



Emerging responses to the COVID-19 crisis from family farming and the agroecology movement in Latin America – A rediscovery of food, farmers and collective action

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ABSTRACT

CONTEXT: In Latin America, the so-called informal sector associated with family farming and the agroecology movements were instrumental at coping with and adapting to the COVID-19 challenges.

OBJECTIVE: To assess the nature and extent of the early initiatives (first three months) deployed by this informal sector to cope with and adapt to the impacts of the COVID-19 pandemic on food production and consumption in several countries of the region.

METHODS: We used key informant consultation (n = 168), an online survey (n = 125) and the detailed characterisation of regional case studies (n = 4). Textual data was analysed and categorised using Reinert's method, combined with similarity analysis.

RESULTS AND CONCLUSIONS: 65% of the initiatives were 'local' in terms of geographic reach, 30% of them started within the first month after the pandemic and most of them were urban or urban-rural, whereas only 29% of them were exclusively rural. The analysis of the textual information captured through the survey revealed four major types of initiatives that were deployed or adapted in response to COVID-19:

1. Direct producer-to-consumer food sales, generally existing before the COVID-19 crisis but adapted/strengthened to cope with it;
2. Short value chains that linked rural and urban organisations and individuals supported by national or local governments, readapted through new health and safety protocols;
3. Newly developed support and training programs on sustainable food production for self-consumption or local commerce, in rural, urban or peri-urban settings;
4. Food assistance and aid initiatives focusing on vulnerable populations, relying on solidarity networks associated with the agroecological movement.

SIGNIFICANCE: The pandemic highlighted the key role played by local food systems and value chains and the need to strengthening them through public policies, as a way to build food resilience in times of crisis.

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1. Introduction

The holistic nature of the COVID-19 crisis and its unusual cascading effects impact on all sectors of the economy and at all levels (FAO, 2020a; UNDRR, 2020). The restrictions to international mobility of goods and people associated with COVID-19 affect the global food system, particularly on the supply side, due to a high degree of international co-dependence (FAO, 2020b; Salazar et al., 2020). Reduced domestic mobility and accessibility also compromises food supply and distribution, resulting in food price increases (FAO, 2020c). By restricting mobility, trade and transport the COVID-19 crisis seriously undermines one of the key pillars of food security: access to food. Depending on how long this crisis and the associated restrictions are going to last, other components of food security, namely availability, stability and utilisation of food will also be seriously affected.

Higher food prices and the negative effect of the pandemic on the informal economy, resulted in a reduction in the demand of food as well (Altieri and Nicholls, 2020). Closing down of the entertainment and tourism sectors meant a sudden reduction in the demand, especially of fresh unprocessed food, while consumer aversion resulted also in avoidance of open markets and fresh grocery shopping, thereby affecting proximity markets that are often served by medium to small scale family farmers.

There are around 16.5 million family farms in Latin America, on which roughly 60 million people work; 56% of those farms are located in South America and 35% in Mexico and the Central American countries (ECLAC et al., 2014). About 53% of the rural residents in the region are in a situation of extreme poverty, 68% of the extremely poor adults work in agriculture, and 4.2 million people are food insecure in need of urgent action (Castañeda et al., 2018; FAO, 2019). The effects of COVID-19 on food security include also the negative impact that the pandemic had on food aid and related food programs, due to limited mobility and accessibility, with consequences for both family farmers (as food suppliers) and the rural and urban poor that depend on food aid. Adding to this, the closing of schools left millions of children who rely on school meals without their daily minimum intake of food. This has been an important collateral effect felt by more than 10 million children and their families in the region (Altieri and Nicholls, 2020). But this has also affected another key proximity market served family farmers. In Brazil, for example, a Food Procurement Program (*Programa de Aquisição de Alimentos*, PAA) directed to vulnerable populations, and a national School feeding program (*Programa Nacional de Alimentação Escolar*, PNAE), both implemented in 2003, created year-round markets for family farmers, and an incentive to agroecology, as a 30% price surplus was paid when farmers delivered agroecological food. The immediate suspension of classes due to COVID-19 disrupted PNAE purchases, negatively impacting both food aid and family farming (Valadares et al., 2020).

The COVID-19 crisis is, however, not yet a food crisis, such as the one caused largely by misinformed Government decisions and market speculation during the price spikes of 2007/8 (McMichael, 2009). But action is needed to prevent a totally avoidable food crisis. In this sense, the informal sectors of the food system appeared to have reacted faster than governments. The emergence of local responses to this crisis appears as an element of resilience (cf. Tittonell, 2020) that operates outside, or at the margins of the mainstream, globalised food system. The agroecology movement, broadly represented in Latin America (cf. www.soclaglobal.org; www.viacampesina.org; www.maela-agroecologia.org; www.aba-agroecologia.org.br), has been instrumental in the design and early implementation of the local responses of family agriculture to COVID-19. Such responses need to be understood and documented, in order to inform the design of more structural measures and policies to reduce food system vulnerability. Family agriculture in Latin America contributes not only food, fresh produce and raw materials, but also rural jobs, retains value locally through rural food processing, preserves agrobiodiversity, supplies ecosystem services and contributes

to local natural resource governance (Tiburcio, Breno Aragão Almada, 2017). It is hence a crucial sector to engage in coping and adaption strategies and resilience building against COVID-19 and other possible catastrophes.

