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Socio-economic drivers in productive rural activities and their impact on the eating habits, lifestyle and nutritional status of people living in a rural area: The Majella National Park as a case study

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Abstract

This paper analyses the relationship between food system dynamics with consumer behaviors, in population within a protected mountain area in Italy. In order to obtain socioeconomic and nutritional data, a combination of qualitative and quantitative research was employed to group farmers, local authorities, and inhabitants. Our research highlighted the close relationship between local food productive sector with consumption habits of local communities. The experience of the Majella National Park can be taken as an example of promoting environmentally friendly agriculture that enhances food quality, increases resource management and preserves local cultural heritage.

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Introduction

Italy's wide and diversified agrobiodiversity reflects a significant agricultural heritage of food traditions, particularly relevant from a socio-economic perspective. Many Italian rural areas are strongly characterised by farms with small-scale local production, cultivated with techniques derived from the historical and cultural tradition of that specific region (Azzini *et al*., 2012). Crops are often grown using sustainable agricultural systems and old cultivation practices that are more respectful of the environment. Moreover, local food products are of great interest from a sociological point of view as they represent the legacy of a traditional food diet that also offers regional-based cuisine beyond local boundaries. However, within the globalised economy, many food products have become commodities produced and traded in a market that has expanded from an essentially local to an increasingly global base. Modern supermarkets are rapidly replacing traditional grocery outlets (Beghin *et al*., 2015). Economic development, urbanisation and market globalisation also contribute to evolving lifestyles, involving changing consumer preferences, purchasing habits, food environments, and a shift towards Western-style diets. Traditional food components are increasingly being replaced by processed foods and convenience products with low fibre and high fat, sugar and salt contents. (Gómez & Ricketts, 2013). This nutritional shift to high fat and sugar intakes combined with decreasing levels of physical activity increased overweight and obesity, as well as non-communicable diseases (Hawkes, 2008; Gayathri *et al*., 2017). Recently, this phenomenon has also been observed in rural areas around the world (Popkin, 2001; Liebman *et al*., 2003). If an adequate diet, combined with a healthy lifestyle, is the key factor for preventing diseases and maintaining people's health, agri-food productions should influence consumer demand.

Rural areas subject to a protection regime, such as parks, represent an interesting "place" of investigation due to their support for a new agriculture paradigm enabling the achievement of several major dimensions of development, most particularly economic, environmental and social sustainability (De Janvry, 2010).

Italy is characterised by the presence of many natural parks. The park system covers more than 10% of national territory and agricultural activities carried out in this context play a strategic role in the economy of such areas. The Majella National Park is a good example here. It features hilly and mountainous areas which, as a consequence, have different types of agricultural models (subsistence, marginal and intensive agriculture). With the aim of preserving natural resources, the Park promotes sustainable agricultural production, mainly characterised by a strong agri-food identity

and traditional, local products. Various local bodies, including the Park and LAG[1], have launched policies to preserve and enhance natural resources, combining them with the economic and social components of the system in which they exist. The experience of the Majella National Park can be taken as an example of promoting environmentally friendly agriculture that enhances the environment with typical niche products, activating all possible synergies with the region, starting with agricultural production. These actions impact the local population above all because, due to proximity to the source of production, they are the main consumers of local products.

Based on the foregoing considerations, the aim of this work is to describe the influence of the dynamics of local agri-food production and trade on the eating habits, lifestyle and nutritional status of a population living in specific rural area: the Majella National Park.

1. Material and Methods

In the framework of TERRAVITA's "Biodiversity, Territory and Nutrition: the sustainability of Italian agro-food" project, the demographic, economic and production trends as well as their possible implications on the nutritional status and well-being of a population group living in Majella National Park were analysed jointly by the Research Centre for Food and Nutrition and Research Centre for Politics and Bioeconomy.

This section includes selection of the study sites and how data was collected for the different analyses. Three surveys were carried out: supply, consumption and nutrition.

Criteria and selection of study sites

The Majella National Park, which covers an area of around 73 thousand hectares with heights above sea level of between 205 and 2800 metres is home to just over 88,000 resident inhabitants and has slightly lower depopulation rates than other areas in Italy (–2% in the comparison between the ISTAT 2001 and ISTAT 2011 censuses). The area's agriculture can be divided into that practised in the mountain areas and that practised on the hills and valley floors. The former is mainly marginal and subsistence farming while the latter is more productive with two prevalent crops, i.e. vines and olives, as well as intensive livestock farming.

Thanks to the Park Authority, the Regional Agency for Agricultural Development Services (ARSSA) and Majella Verde LAG collaborating within

1. Local Action Group is a group (generally a consortium) made up of public and private subjects which works for local development in a rural area through structural funds.

the Rural Development Programme (RDP) of the Abruzzo Region, there has been renewed interest in local food production and the recovery of ancient cultural traditions. At the same time, these initiatives build a stable connection with tourism thanks to the growing interest of visitors in the environment, local traditions and high-quality healthy products of the area.

