An analysis of the transaction towards sustainable food consumption practises during the Italian lockdown for SARS-CoV-2: the experience of the Lombardy region

Marco D'Addario, Massimo Labra, Silvia Mari, Raffaele Matacena, Mariangela Zenga

1. Introduction

In the pandemia for SARS-CoV-2, food occupies a central position (Galimberti et al., 2020). During the lockdown period, the attention has been devoted to the activities and behaviors related to nutrition, considering also the acts of purchasing, cooking and consuming food. In a context in which working-day out-of-home and school meals were no longer available, people forcely prepared and consumed their meals at home.

This work is part of an ongoing research that analyzes the effects of the pandemic on the healthiness and sustainability of food-related behaviors. It does so by means of an empirical investigation carried out in Lombardy region, the region severely hit by the coronavirus pandemic in Italy. Within this frame, the specific objective of this work is to assess whether behavioral and attitudinal patterns related to consuming food have changed with respect to the established habits of 'ordinary' periods, and how these transformations are linked to socio-demograhic information of respondents.

2. The survey and the sample

An online survey was administered in May-June 2020, employing the Computer Assisted Web Interview (CAWI) methodology. The survey was designed to link data about socio-demographics and living conditions, with self-reported changes in practices related to food consumption, cooking and food shopping. Moreover, data about the psychological condition during the lockdown, weight management, physical activity and health status, and food- and sustainability-related opinions, attitudes and future intentions were recorded.

Of the 2288 complete responses recorded, we consider only $n = 1540$ respondents living in Lombardy that was the region most affected by the SARS-CoV-2 during the period February-May 2020. As shown in Table 1, 51.6% of respndents were provided by participants who identify themselves as females. The average age was 48.79 years (sd=17.43). The level of education of the sample is imbalanced towards higher educational attainments: 63.8% of respondents hold a graduate or a post-graduate degree. The sample was characterized by higher-than-average levels of socio-economic well-being (measured by MacArthur Scale of Subjective Social Status (Adler et al. (2000)) with a mean value of 6.24 (sd=1.33). Most respondents (51.7%) had a normal weight, while the 45.1% was overweighted or obese. Moreover, 80.1% of respondents declared to follow an omnivore diet.

A large proportion of respondents (34.4%) declared a worsening effect of the SARS-CoV-2 emergency on their economic conditions. From the point of view of work, 53.8% of the sample reported having worked from home, while 9.4% declared not having worked at all in the period

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and 7.6% of the sample were employed in essential sectors. Most respondents (39.2%) lived as a couple, 18.9% of cases consisted of three people, and 24.5% of cases comprised four or more people. The individuals who lived the period alone were 15.5%.

	n	%		n	%
Gender			***Liv. cond. in 1.st lockdown***		
Male	746	48.4	Single	238	15.5
Female	794	51.6	Couple	604	39.2
			3 persons	291	18.9
Level of education			4 or more	377	24.5
Up to secondary school	85	5.5			
High school	473	30.7	***Work cond. in 1.st lockdown***		
Graduation or more	983	63.8	Working at home	828	53.8
			Essential sector	117	7.6
BMI			Not working	145	9.4
Underweight	49	3.2	Other	450	29.2
Normal weight	796	51.7			
Overweight	420	27.2	***Ec. cond. after 1.st lockdown***		
Obese	275	17.9	Much worse	118	7.7
			A little worse	412	26.7
Usual Dietary Regime			No influence	904	58.7
Omnivore	1234	80.1	A little better	104	6.7
No red meat	181	11.7	Much better	3	0.2
Pescatarian, vegetarian, vegan	125	8.1			

Table 1: The sample (n=1540)

3. The transition towards sustainable foods consumption practises

With the aim to analyze the transition towards sustainable foods consumption practises, we considered the multiple choice (single answer) item: "In comparison to your 'ordinary' life habits, how often have you consumed the following dishes and foods during the lockdown? Answer: Never as before, less frequently, as usual, more frequently". For the purpose of this paper, the four categories on food consumption were collapsed in 3 categories as follow: Less than before; Never or equal than before; More than before. Now, the second category is thought to underline behaviors that have not changed since before the lockdown. Table 2 reports the consumption's food habits during the first Italian lockdown. A closer look at the results reveals how certain food groups have been favored over others in the timeframe investigated. Among these, sweets and desserts, vegetables, carb dishes and fresh fruit recorded the highest percentages of consumption increase, since they were eaten more frequently than usual by, respectively, 43.3%, 35.8%, 27.5% and 26.5% of the sample. Other foods that were privileged by lockdown eaters belong to the categories of legumes (21.1%) and dairy (20.8%). Interestingly, meat does not seem to have played a leading role within lockdown diets. Despite the overarching tendency pointing towards increased variety and quantity of food consumption, the proportion of respondents who in fact reduced the consumption frequency of meat-based dishes (15.9%) is slightly higher than that of those who consumed meat more frequently (12.3%). A trend of reduction is also highlighted in the cases of sugary beverages (sodas and juices) and alcoholic drinks, most likely linked to the supervened impossibility to experience social gatherings and/or celebration moments. Nevertheless, it is important to notice that 19.1% of the sample - a significant propor-