The objective of this communication is to characterise the initial responses that the family farming and the agroecology movements developed to overcome the threats and limitations to food security within the first three months of the COVID-19 pandemic, with a regional focus in Latin America. We combined key informant consultation with an online survey and detailed description of illustrative case studies. We emphasize on the first months' responses to capture informal, early emerging dynamics. We are aware however that our methodological choices may have compromised depth and representativeness of our analysis. More detailed, follow-up studies on the relationship between COVID-19 and food security are now being developed.

2. Materials and methods

2.1. Conceptual approach

Several well-known definitions and conceptualisations of vulnerability exist in the literature, that use concepts such as shocks, stress, risk, disturbance, exposure, thresholds, sensitivity, resilience, responses, coping and adapting strategies, etc., to define it (e.g. Birkmann, 2006; GIZ and EURAC, 2017; IPCC, 2014; Luers, 2005; Turner et al., 2003; UNDRR, 2017; Wisner et al., 2004). It is not our objective to dive into this informative discussion but rather select a working definition of vulnerability and related concepts to guide our study of initial responses to COVID-19. Here we follow the definitions provided by the (UNDRR, 2017):

- **Hazard:** A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.
- **Exposure:** The situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.
- **Vulnerability:** The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.
- **Adaptive capacity:** The combination of all the strengths, attributes and resources available within an organization, community or society to manage and reduce disaster risks and strengthen resilience.

Capacities may include infrastructure, institutions, human knowledge and skills, and collective attributes such as social relationships, leadership and management. **Coping capacity** is the ability of people, organisations and systems to manage adverse conditions, risk or disasters using available skills and resources. The capacity to cope requires continuing awareness, resources and good management, both in normal times as well as during disasters or adverse conditions. Coping capacities contribute to the reduction of disaster risks. The resilience of the system is defined here as the ability of the system to absorb the impact of a shock and retain its functions. Again, there are several definitions and conceptualisations of resilience but we adhere to the notion of generalised system resilience, which may include elements of adaptability and transformability (cf. Tittonell, 2014), as opposed to the idea of specified resilience, i.e. the resilience 'of what against what' as distinguished by Walker et al. (2004).

Another concept used profusely in this study is that if the **food system**, which is defined following Ericksen (2008) as all the processes, institutions and infrastructure involved in feeding a population, from growing and harvesting, processing, packaging, transporting, and marketing, plus the consumption and disposal of food and food-related items, and the inputs needed and outputs generated at each step. A

food system requires human resources that provide labour, decision, research and education, and hence it is influenced by social, political and economic contexts, and largely driven by environmental factors in its primary steps. As systems, they can be considered scale-agnostic, that is, a food system without specifications may refer to a local, regional, national or global food system. To assess the impact of the COVID-19 pandemic on food systems, and vice versa, we consider a hierarchy of three nested aggregation levels, colloquially referred to as ‘scales’ (although they are not). The food production and land use system (level 1), the trading, processing and wholesale distribution system (level 2), and the consumption and food governance system (level 3) (Fig. 1). These levels may also be defined at different geographical scales, such as local to global land use or trading subsystems. The COVID-19 pandemic impacts on these three levels of the food system (‘Impacts on’), while there is growing evidence suggesting that attributes of these three levels have contributed to the COVID-19 emergence and persistence (‘Impacts of’). Here we focus on the left hand-side of Fig. 1, and in particular on how the family farming and agroecology movements responded to overcome or mitigate the initial impacts of COVID-19 on food production, supply and demand. When studying responses, it is also necessary to distinguish between short- and long-term impacts, although the study of the former requires yet a broader window of time. Since we are studying here systems that produce and distribute food, an essential good, we are mainly interested in capturing short- rather than long-term resilience attributes.

2.2. Data collection

Data collection was done in three steps. First, we conducted a round of consultations via email reaching out to a large number of key informants in the region, from the public and private sectors, extension agents, non-governmental organisations, researchers and academicians, farmer organisations, trading brokers, health centres, rural schools, consumer organisations, journalists and so on. To reach out to a large number of relevant key informants, we made use of the regional networks of the Latin American Scientific Society for Agroecology (SOCLA: www.soclaglobal.com) and their respective country chapters. These

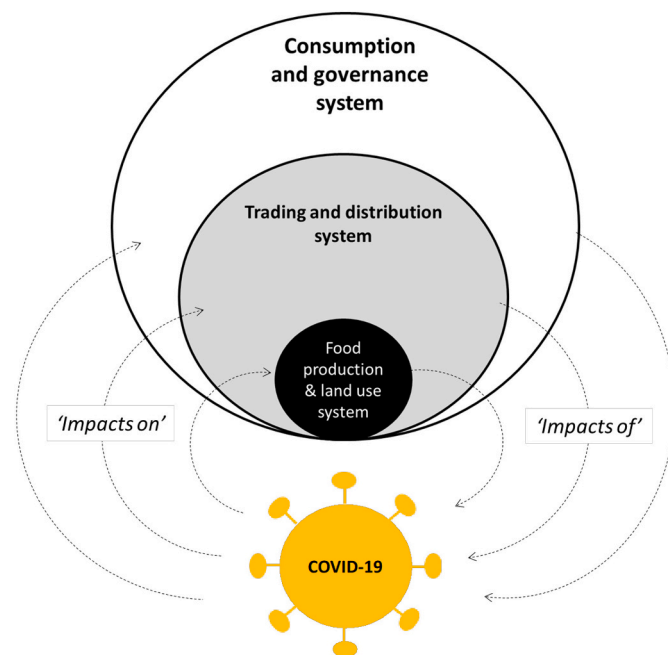


Fig. 1. Impacts of the COVID-19 pandemic on three nested aggregation levels that characterise the food system, and suggested impacts of key attributes of these three sub-systems on the emergence and persistence of the pandemic.