In order to respond to the research objectives, a limited area was identified: a group of municipalities with "marginal geographic" features and potentially less affected by standard eating habits depending on large-scale distribution. The study restricted its analysis to areas that were overwhelmingly rural with a sustainable environment and a marked presence of typical, local food products featuring in the diet of the local population. In this way, we were able to "isolate" a marginal, peripheral area that is still characterized by a great deal of agricultural activity and a high number of typical, local food products. In addition to territorial analyses, territorial statistical data and socio-economic characteristics of the Majella National Park area (ISTAT Population Census 2011 and Agriculture Census 2010) and indicators for the definition and implementation of the National Strategy for Inner areas (NSIA)[2] were used to identify the limited area.

The sampling criteria adopted for the area identification included:

- location of the municipalities within the Park;
- altitude definition (mountain 700 mt. above sea level);
- resident population (< 3500 inhabitants);
- depopulation rate (> 5% compared with the last two ISTAT censuses 2001-2011);
- elderly population (> 30% of total local population);
- the presence of peripheral or ultra-peripheral municipalities within the classification of internal areas defined by the Ministry of Economic Development in its Inner Area Strategy.

The study was carried out in a peripheral area within Majella National Park and included the five municipalities of Chieti, Gamberale, Pennapiedimonte, Pizzoferrato, Lama dei Peligni and Montenerodomo.

Analysis of the agricultural system within the limited area showed that during the decade 2000-2010 the average size of farms increased by

2. NSIA represents direct action to support sustainable territorial competitivity, with the aim of halting, in the medium term, the demographic decline that characterises the Italian interior. The aim is to create new earning opportunities, ensure inhabitants have access to essential services and improve maintenance of the land itself. For help with funding for local projects, NSIA has recourse to European funds (EFRD, EFS e EFARD) and national resources. Indicators for the choice of areas for action are: number of hospitals, SED (Specialised Emergency Department), existence of secondary schools, a railway station, places in facilities for the elderly, the share of the population without access to fixed broadband networks, and share of the population with access to fixed and/or mobile broadband networks.

about 27% (ISTAT, 2010) and these were largely farms dealing with seminative crops and sheep farming. Agriculture in the Majella National Park is therefore important for preventing the abandonment of mountain lands.

To define the relationships existing between the production sector, local trade and the composition of consumer demand in this area in order to understand the consumption choices, eating habits and lifestyle of a population subgroup, three surveys were conducted.

1.1. *Supply survey for agri-food products*

To understand the consumption choices and–food habits of the study population, two surveys (***Supply survey for agri-food products*** and ***Consumption survey***) were carried out aimed at defining the relationships existing between the production sector and local trade and the composition of consumer demand.

For analysis of the dynamics of the trade of local food products, a "face to face" questionnaire was given to farmers, retailers and commercial dealers in the municipalities covered by the investigation in order to carry out a survey of the production origin of food products and the type of distribution. The analysis is based on the offer and related supply methods of so-called "fresh" products, including fruit and vegetables, milk and processed meat (ham), flour, pasta, bakery products and eggs. The questionnaire was also given to privileged observers such as mayors and reference LAGs for the area who know the food businesses and the food product supply chain at local level.

The questionnaire was divided into three parts. The first part focused on the type of sales outlet and was aimed at identifying:

- The nature of the sales outlet and thus the commercial environment in which food products are offered to consumers (for example, farm/farm holiday, general grocery shop, dairy products shop, butchers, etc.).
- The position occupied by the sales outlet in the supply chain and whether it operated as a direct seller or intermediary.

The second part aimed to investigate the way in which the products sold were supplied and the reasons on which this choice was based, as well as the seller's perception as to what guided or attracted the local population with regard to purchasing local products.

Finally, the third part aimed at identifying the type of food products habitually bought by the local population and to what extent these formed part of the traditional, local food product heritage.

In addition, information relating to the privileged observers was also collected which made it possible to complete analysis of the offer of agri-food products locally. In this way it was possible to draw the first qualitative

conclusions, albeit not statistically comparable, on food "habits". as well as on the origin of the food itself, whether produced mainly at local level, originating in neighbouring areas or coming from large-scale distribution.

1.2. *Consumption survey*

With the collaboration of local authorities and primary care physicians, subjects were recruited through special community presentation and meetings, dissemination notes and project posters to give visibility to the project. Enrolment of subjects was carried out using the probability sampling method on municipal lists of residents. Participants living in the five municipalities selected for the economic survey included 198 healthy free-living volunteers (61 males and 137 females), aged 18-86 years. Following a detailed remote and close history, volunteers were selected based on the absence of pathologies potentially interfering with the parameters studied, the absence of ascertained viral infections, allergies and food intolerances. Subjects who did not meet these criteria were excluded and among the recruited subjects a high percentage of male volunteers did not join the study. The sample size was proportional to the number of residents in the various municipalities and was not meant to be representative of the population.

To study the eating and buying habits of local population, data from the population survey were obtained by interviewing selected subjects. The questionnaire was divided in two parts: the first was structured to identify the main place of purchase of the main food products (pasta, bread, meat, eggs, milk, fruit, vegetables, etc.) and to investigate the selection criteria adopted for their purchase (such as, for example, price, origin, etc.). The second part aimed to investigate the degree of knowledge about and consumption of typical local products (place of purchase, motivation behind choice, etc.).