tion - increased their alcohol consumption while under lockdown. In sum, the lockdown seems to have had a double effect on diets: on the one hand, it spurred the consumption of ingredients that are typical of the Mediterranean diet (vegetables, legumes, fruit) and also deeply associated with traditional patterns of cooking and eating in Italy; on the other, it underscored the 'comforting' effect of certain foods, which brought many people to indulge, in our case, on pasta, sweets and dairy, perhaps as an attempt to cope with boredom and/or other negative subjective consequences of social confinement.

	Less than before		***Equal than before***		***More than before***	
Food	**n**	**%**	**n**	**%**	**n**	**%**
Carb-based dishes	141	9.1	975	63.3	424	27.5
Meat-based dishes	245	15.9	1106	71.8	189	12.3
Dairy products	151	9.8	1069	69.4	321	20.8
Sweets and desserts	220	14.3	654	38.2	666	43.3
Alcholic beverage	285	18.5	961	62.4	294	19.1
Sugary beverage	175	11.3	1251	81.2	115	7.5
Vegetables-based dishes	120	7.8	868	56.4	552	35.8
Legumes	162	10.5	1054	68.4	325	21.1
Whole-grain cereals	142	9.2	1220	79.2	179	11.6
Nuts and oily seeds	188	12.2	1165	75.7	187	12.2
Fresh fruit	122	7.9	1010	65.6	408	26.5

Table 2: The consumer's food habits during the first Italian lockdown.

Since the nature of the scale of the previous items, we applied the categorical principal component analysis (CatPCA, Linting & van der Kooij (2012)) to examine the component structure of the latent construct. Following the EATLancet Commission's dietary recommendations (Willet et al. (2019)), we considered two groups of foods: the sustainable and healthy foods (vegetables-based dishes, legumes, whole-grain cereals, nuts and oily seed and fresh fruit) and, on the contrary, unsustainable and unhealty foods (carb-based dishes, meat-based dishes, dairy products, sweet and desserts, alchoolic beverage, sugary beverage). This choice was confirmed by the application of a preliminary CatPCA on the eleven items. The application of the CatPCA separately on the two groups allowed us to obtain an index of transition for the sustainable foods' consumption (TSF) and an index of transition for the unsustainable foods' consumption (TUF).

4. The transition for the sustainable foods' consumption

We performed a CatPCA with the five items of the sustainable foods' consumption. According to the "eigenvalue greater than one" criterion only the first component was retained (first eigenvalue equal to 1.895).

Food	**Comp. loading**
Legumes	0.716
Whole-grain cereals	0.635
Vegetables-based dishes	0.624
Nuts and oily seeds	0.518
Fresh fruit	0.475

Table 3: Component loadings for the CatPCA of transition for sustainable consumer's foods.

The related Cronbach's alpha was 0.555. Table 3 reports the factor loadings of the five foods: it is clear that the first component is highly influenced by the increase in the consumption of legumes, whole-grain cereals and vegetables-based dishes. This new latent construct is interpretable as the transition towards sustainable food consumption practises (TSF): the more the value is positive the more a person realized a transition to sustainable foods' consumption. In analysing the transition towards sustainable foods' consumption practises, a linear regression model was fitted. We obtained the model reported in Table 4, where R^2 equals 8.3% (adjusted R^2 = 7.4%).