informants reported on cases they knew first-hand on local responses to the COVID-19 pandemic, as well as pointing out to other cases and examples, and provided contact details of people and organisations involved in such initiatives. In addition, we asked these key informants directly to provide their opinion/experience/perspectives on how the COVID-19 crisis affects and is affected by factors associated with the three organizational levels illustrated in Fig. 1: food production and land use, trading and distribution, and the consumption and food governance system.

In a second step we developed and released an online survey aiming at broadening our sample and collecting information more systematically, if perhaps less detailed. The survey consisted of 11 sections, each section including a number of questions, totalling 41 questions (<https://forms.gle/m62T9LsLAWNbeFVg9>). The four main topics of the survey consisted of:

- (i) a characterisation of the type of initiative described (e.g. capacity building, commercialisation, production, access, urban/rural, etc.);
- (ii) the type of beneficiaries to which the initiative was aimed for;
- (iii) the type of stakeholders involved in the design and implementation of the initiative;
- (iv) general information on the respondent (individual or collective) and explicit consent for data use and publication of the results.

We decidedly aimed to keep the questionnaire simple, considering the diversity of respondents we expected to reach out to and their time availability to engage in responding a survey in the midst of a pandemic. We are aware that, by design, our choice for simplicity may have compromised the precision, completeness and quantitative rigour of the data. Yet simplicity allowed us to acquire enough information in a relatively short period of time.

We made use of the regional networks of the SOCLA and of our research institutions to reach out to a large number of respondents. The online survey was also communicated using social media. This meant that, although the family farmers and initiatives participating in the survey were not strictly all agroecological, the use of these networks to identify respondents introduced a bias towards agroecology in our sampling. In particular, the Argentinean chapter of the SOCLA and the National Institute for Agricultural Technology (INTA) have been very active at disseminating the survey and promoting participation, which resulted also in an unbalanced, overrepresented collection of cases from this country. The data thus collected conveyed much valuable information, yet we do not claim to have appropriately captured a representative section of all family farming in Latin America.

A third and final step consisted in the selection, from the information provided by key informants and by the respondents to the online survey, of four regional case studies that illustrate the diversity of responses from the family farming and agroecology organisations to the COVID-19 pandemic. The criteria to select the four case studies included:

- Regional, territorial representativeness;
- The type of initiative, beneficiaries, stakeholders concerned;
- The way in which they illustrate diverse resilience/adaptation mechanisms;
- A gender-sensitive perspective.

Once these four case studies were identified, we contacted the informants and proceeded to collect more in-depth information on each case (these informants were invited to co-author this article). Cases were then characterised in more detail considering the type of COVID-19 related shock that was experienced, the type of positive response deployed by the community, and the prospective views on how the initiative may develop into the future.

2.3. Data analysis

2.3.1. Key informant consultation

The three steps of data collection resulted in very diverse types of information. The (mostly narrative, descriptive) information collected during the first step, through consultation with key informants, was simply compiled and summarised following the concepts depicted in Fig. 1, i.e., according to the perceived effects of COVID-19 on the three organizational levels chosen to represent the food system, and vice versa, according to how these three levels may have impacted the emergence and spread of COVID-19 in the views of the key informants.

2.3.2. Online survey data

We used descriptive statistics to characterise survey data, such as frequency analysis of types of initiatives, beneficiaries and stakeholders, countries of origin, gender composition, urban and rural contexts, etc.

We used text mining techniques to analyse and categorise textual data provided in the responses to the online survey, in particular when combining narrative responses with data from multiple choice questions. The complete workflow used to create a single analytical corpus of data to categorise responses is depicted in Fig. 2. The data analysed included open-ended questions (text variables) for the description of the type of initiative, and close-ended questions with multiple choices (mutually and non-mutually exclusive) categorical variables to characterise the initiative, its beneficiaries and the stakeholders involved. Non-mutually exclusive categorical variables were transformed to mutually exclusive categorical variables before the analysis, considering different combinations of options as different categories, and excluding categories with a frequency below 3%.

Data were organized in an analytical corpus of successive entries (one for each survey) combining text from all open-ended questions. The head of each entry included as metadata the ID of each survey and the corresponding category of each of the categorical variables. This analytical corpus was used to perform different kinds of analysis using

Iramuteq software version 0.7 alpha 2. Before the analyses, lemmatization and indexation were performed, considering adjective, noun, verb and non-recognized terms as active terms (terms to analyse). Numbers were excluded and all other grammatical terms (e.g. adverbs, articles, prepositions) considered as supplementary terms for the analyses.