1.3. *Nutritional survey on study subjects*

The nutritional survey was conducted to evaluate anthropometric measurements, lifestyle, physical activity and diet of the selected sample. On enrolment, qualified interviewers administered a questionnaire on lifestyle and a semi-quantitative food frequency questionnaire (FFQ) to the 198 participants. The lifestyle questionnaire consisted of a series of questions specifically designed to obtain different information about socio-demographic factors (marital status, education and occupation), smoking habits and alcohol consumption. Food consumption was detected by a validated food diary on four consecutive days including the weekend. All foods and beverages

consumed were recorded by participants and verified by a dietician for correctness of recording. Furthermore, in order to improve accuracy on the estimation of portions, a photo album (Dietometro, 1999) was used. Italian food composition tables were used to calculate energy, macro and micronutrients from daily consumption (Italian Food Composition Tables - INRAN, 2000). Anthropometric measurements including body weight and stature were assessed in accordance with the techniques described by Lohman *et al.* (1988) and body mass index (BMI) was calculated (kg/m^2). Self-reported levels of physical activity were measured using the short-form International Physical Activity Questionnaire (IPAQ-SF). A lifestyle score was developed by selecting 4 lifestyle-related variables including fruit and vegetable consumption, smoking status, alcohol consumption and level of physical activity. A binary score was defined for each variable (fruit and vegetable consumption over or under 750 g/day and more or less than 5 portions altogether a day; smoker or non-smoker; alcohol consumption under or over 30 g/day for men and 18 g/day for women; more or less than 150 minutes of moderate/vigorous physical activity per week), with a score of 1 awarded for each healthy behaviour. The addition of points for fruit and vegetable consumption, smoking habits, alcohol consumption and physical activity amounted to a comprehensive lifestyle score ranging from 0 (least healthy) to 4 (healthiest) for each subject (Tagoe & Dake, 2011).

The study was conducted in accordance with the Declaration of Helsinki on performing trials on humans and participants provided informed consent. The Ethics Committee of "Lazio 2" approved both the procedure and the method of conducting this study.

1.4. *Statistical analysis*

Statistical analyses were performed with StatSoft® STATISTICA 8 for Windows (StatSoft, Italia Srl). To analyse data on consumption and nutritional surveys the differences between groups of different purchasing channels, or in general characteristics of subjects between municipalities, were analysed using ANOVA analysis, $\chi 2$ test and the non-parametric U-test of Mann-Whitney. For all statistical analyses, a significance level of $P < 0.05$ was used. The socio-demographic variables of volunteers by municipalities, food purchase channels, and sample distribution by purchase habits are presented as percentages; the physical characteristics of volunteers and diet are presented as mean and standard deviation.

2. Results

Supply survey for agri-food products

Majella National Park is rich in a wide variety of plant species. These include products certified according to the EU European certification system (PDO and PGI quality scheme), Geographical Indication (PDO and PGI) as well as "Italian Traditional Foodstuffs" regulated by the MIPAAFT list (PAT). Furthermore, some products are defined as "typical" by commercial brands such as Slow Food or Parks (ARSSA Abruzzo, 2016; Touring Club Italiano, 2015). Table 1 shows the typical agri-food products categories present in this area.

Table 1 - Typical agri-food products in Majella National Park (investigation area)

Product name	Category	Certification type	Year
Caciotta frentana	Cheeses and dairy products (Caciotta)	Other	/
Salsicciotto di Pennapiedimonte	Cold cuts, fresh meat and their preparations (sausages)	PAT	2000
Salsiccia di fegato	Cold cuts, fresh meat and their preparations (sausages)	PAT	2000
Salsicciotto frentano	Cold cuts, fresh meat and their preparations (sausages)	Slow Food Presidia	/
Broccolo riccio	Vegetables and Legumes (Broccoli)	Parks	/
Fagioli a olio	Vegetables and Legumes (Beans)	PAT	2000
Fagioli a pane	Vegetables and Legumes (Beans)	PAT	2000
Fagiolo 'Socere e Nore'	Vegetables and Legumes (Beans)	Parks	/
Fagiolo a caffè	Vegetables and Legumes (Beans)	Parks	/
Fagiolo aquilano	Vegetables and Legumes (Beans)	Parks	/
Fagiolo Borlotto Antico	Vegetables and Legumes (Beans)	Parks	/
Fagiolo cannellino	Vegetables and Legumes (Beans)	Parks	/
Fagiolo Gentile Munitilio o Monachelle	Vegetables and Legumes (Beans)	Parks	/
Fagiolo quaranta giorni	Vegetables and Legumes (Beans)	Parks	/
Fagiolo Tondino	Vegetables and Legumes (Beans)	Parks	/
Pomodoro a pera	Vegetables and Legumes (tomato)	PAT	/
Mezza Fava, Fava Nostra	Vegetables and Legumes (Broad bean)	Parks	/
Patata di montagna del medio Sangro	Vegetables and Legumes (potato)	Other	

