	0,99NS
– Thyme	0,99NS
– Absinthe	0,99NS
– Olive leaves	0,99NS
Section 4: Food Security (13) since the occurrence of Covid- 19	
– Were you worried about not having enough food in your family?	0,99NS
– Were you or someone in your family unable to eat the food of their choice because there was not enough money to buy it?	0,99NS
– Did you or someone in your family have to eat little variety of food because there wasn't enough money to buy it?	0,99NS
– Did you or someone in your family have to eat certain foods that they really didn't want to eat (or didn't want to eat at all) because there wasn't enough money to buy something else?	0,99NS
– Did you or someone in your family have to eat a meal that wasn't consistent enough for lack of money?	0,99NS
– Did you or someone in your family have to reduce the number of meals in the day due to lack of money?	0,99NS
– Did it happen that there was absolutely nothing to eat in your house because of a lack of money?	0,99NS
– Did you or anyone in your family go to bed hungry because there wasn't enough to eat?	0,99NS
– Did you or anyone in your family spend a day and a night without food because there wasn't enough money to buy food?	0,99NS

Note *= Test khi 2 (significant at $p < 0,5$), NS = Not Significant

Internal consistency study by the Cronbach Alpha reliability test

Table 3 shows that for section 1, the Cronbach's Alpha coefficient is 0.6, for section 2, it is 0.7, for section 3, it is 0.8 and for section 4, it is 0.96.

Table No. 3: Internal consistency study by the Cronbach Alpha reliability test

Sections	Items	Internal consistency (Alpha cronbach)	Test de
Section 1 : Covid-19 Pandemic & containment	<ul style="list-style-type: none"> - Infected by coronavirus - Respect of containment - Effects of the containment : <ul style="list-style-type: none"> ▪ Better yield ▪ Availability for the family ▪ Better organisation ▪ Boredom ▪ Violence - Causes of stress : <ul style="list-style-type: none"> ▪ Financial Problems ▪ Health concern ▪ Afraid of the unknown 	0,6*	
Section 2 : Anthropometry & healthy life	Effects of Covid-19 pandemic & containment on : <ul style="list-style-type: none"> - Bodyweight - Physical activity - Sun exposure - The duration of sleep - The rhythm of sleep - Smoking - Alcoholism - Food balance - The number of meals or snacks - Snacking - Outside meal orders 	0,7**	
Section 3 : Prevention & treatment of Covid-19 by foods	List of foods (water, hot infusions, vegetables, fruits, spices...)	0,8**	
Section 4 : Food Security	Criteria for assessing the purchasing power of sufficient food to eat enough.	0,96***	

Note : *= moderate reliability , **= high reliability, ***= excellent reliability

DISCUSSION

The questionnaire project presented in this study was constructed following a literature review. This analysis allowed the generation of the basic principles essential for the creation of a tool for general data collection (9) and guide the development of a questionnaire (28) as well as to identify the evaluation concepts(29).

The experts analysis led to restructuring, concluding and reducing the questionnaire based on the Content Validity Index (CVI) that is a relevant and widely used technique (28). In another study (9), the contribution of the experts allowed the improvement of the construction of the measuring variables. The judgmental approach to establishing the validity of the content includes examining the documentation, then monitoring the evaluation by an expert judge or a committee (30). The CVI is calculated for each element using the Lawshe method (26), the elements which are not relevant have been eliminated (4).

The face-to-face and online pre-tests verified the clarity of the questions and the time required to complete the questionnaire. The pre-test is mandatory in any research process, as it allows the methodology to be tested and readjusted before starting data collection (31,32).

The absence of a significant difference between the results of the face-to-face and the results of the online surveys favors flexibility in the use of the developed questionnaire depending on the available resources.

Following the statistical analysis of the reliability of the questionnaire, 55 items were retained because the test revealed moderate reliability for the section 1 ($0.50 \geq \alpha < 0.70$), high reliability for the sections 2 and 3 ($0.70 \geq \alpha < 0.90$) and excellent reliability for section 4 ($\alpha \geq 0.90$) (27).

CONCLUSION

The questionnaire developed concerns lifestyle changes and food security following the occurrence of the Covid-19 pandemic and containment. The validity and reliability of this questionnaire were studied according to the approach recommended by scientific evidence. It is a relevant tool that could be administered face to face and online. The questionnaire developed could also be modified to be adapted to all populations and various situations.

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