A classification analysis was subsequently run following the Reinert's method (top-down hierarchical classification) using simple clustering on text segments for descending hierarchical classification with default settings. The analysis was followed by a post-hoc correspondence factor analysis, considering active and supplementary terms as active and supplementary variables. Categories of categorical variables were considered as illustrative variables post-hoc. Statistical association among classes and active, supplementary and illustrative variables were assessed through Chi square tests. For each class, a word cloud (based on active term frequency) and a similarity analysis (based on co-occurrence of active terms) were also performed. A similarity analysis was also performed considering co-occurrence scores of active terms from the complete corpus text. Network graphs were exported to Gephi v 0.9.2 for final plotting and visualization.

2.3.3. Case studies

The four case studies selected using the criteria outlined earlier were systematized using the following structure:

- **Type of initiative**, in terms of scale, starting period after the official date of the declaration of the pandemic in each country, stakeholders concerned and their aim;
- **COVID-19 threats and shocks**, comprising the main drivers/processes affected by the COVID-19 pandemic as experienced by local stakeholders;
- **Strategies and emerging patterns**, describing the diverse resilience, adaptation and coping mechanism deployed to face the crisis;

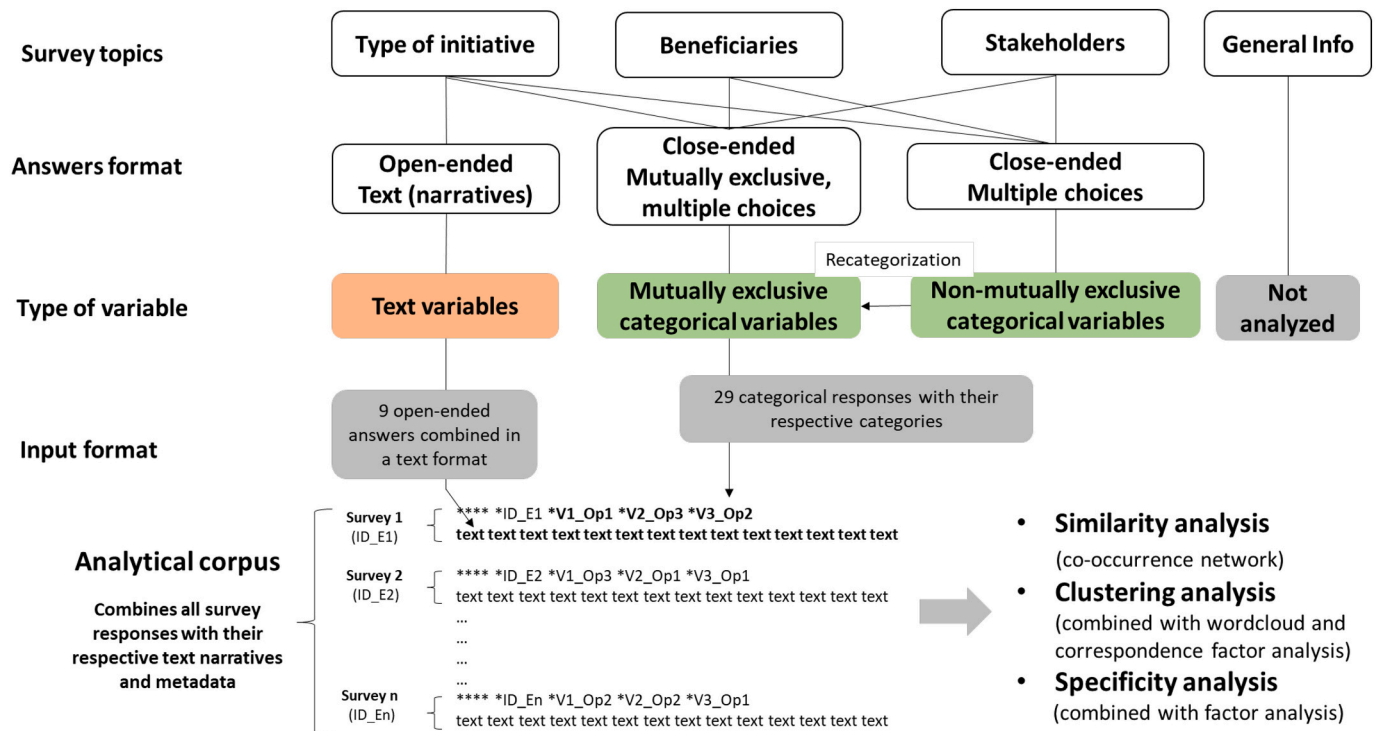


Fig. 2. Analytical workflow for the online survey data ($n = 125$). The survey consisted of four main topics, of which only three were used in the analysis of responses. Following from the design of the survey, each of these three topics provided information in different formats, resulting in text and categorical variables that were combined to arrive at a common analytical corpus.

- **Vulnerability, exposure and capacity components**, considering social, economic, ecological, cultural and educational components of vulnerability and capacities, growth and development.

This resulted in a summary table and descriptive texts. The complete description of the four case studies which by design are no longer than 1000 words each, is presented as supplementary material in Appendix A. Further details on each case study will be made available, with the participants' consent, through an online portal after publication of this article.

3. Results

3.1. Key informant consultation

We reached out to a total of 168 key informants, who provided a diverse set of data in the form of reports from local surveys, narrative description of cases, journal articles, websites, blog posts, recordings of social media events, videos, pictures, podcasts, etc.