Table 1 - continued

Product name	Category	Certification type	Year
Peperone dolce di Altino	Vegetables and Legumes (Pepper)	Slow Food Presidia	2009
Farro d'Abruzzo	Fruit, vegetables, table olives and preserved (Spelt)	PAT	2000
Tartufo d'Abruzzo	Fruit, vegetables, table olives and preserved (truffle)	PAT	2000
Grano tenero Carosella	Rice, Pasta and Cereals (wheat)	Parks	/
Grano tenero Solina	Rice, Pasta and Cereals (wheat)	PAT	/
Segale Secina	Rice, Pasta and Cereals (rye)	Parks	/
Mela Gelata	Fruit (apple)	Parks	/
Mela Limoncella, Meloncella Mela limone	Fruit (apple)	Parks	/
Mela Mangione	Fruit (apple)	Parks	/
Mela Paradiso	Fruit (apple)	Parks	/
Mela Piana, Mela Casola o Mela di Altin	Fruit (apple)	Parks	/
Mela Rosa	Fruit (apple)	Other	/
Mela Tinella	Fruit (apple)	Parks	/
Pera "De vièrne"	Fruit (pear)	Parks	/
Pera Campanella	Fruit (pear)	Parks	/
Pera San Giovanni	Fruit (pear)	Other	/
Pera San Domenico	Fruit (pear)	Parks	/
Pera Trentatrè Once	Fruit (pear)	Other	/
Pesca Pomo di Renzo	Fruit (peach)	Parks	/
Pesca Testa "Rosce"	Fruit (peach)	Parks	/
Trebbiano d'Abruzzo	Wine	PDO	1972
Valle Peligna	Wine	PGI	1995
Terre di Chieti	Wine	PGI	1995
Colline di Teatine	Wine	PGI	1995
Colline di Teatine	Extra virgin olive oil	PDO	1997
Sfogliatelle di Lama	Bakery and pastry products	PAT	2000
Sise delle monache di Guardiagrele	Bakery and pastry products	PAT	2000
Torrone di Guardiagrele	Bakery and pastry products	PAT	2000
Vino cotto	Bakery and pastry products	Other	/

These are local food products obtained using typical cultivars and indigenous varieties, extensive livestock farming and artisan production methods based on local traditions and knowledge.

According to the selected area analysis, the main agri-food products include meat (bovine, ovine, pork), milk (mainly bovine used for small production derivatives like *caciotta* and *scamorza*), fruit (typical mountain products such as apples and nuts), vegetables (especially red potatoes), mushrooms (local inhabitants collect instead of buy them so their sales are not traceable), black and white truffle (their sales to small artisan businesses are not traceable), legumes and cereals(mainly for feeding livestock and self-consumption).

The information collected from the survey of local retailers allowed us to obtain a picture of the local food product sales outlets in the delimited area, which can be divided into the following types (Table 2):

- Direct sales outlets of farm products in urban centres. In some cases, they sell a variety of foods while others sell specific categories (feed, fruit and vegetables, meat, etc.).
- Direct sale of products at the farm (meat, milk and dairy products).
- Food shops, more or less specialised and not necessarily specialising in the sale of local products (meat and dairy products, fruit and vegetables, eggs, wine, potatoes, etc.).
- Mid-sized distribution (supermarkets) that mainly sell industrial products.

It should be noted that there are many family gardens. These are supply outlets that are not included in the census data, but which provide resident families with olive oil, potatoes, fruit and vegetables, legumes, eggs and even meat from farmyard animals.

Table 2 - Agri-food product sales channels in investigated municipalities

Municipalities	**Sales Point in city centre**					**Supermarket**
	Food shop	**Fruits and vegetables**	**Butcher's shop**	**Bakery shop**	**Farms**	
Montenerodomo		1			6	
Pizzoferrato	1		1	1	3	1
Lama dei Peligni	2	2	1	1		2
Gamberale					3	
Pennapiedimonte	1			1		
	4	**3**	**2**	**3**	**12**	**3**

Analysis of the questionnaires identified two main purchase channels (Table 2):

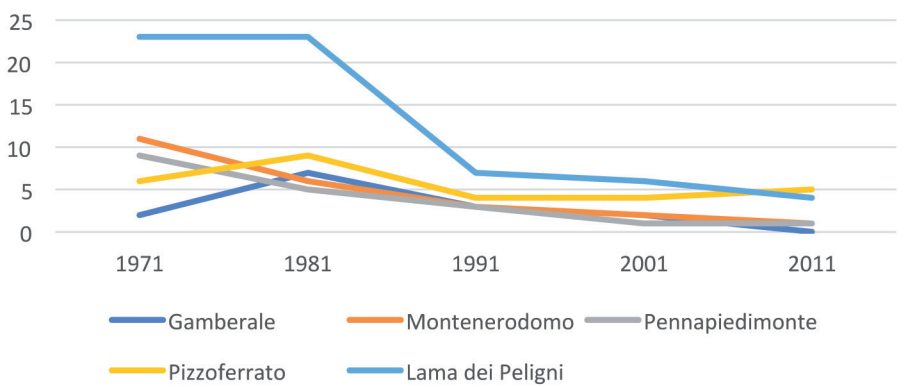
- *Direct* supply channel: food products are acquired directly from the producer without the intervention of intermediaries: the products are therefore local.
- *Mixed* supply channel: food products are purchased both directly from the producer and from a large-scale retail channel or small local shop as well as through intermediaries and wholesalers. The products are locally produced (vegetables, potatoes and eggs) or are products of neighbouring areas (fruit, cold cuts, fresh meat and their preparations and dairy products), as well as from other areas of the region or Italy.