Parameter	**Estimate**	**SE**	**p-value**
Intercept	-0.272	0.273	0.320
Male (vs Female)	-0.078	0.061	0.199
Working condition (reference: Other)			
Working at home	0.092	0.077	0.228
Not working	0.247	0.110	0.024
Essential sector	0.168	0.112	0.134
Educational level (reference: University)			
Up to secondary school	-0.170	0.122	0.164
High school	-0.090	0.063	0.155
Living condition (refence: 4 persons or more)			
Single	-0.125	0.095	0.188
Couple	0.123	0.073	0.094
3 persons	-0.034	0.093	0.714
Pescatarian/veg (vs no pescatarian/veg)	0.148	0.061	0.016
BMI	-0.014	0.007	0.040
Economic Well-being	0.019	0.021	0.366
Age	0.009	0.002	$<$0.0001

Table 4: Parameters estimates, standard errors (se) and p-values of the predictors for the linear regression model with the dependent variable being the TSF.

The TSF index resulted to be affected (statistically significant at 90%) by: age, BMI and food diet. In particular:

- the older people resulted to have realized a greater transition to a sustainable foods' consumption;
- people with a lower BMI realized a greater transition to sustainable foods' consumption;
- respect to omnivorous people, pescatarian/vegerarian/vegan respondents had a greater transition to sustainable foods' consumption.

5. The transition for the unsustainable foods' consumption

The results of the CatPCA on the six items of the unsustainable foods' consumption showed that only the first component had a eigenvalue greater than one (eigenvalue equal to 1.888). The related Cronbach's alpha was 0.564. Table 5 reports the factor loadings of the six foods: the first component is highly influenced by the increase in the consumption of carb-based dishes, sweets and desserts. This new latent construct is interpretable as the transition towards unsustainable foods' consumption practises (TUF): the more the value is positive the more a person realized a transition to unsustainable foods' consumption. We fitted a linear regression model on TUF and we obtained the model reported in Table 6, where R^2 equals 13.5% (adjusted R^2 = 12.5%).

Food	Comp. loading
Carb-based dishes	0.693
Sweets and desserts	0.675
Dairy products	0.578
Alcoholic beverage	0.567
Sugary beverage	0.416
Meat-based dishes	0.350

Table 5: Component loadings for the CatPCA of transition for unsustainable consumer's foods.

Parameter	Estimate	SE	p-value
Intercept	0.917	0.246	<0.0001
Male (vs Female)	-0.387	0.062	<0.0001
Working condition (reference: Other)			
Working at home	0.099	0.072	0.169
Not working	0.337	0.110	0.002
Essential sector	0.066	0.115	0.569
Educational level (reference: University)			
Up to secondary school	0.171	0.122	0.161
High school	-0.061	0.062	0.323
Living condition (refence: 4 persons or more)			
Single	0.128	0.093	0.168
Couple	0.131	0.079	0.097
3 persons	0.139	0.087	0.111
Pescatarian/veg (vs no pescatarian/veg)	-0.185	0.071	0.009
BMI	0.003	0.007	0.634
Economic Well-being	-0.064	0.021	0.003
Age	-0.010	0.002	<0.0001

Table 6: Parameters estimates, standard errors (se) and p-values of the predictors for the linear regression model with the dependent variable being the TUF index.

The TUF index resulted to be affected (statistically significant at 90%) by: gender, age, food diet and economic well-being. In particular:

- respect to females, males showed a higher transition to unsustainable foods' consumption;
- the transition to unsustainable foods' consumption decreased with increasing age;
- people with a higher level of economic well-being realized a lower transition to unsustainable foods' consumption;
- respect to omnivorous people, pescatarian/vegerarian/vegan respondents had a lower transition to unsustainable foods' consumption.

6. Conclusion

The outbreak of the SARS-CoV-2 pandemic caused major perturbations to the food environment in many localities of the world, further exacerbated by the introduction of social isolation and business shutdown measures intended to slow down the transmission of the virus.

This research investigated the profiles of sustainability of the transformations that occurred in the daily nutritional choices and behaviors of Italian households during the March-May 2020 general lockdown. Home confinement affected the food behaviors of our respondents and the health crisis seemed to be an occasion for a large section of interviewees to rethink food and nutrition.

During lockdown weeks, food was appreciated in its raw, fresh, seasonal, local-bound and unprocessed form, (re-)gaining relevance not only as a pleasurable hobby (cooking as a leisure activity) but also as a cornerstone of pro-health behaviors and shared social practices. This led to an improvement of the healthiness and sustainability of diets which we measured and compared through the elaboration of the transition for the sustainable foods' consumption index and the transition for the unsustainable foods' consumption index.

The evidence gathered by this research suggests that the trajectories towards such a transition are already plotted, but it will take an adequate support from cultural, political and economic institutions to create the conditions for sustainable food production and consumption to take hold as the 'new' normal in the post-pandemic era.

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