Compiled and summarised information provided by the referents revealed negative and positive effects of the COVID-19 on the three organizational levels of the food system (Table 1). Effects of these organizational levels on the COVID-19 were perceived as negative by the referents, due to their contribution to the spread of the pandemic (Table 1). Positive effects of COVID-19 on the food system were also reported, such as e.g. higher demand for home delivered food and increased importance given to food origin and of short-chain circuits, benefiting both proximity (family) farmers and urban consumers, according to our key informants.

3.2. Online survey data

3.2.1. Regional initiatives, beneficiaries and stakeholders

A total of 143 answers were collected, 7 of them incomplete, 8 of them not pertinent, and 3 of them without explicitly expressing their permission to use and publish the data, resulting in a total of 125 answers for further analysis. These 125 answers to the online survey came from all South American countries (except Venezuela, Surinam, Guyana and Guyenne), and also from Mexico, Puerto Rico and Costa Rica in Central America and the Caribbean (Fig. 3). Yet most of the responses to the survey corresponded to Argentina (69) and Brazil (21). As a result of the design and implementation of our survey, 96% of the initiatives or actions were concerned with family agriculture, and 100% of them were framed as 'agroecological'. More than 90% of the respondents indicated that their initiative contributed to food security. Their vast majority (65%) were 'local' in terms of geographic reach, whereas another 10% were both local and interdepartmental (e.g. various municipalities, counties, districts, etc.). A few initiatives were provincial and/or interdepartmental, or even organized at national level (Fig. 4).

Most of the initiatives described were urban or peri-urban or combinations of both, whereas only 29% of them were exclusively rural. More than half of the initiatives described started before the pandemic, and readapted to cope with it. A number of initiatives, 30% of them, started right (< 1 week) or between 2 and 4 weeks after the onset of the pandemic (marked by its official declaration in each country). When asked about the end or termination of the initiative, the answers were variable (not shown in Fig. 4) but 44% of the respondents indicated that they wished for the action to continue after the pandemic is officially over. Another 37% indicated that it is highly likely that they will continue after the end of the pandemic, a few will definitely stop after the pandemic and a few others would continue until their resources allowed it.

In terms of the type of actions deployed by the family farming and agroecology movements, about half of them involved the development of short chains of commercialisation, and about one third of them included the development of new and/or extended safety protocols to

Table 1

Effects of the COVID-19 pandemics on different organizational levels of the food system (cf. Fig. 1) and effect of these on the spread of COVID-19, as perceived by 168 regional key informants in Latin America (Email consultation).

Organizational level	Effects of COVID-19	Effects on COVID-19
Food production and land use system	Restricted access to input and output markets and future uncertainties affect production, and reduced incentives to produce Highlighted the importance of farmers and their (essential) societal role of producing food Greater attention paid to rural areas as places to live	Disruption of the ecological infrastructure of agro-ecosystems Confinement of animals exacerbating chances of zoonosis
Trading, processing and distribution system	Restricted mobility affects access to inputs and output markets Risk aversion by farmers, workers, traders limit marketing, food processing and distribution activities High vulnerability of countries or regions that depend on food imports High vulnerability of countries or regions that base their economy on food exports Higher demand for home delivered food (of high quality) Increased importance of short mileage, short-chain food	Co-dependence and high global connectivity facilitating the fast spread of the disease Wholesale distribution facilitating the spread of the disease at national level
Consumption and food governance system	Less demand for food due to less income (effects on the informal sector) and to higher food prices Less demand due to closing of entertainment, gastronomic and tourism sectors Interruption or disruption of food aid systems and school meals Increased awareness on solidarity and solidary economies	Consumption of highly processed and uniform diets year-round leading to reduced immunity Supermarkets as major outlets for food (concentration of people in confined places)

minimize the spread of COVID-19 (Fig. 4). A few extra actions were directed to assisting farmers with the commercialisation of their produce, and also a few involved direct food aid to people with less access or less resources to access food under the pandemic, like the rural poor. One fifth of them aimed at training on, supporting or promoting the production of food for self-consumption through sustainable means. About a quarter of all the initiatives comprised combinations of all of the others. In general, the actions or initiatives deployed aimed at improving organizational capacities, such as coordination of efforts, logistics or leadership, including technical/technological capabilities (79%). Among these organizational capacities, some initiatives also placed emphasis on improving/creating financial (21%) or relational capacities (42%), and relied on motivational capabilities such as solidarity and empathy (44%) (not shown in Fig. 4). When asked on which attributes of vulnerability and resilience were aimed at improving through the initiative, 90% of the responses indicated that their actions were aimed at enhancing adaptation, followed by 83% at increasing resilience (Fig. 5A).

A diverse set of stakeholders were involved in the design and implementation of the initiatives. The majority of them were non-governmental organisations and 'movements' (i.e., mostly informal



Fig. 3. Mapping of the countries from where answers to the to the online survey were received ($n = 125$). The red dots indicate the relative contribution of each country to the survey. The yellow stars indicate the approximate geographical location of the four case studies selected for detailed characterisation. Photos from the initiatives were provided by the respondents with the corresponding consent for their use.

organisations, family farmer and/or agroecological movements), local associations and cooperatives, mostly concerned with consumer associations and purchasing groups (Fig. 5B). But the governmental sector through educational and other institutions (development, research, etc.) were also substantially represented (46%). In terms of beneficiaries, more than half of the actions benefited populations of between 50 and 500 people, while a quarter of all the initiatives benefited larger groups (Fig. 6). Most of the actions were directed to help vulnerable populations, some of them explicitly aimed at supporting indigenous people, African-Americans and/or migrants. Most initiatives were aimed either at all ages or at adult populations, with fewer cases in which the children, the youth and/or the elderly were specifically aimed at. Most initiatives were gender-balanced, although some of them were also gender-orientated. Half of the respondents indicated that their initiative benefited both food producers and consumers, whereas one third indicated the producers to be their main beneficiaries. In two thirds of the cases the beneficiaries were individual people or families, and the remainder were associations.