To these channels should be added the *occasional* offer of guaranteed products at the weekly market, which is populated by local producers, producers of neighbouring areas and ambulant sellers from Val di Sangro and Molise. Thus, the market frequently offers products (vegetables, fruit, oil, dairy products and fish) that are not produced in the area surveyed and the Majella National Park. This channel is the answer both to the progressive reduction of the resident population that has led to a consequent closure of the already few existing commercial retailers and to the difficulty for the elderly population to move from one municipality to another

Data from the analyses show that the main supply source for fresh products in this area is sale at farms.

Comparison of the data for the last 40 years allows us to understand how the phenomenon of depopulation has brought with it the contraction of commercial businesses (Figure 1). The data, which refer exclusively to

Figure 1 - Presence of retail businesses selling fresh food products (1971-2011)



Source: ISTAT (2011).

commercial retailers selling fresh products, highlight the vertiginous collapse in all the area's municipalities with a notable decrease in Lama dei Peligni. This is because inhabitants of Lama dei Peligni are able to reach those municipalities in the valley where the presence of large-scale distribution is greater. In Lama dei Peligni, the weekly market plays an important role in the supply of fresh products for the population of the municipality and neighbouring areas.

Consumption and nutritional surveys

Study participants included 198 healthy free-living volunteers (61 males and 137 females). The physical characteristics of the total sample by municipality are shown in Table 3. The mean BMI (from 26.7±4.9 kg/m^2 to 28.9±5.1 kg/m^2) indicates the presence of an overweight status, without significant differences among the five municipalities. 37.2% of subjects studied were overweight, while 34.6% were obese. Our sample shows a different distribution according to the BMI compared with national data (Istituto Superiore della Sanità Passi, 2018a). The latter show an overweight percentage of 37.2% and obesity of 10.9% for Italy, while in Abruzzo is the figures are 33.2% and 11.4% respectively.

Table 3 - Physical characteristics and body composition of volunteers by municipalities (mean value ± standard deviation)

	Municipality							
	MON	PIZ	GAM	LdP	PEN	Total sample	P*	
							C	G
N	34	68	27	36	38	198		
Weight (kg)	74.4±16.1	74.6±13.5	69.2±11.9	68.3±12.4	72.8±14.9	72.6±14.0	n.s.	0.000
Height (cm)	161.3±7.8	160.9±8.4	157.8±10.1	160.2±7.8	159.5±9.0	160.2±8.5	n.s.	0.000
BMI (kg/m^2)	28.6±5.6	28.9±5.1	27.8±4.2	26.7±4.9	28.7±5.8	28.3±5.2	n.s.	n.s.

MON = Montenerodomo; PIZ = Pizzoferrato; GAM = Gamberale; LdP = Lama dei Peligni; PEN = Pennapiedimonte. Statistical analysis: *ANOVA: C = differences by centres, G = differences by genders; P = level of significance; n.s. = not significant.
Source of data: Our analysis in the field (data set are measured during the study, see material and methods section).

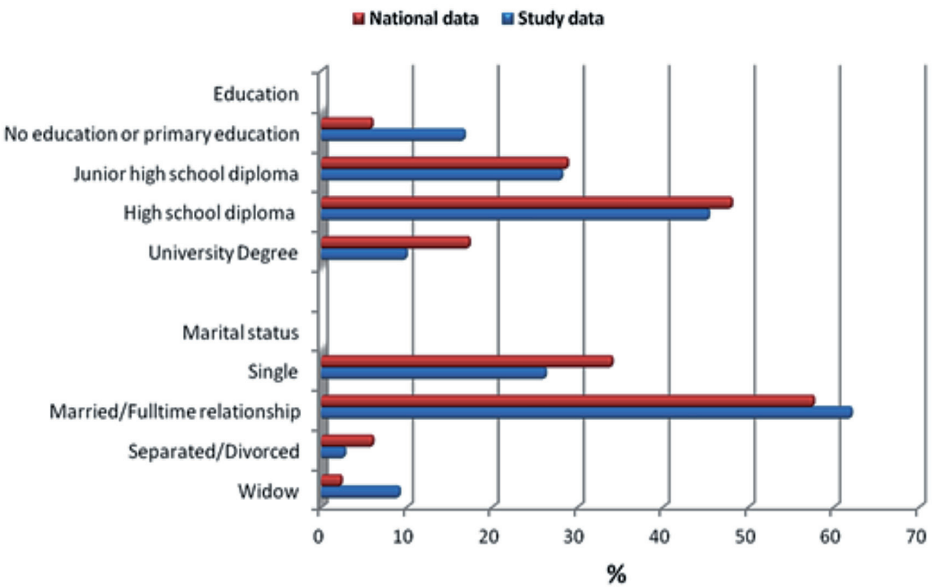
Table 4 shows the specific socio-demographic variables of the sample studied. Since there were no significant differences between the genders, the results are reported for the total sample by municipality. Volunteers are predominantly married (62%) while only about 3% are separated or divorced. Moreover, 45.3% of volunteers have a high school diploma and 0.5% have not studied. Among the different municipalities, the highest prevalence of graduates is in the municipality of Lama dei Peligni (20.0%), while the lowest is in the municipalities of Gamberale (0%) and Pennapiedimonte (5.3%). In the municipalities of Gamberale and Lama dei Peligni, there are no separated or divorced people, but these municipalities have the highest percentages of widowers, respectively 18.5% and 10.7%. In Figure 2, socio-demographic data were compared with national data ((Istituto Superiore della Sanità Passi, 2018b). To do this, no education and primary education were placed together and the data show different values with the highest percentage in our sample (16.7% vs 5.9%). This difference was also observed in the higher education level with values of 9.9 % for our sample and 17.3% for national data. Regarding marital status, national data show higher percentages of singles (34%) than in our study (26.2%), while the opposite is found for widowers with only 2.3% for national data and almost 10% for our sample.