3.2.2. Categorising regional responses to COVID-19

Similarity analysis based on co-occurrence of active terms on the complete corpus text data (cf. Fig. 2) revealed a network of terms centred on a principal cluster interacting with seven peripheral clusters (Fig. 7). The principal cluster (pale green in Fig. 7) denoted the central role of production and commercialization to sustain access and supply of fresh, healthy and quality food to urban populations, allowing at the same time to sustain family incomes and health of people in the context of the pandemic. The peripheral clusters highlighted the particular focus of different types of initiatives, such as (i) food security and sovereignty food (violet), (ii) vulnerability of the population (blue), (iii) fair pricing and democratic food governance (red), (iv) direct producer-consumer relationships associated with short-chain markets (orange), (v) food delivery to decrease exposure to the virus (turquoise), (vi) online commercialization of food baskets to increase supply of fresh food (dark green), and (vii) the contribution of family agriculture (pink).

Further, four classes were identified based on Reinert's top-down hierarchical classification of the text provided in the responses to the open-ended questions in the survey (Appendix A). Structural differences among classes were also evident in a network analysis on the co-

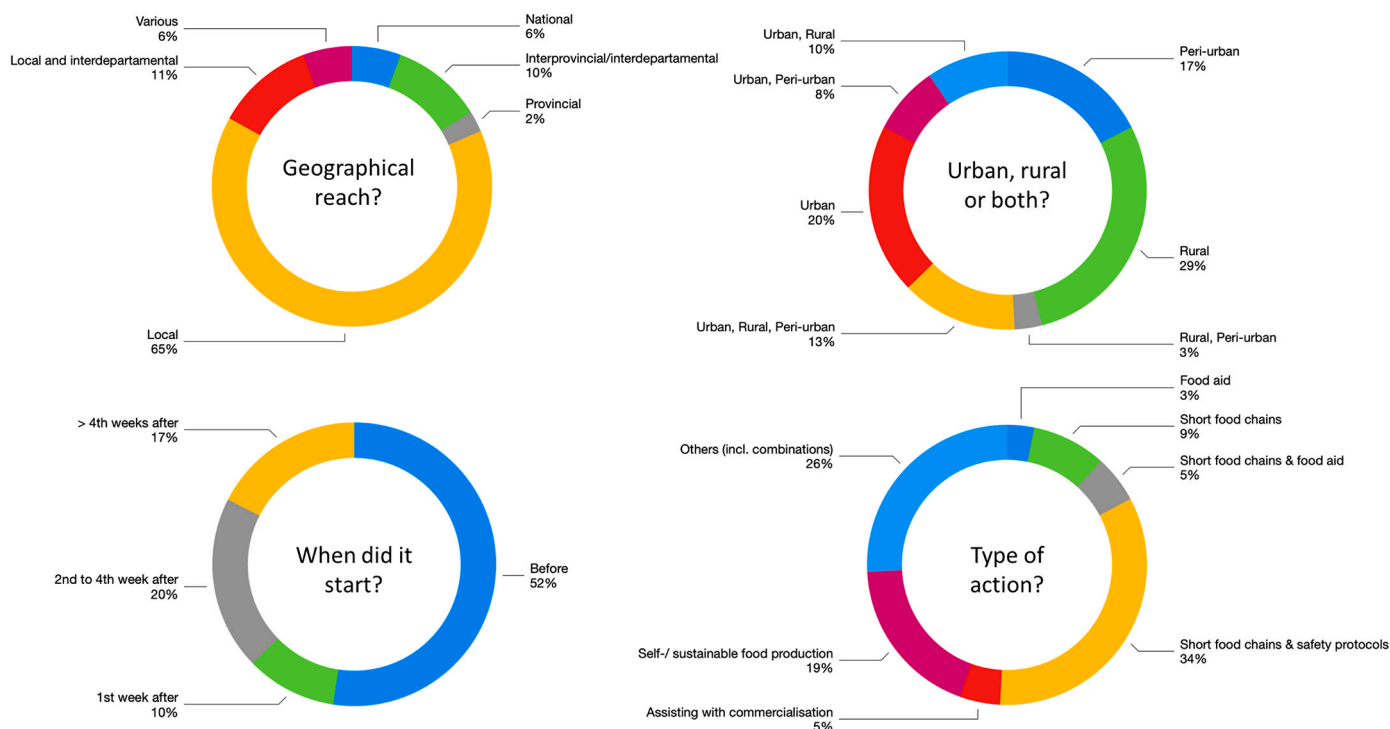


Fig. 4. Descriptive statistics pertaining to the 125 cases derived from the survey: What was the geographical reach of the initiative, when did it start, was it urban, rural or both, and what type of action was being described.

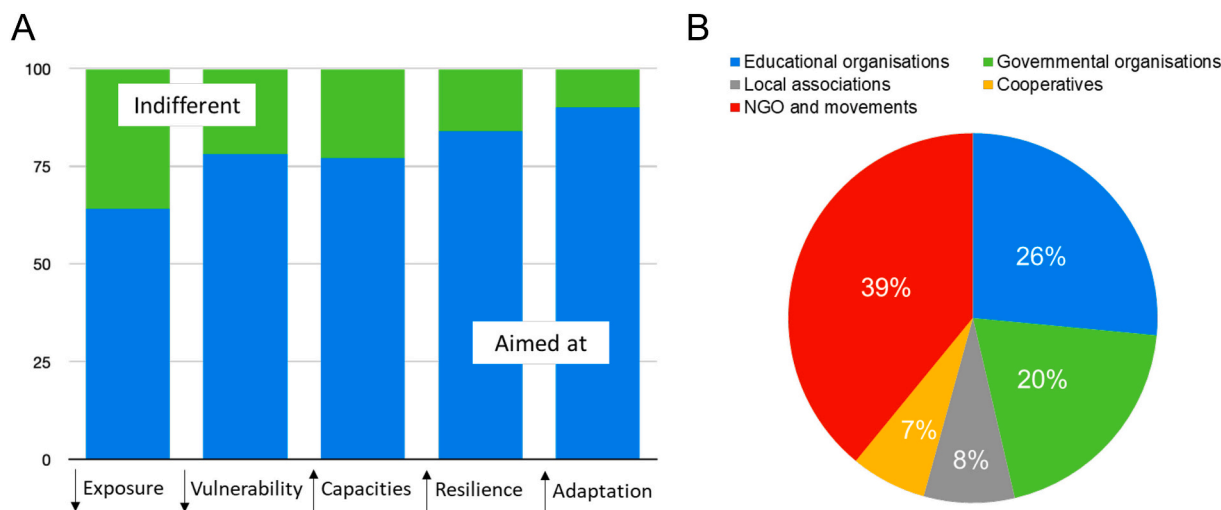


Fig. 5. (A) The proportion of surveys in which the action or initiative aimed at reducing exposure and vulnerability, increasing capacities and resilience, or enhancing overall adaptation to the impacts of the COVID-19 pandemic; (B) The type of stakeholders involved in the design and implementation of the initiatives ($n = 125$).

occurrence terms in each class (Fig. 8). Each class showed a clearly differentiated, specific word-cloud, indicating that they differ on the textual information provided through the survey (Appendix A). More than 70% of the variability was explained by a post-hoc correspondence factor analysis (Appendix A), revealing groups of categorical variables associated with each class. These associations allowed us to reconstruct the main characteristics of the four classes according to the main topics of the survey; namely type of initiative, beneficiaries and stakeholders (Table 2).

Globally, these four classes represent different types of initiatives, meaning different responses to the COVID-19 crisis:

Class 1: involves responses originated mainly at the consumption and

food governance level (cf. Fig. 1), which preceded the pandemic but were reinforced at the beginning of the lockdown, allowing a very quick response to the COVID-19 in the form of enhanced access to food. The co-occurrence network (Fig. 8) exhibits a central cluster with the term food at a central position and connected to peripheral clusters. These cluster refer to different aspects of the food system in which this class focused, such as short-chain market (green cluster), fair price (red cluster), alternative forms of commercialization (yellow cluster), food security and sovereignty (orange cluster), vulnerability (turquoise and blue clusters) and exposure to the virus (dark green).

Class 2: involves responses mainly from the trading, processing and distribution level (Fig. 1) which adapting their functioning to the