Table 4 - Socio-demographic variables of volunteers by municipalities (%)

	Municipality						
	MON	PIZ	GAM	LdP	PEN	P*	Total sample
Marital status							
Single	22.6	42.9	22.2	10.7	15.8		26.2
Married/Full-time relationship	67.7	46.0	59.3	78.6	73.7	0.03	62.0
Separated/Divorced	3.2	3.2	–	–	5.3		2.7
Widow	6.5	7.9	18.5	10.7	5.3		9.1
Education							
No education	3.2	–	–	–	–		0.5
Primary education	9.7	4.6	25.9	30.0	23.7		16.2
Junior high school diploma	19.4	39.4	33.3	13.3	23.7	0.008	28.1
High school diploma	54.8	45.5	40.7	36.7	47.4		45.3
University degree	12.9	10.6	–	20.0	5.3		9.9

MON = Montenerodomo; PIZ = Pizzoferrato; GAM = Gamberale; LdP = Lama dei Peligni; PEN = Pennapiedimonte *P level of significance χ^2 test.
Source of data: Our analysis in the field (data set are measured during the study, see material and methods section).

Figure 2 - Comparison of socio-demographic variables (%) in the studied sample with national data (Istituto Superiore della Sanità Passi, 2018b)



Regarding food purchase channels, 40% of volunteers studied (N = 198) purchase food by direct supply channel, 48% of consumers by mixed supply channel and 12% by weekly/occasional supply channel (Figure 3).

Figure 3 - Food purchase channels for agri-food products

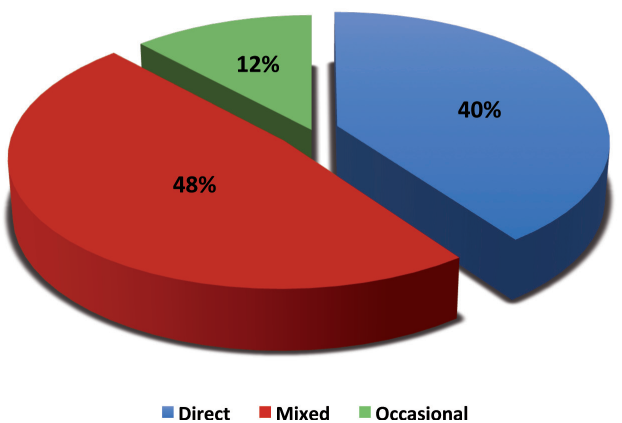
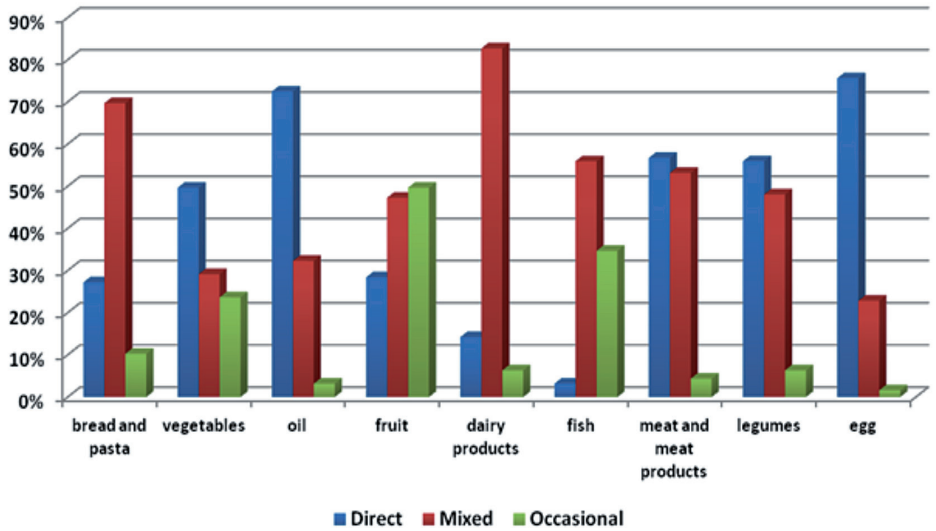


Figure 4 - Food purchase channels by food categories



Considering food categories, the direct supply channel is mainly used for vegetables, oil, meat and meat products; the mixed supply channel for bread and pasta, dairy products and fish; the weekly/occasional supply channel for fruit (Figure 4).

Habitual purchase behaviour appears to be rather consolidated; as reported in Table 5, over the years only 17.5% of those interviewed changed their purchase habits even though they were unable to clarify the reason for doing so. Among the criteria that guide purchase choices, attention to the origin of the product is the most relevant. In fact, only 22% of those interviewed stated that they do not pay attention to this, mostly due to lack of credibility in labelling. With reference to product origin, the analysis shows an average attention towards nationality; 61% of respondents state that they do not buy foreign products because they consider them "less safe" in terms of authenticity and quality. A second criterion of choice is price; in fact, 71% of those interviewed stated that they pay attention to the price of all food products, particularly cereals, fruit, vegetables, meat and dairy.

Assessing consumers' food choices is challenging in itself, given the large number of factors that affect such decisions. Regarding socio-demographic factors, it is difficult to hypothesise relations between specific demographic variables and consumer choice. The results suggest that socio-demographic variables have relatively weak explanatory power in relation to the attitudes of

Table 5 - Sample distribution (%) by purchase habits

Have you changed the place of purchase? (%)	**Yes**	**No**									
	17,5	82,5									
For what reason? (%)	Cohabitation/ marriage	Birth of children		Change of residence	Change in economic conditions		Greater awareness	Other	No answer		
	2,9	0,0		14,7	0,0		8,8	8,8	64,7		
Do you ask or read place of provenance?	**Yes**	**No**									
	78,0	22,0									
If No, why? (%)	I do not care	I am ashamed		The labels are not legible	The labels are incomprehensible		They are not all true	I have no time	No answer		
	31,0	0,0		9,5	2,4		14,3	16,7	26,2		
Do you pay attention to the price? (%)	**Yes**	**No**									
	71,1	28,9									
If yes, for which products?	All products	Cereals	Fruits	Meat	Vegetables	Cured meats	Dairy	Fish	Legumes	Olive oil	Non-food products
	45	15	10	6	4	3	8	2	2	2	2
Do you buy non-Italian products? (%)	**Yes**	**No**									
	38,9	61,1									
If No, why? (%)	I do not care	Less genuine		Less healthy		Less secure			Less cheaper		
	17,8	12,6		12,6		55,6			1,5		

consumers towards food choice factors (Cranfield *et al*., 2012). Our study shows no difference between the choice of food purchase and lifestyle, including marital status and level of education (Table 6). However, subjects with university degrees buy more non-Italian products compared with other levels of education. Regarding marital status, the separated/divorced subjects surveyed do not pay attention to price and also buy more non-Italian products compared with the other marital statuses that show a similar trend, although these data are not statistically different (data not shown). Differences in the supply channel, on the other hand, were observed between municipalities: Pennapiedimonte and Lama dei Peligni show a higher purchase preference than other municipalities (40.43% and 36.36% respectively) (Table 7).

Table 6 - Food purchase channels by socio-demographic variables (%)

	Direct	**Mixed**	**Occasional**	
	%	%	%	P*
Marital status				
Single	26.0	27.1	27.9	
Married/Full-time relationship	61.6	60.8	59.7	n.s
Separated/Divorced	2.8	2.8	2.3	
Widow	9.6	9.4	10.1	
Education				
No education	0.5	0.5	0	
Primary education	16.5	16.7	13.5	
Junior high school diploma	28.6	28.0	30.1	n.s.
High school diploma	46.2	45.7	48.9	
University degree	8.2	9.1	7.5	

*P level of significance c^2 test; n.s. = not significant.

Source of data: our analysis in the field (data set are measured during the study, see material and methods section).

Table 7 - Food purchase by municipalities (%)

	Direct	**Mixed**	**Occasional**	P
	%	%	%	
Montenerodomo	36,05	34,88	29,07	n.s.
Gamberale	34,18	34,18	31,65	n.s.
Pizzoferrato	35,06	38,51	26,44	n.s.
Lama dei Peligni	36,36	36,36	27,27	n.s.
Pennapiedimonte	40,43	39,36	20,21	n.s.

*P level of significance c^2 test; n.s. = not significant.
Source of data: Our analysis in the field (data set are measured during the study, see material and methods section).

Data concerning food intake and lifestyle of the studied population are shown in Table 8. There are no differences between the municipalities regarding food intake and macronutrients, except for carbohydrates ($p < 0.05$). However, in all municipalities, differences with respect to the

recommendations for macronutrients (SINU, 2012) were observed, with a higher percentage of energy provided by fats (on average 37.3% of energy) and a lower percentage by carbohydrates (on average 46.9% of energy), confirming the trend of the general Italian population (Sette *et al*., 2011). On the other hand, differences in the consumption of some food groups are observed especially in the categories to which local products belong. For example, volunteers living in the municipalities of Lama dei Peligni and Pennapiedimente consumed more legumes, fruit and vegetables and less meat and meat products (P<0.05) with respect to other municipalities. If we analyse the sample by lifestyle score, we can observe an adherence to higher scores (score 4) in the municipalities of Lama dei Peligni and Pennapiedimonte (53.8% and 51.4 respectively).

Table 8 - Energy and average daily per capita consumption of food by volunteers by municipality

	Municipality					
	MON	PIZ	GAM	LdP	PEN	P
	mean ± sd	mean ± sd	mean ± sd	mean ± sd	mean ± sd	
Energy Intake kcal/die	1890±391	1812±394	1839±363	1920±498	1792±426	n.s.
Proteins % of energy	16.4±2.4	15.6±2.5	15.3±2.5	14.6±4.2	15.2±2.7	n.s.
Lipids % of energy	38.4±5.5	38.4±6.5	35.3±3.6	37.9±8.1	38.5±7.3	n.s.
Carbohydrates % of energy	45.2±5.1[a]	45.8±7.4 [a,c]	50.3±4.8[b]	48.5±9.1[c,d]	48.0±7.0[c,d]	0.01
Food group	mean ± sd (median)	mean ± sd (median)	mean ± sd (median)	mean ± sd (median)	mean ± sd (median)	
Cereals	215±60 (216)	208±70 (206)	229±56 (216)	187±106 (192)	204±90 (189)	0.008
Legumes	29±43 (10)	16±26 (5)	18±31 (10)	37±58 (0)	25±54 (0)	0.01
Meat and meat products	131±63[a] (121)	114±54[a] (104	100±58[a] (98)	91±84[b] (100)	77±67[b] (57)	0.05
Fruit & vegetables	437±145[a] (408)	454±147[a] (500)	447±172[a] (451)	533±263[b] (525)	565±283[b] (570)	0.02
Lifestyle score	%	%	%	%	%	P[§]
1	6.5	1.5	0	3.8	2.7	n.s.
2	16.1	26.2	14.8	7.7	10.8	
3	58.1	43.1	37.0	34.6	35.1	
4	19.4	29.2	48.1	53.8	51.4	

MON = Montenerodomo; PIZ = Pizzoferrato; GAM = Gamberale; LdP = Lama dei Peligni; PEN = Pennapiedimonte. Statistical analysis *P level of significance = ANOVA; different letters in the same row indicate a statistically significant difference (p<0.05); P[§] level of significance χ^2 test; n.s. = not significant.

Concluding remarks

The socio-economic analyses conducted to identify the limited area revealed a very strong geographical isolation for the 5 municipalities under investigation.

Analysis of structural and demographic data showed that the area was characterised as a depressed area with very small municipalities and significant rates of depopulation, especially with reference to the low number of resident populations. Differences between the five municipalities under study were observed. Two clearly distinct areas can be recognised: the first, with a fair presence of commercial farms (Lama dei Peligni and Pennapiedimonte), the second including municipalities where the link with agricultural activities has been progressively lost over time (Montenerodomo, Gamberale, Pizzoferrato).

Furthermore, data on consumption and nutritional surveys confirm differences between the two areas identified. In both cases, farms constituted the main sales channel for fresh products, reflecting a strategy for dealing with the progressive reduction in shops in the 5 municipalities. Local products are widely known and consumed even if price levels are not always cheaper (greater production costs resulting from artisan processing and limited quantity of products). Based on these purchase choices, there appears to be widespread knowledge of the "origin" of products, intended both in terms of local origin and production technique used, which ensures higher quality products with better organoleptic characteristics (tastes that appeal to the local population) and the link between the product and local tradition, a symptom of a deeply rooted territorial identity. In spite of this, local consumption seems to be prevalent and strongly influenced by *global* products. Global markets can reach the population living in small mountain towns, so the threat of the erosion of livestock and agricultural products and plant and animal heritage and local traditions in the mountains and in the most rural marginal areas is increasing. The reduction in inhabitants in the areas has led to a decrease in businesses that inevitably reflects on consumer choices. Our results hypothesise that rural populations are affected by global changes, which will lead to homogenisation of eating behaviour; however, there are some population groups that appear to be health conscious and believe that food, nutrition and physical activity could improve their health. These aspects relating to well-being can also be linked to additional awareness that the consumer places on the purchase of products. In a survey on consumer lifestyles conducted in New Zealand, Mirosa & Lawson (*2012*) concluded that "*Consumers who express an interest in purchasing local food are a demanding segment of the population whose interest in food makes them critical judges of produce. Local food must thus be fresh and value for money. Increasing this sector requires making local food more accessible through mainstream retail outlets*".

In conclusion, the results of the study conducted in the rural area of Majella National Park reinforce the need for joint action among the different institutional players for regional dissemination of the importance of maintaining the biodiversity of local products and a balanced diet for a healthy life. Local products should be considered a "plus" for rural development in sustainable areas in order to increase the national and international markets supply and to promote agricultural production and productivity at regional level. At the same time, local products allow maintaining agricultural and food production diverse and varied, with benefits for the preservation of typical habitats and bringing back indigenous breeds, species and cultivars, as well as for diet. The spread of these products would increase the profitability and competitiveness of local producers and small and medium-sized enterprises and improve the quality of life and the diet of the local population.

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