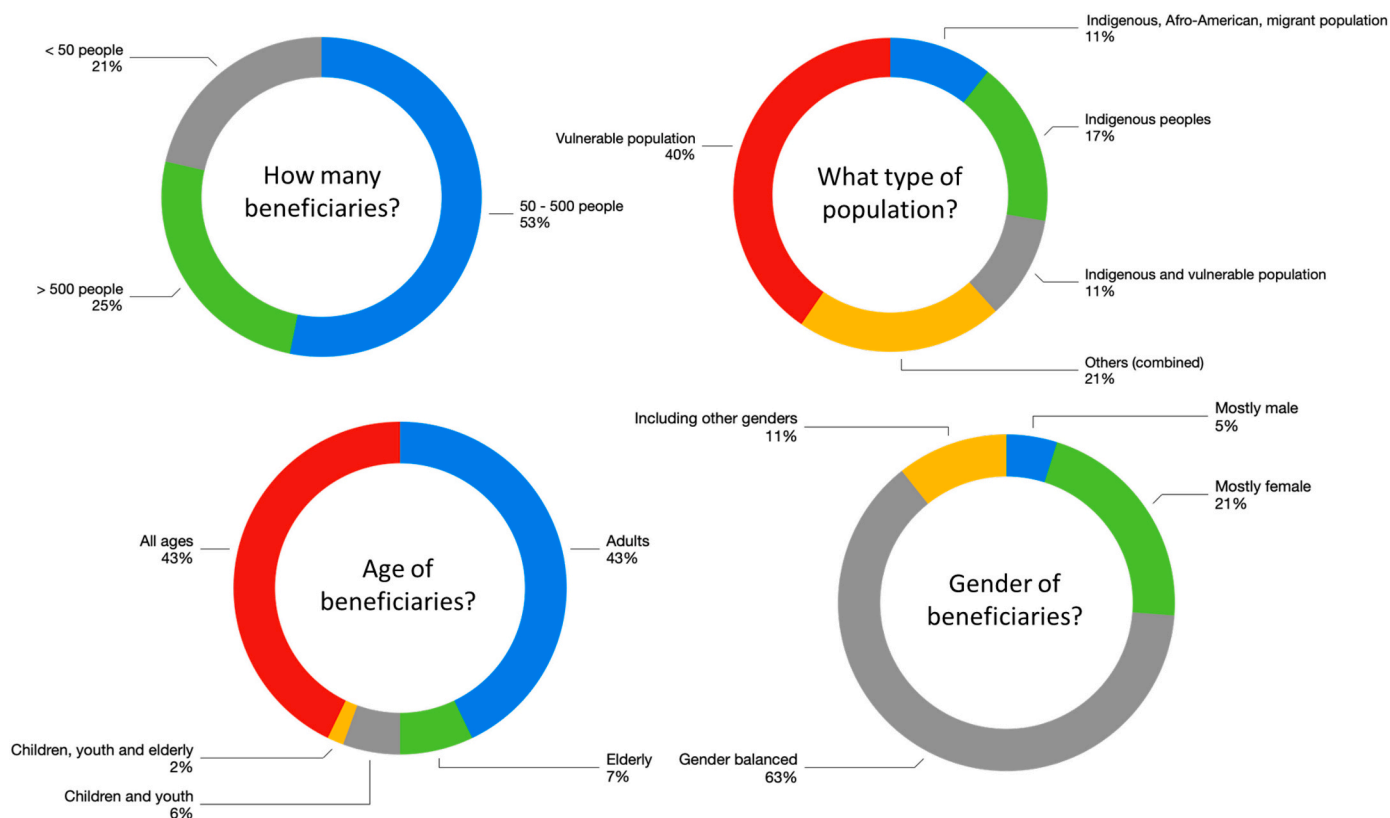


Fig. 6. Characteristics of the type and size of the beneficiary population as described in the answers to the online survey (n = 125).

lockdown to secure food access under safe sanitary conditions. The network (Fig. 8) exhibits the term street markets and consumer as principal clusters and refers to the new or adapted commercialization channels implemented. Short-chain market (violet cluster) has a central role, but also the type of food delivery (orange cluster), and the safety protocols implemented (turquoise cluster). The categorical variable indicating if the initiative decreased exposure (based on the participants answer) was associated with this class, a characteristic highlighted in the network by some of the peripheral clusters.

Class 3: involves responses originated from the food production and land use level and aimed at the consumption and food governance level of the food system (cf. Fig. 1) to secure food availability, were developed by governmental organisations that advise and train smallholder rural populations. These initiatives were new and required organization, starting generally later than the initiatives of Class 1 and 2. The network (Fig. 8) has a single central cluster with the term production at a central position and connected to peripheral clusters. These peripheral clusters refer to the ways in which the production was sustained and reinforced, and most of them focused on sustainable food production and self-consumption. The categorical variable indicating whether the initiative increases adaptive capacity (based on the participants' answers) was associated with this class, a characteristic highlighted in the network by the peripheral clusters.

Class 4: involves responses mainly from the consumption and food governance level (cf. Fig. 1) to the impacts of COVID-19 on food availability, based largely on food aid and assistance to most vulnerable populations provided by government, institutions, research centres and other stakeholders. As initiatives of class 3, they started after initiatives of class 1 and 2, due to organizational challenges. The network (Fig. 8) is shaped by a cluster of terms with equal contributions referring to organizational attributes of the initiatives. The network revealed that the agricultural sector with government support (red cluster) connects rural, migrant and native communities on one side (violet cluster) and

organizational actions with support of research centres on the other (blue cluster). The role of female labour and activities in rural communities is highlighted by this network (turquoise cluster). Other clusters also refer to logistics and organizational strategies (dark violet, orange and yellow). The categorical variables indicating whether the initiative increases resilience or responds to the impact of COVID-19 on food security (based on the participants' answers) were associated with this class, a characteristic cleared revealed in the network configuration.

3.3. Case studies

The four case studies analysed revealed adaptive capacities of individuals and organisations to address the various challenges posed by the COVID-19 hazard (Table 3). In analyzing these cases we used the concepts of exposure, vulnerability and adaptive capacity as defined earlier (cf. Section 2). The responses emerged from the three levels of the food system: food production and land use; trading, processing and distribution; and the consumption and food governance system (cf. Fig. 1). Local agroecological production and direct marketing were common to the four experiences as a way to reduce people's exposure and vulnerability to shocks. While farmers were able to benefit from a permanent or even increasing demand for fresh products, consumers, both in rural and urban areas, benefited from easier access to healthy and diversified food at fair prices.

In the four cases, multi-sectorial networks - civil society and government agents - associated with new or existing local food systems developed new capacities to cooperate and build collective action under COVID-19. New capacities, strong networking, short commercial circuits and learning processes were central to the responses deployed to reduce vulnerability and minimize potential hazards. Rural communities and consumers strengthened their capacities and fortified alliances, thereby enhancing adaptability and resilience at different levels of the food systems.

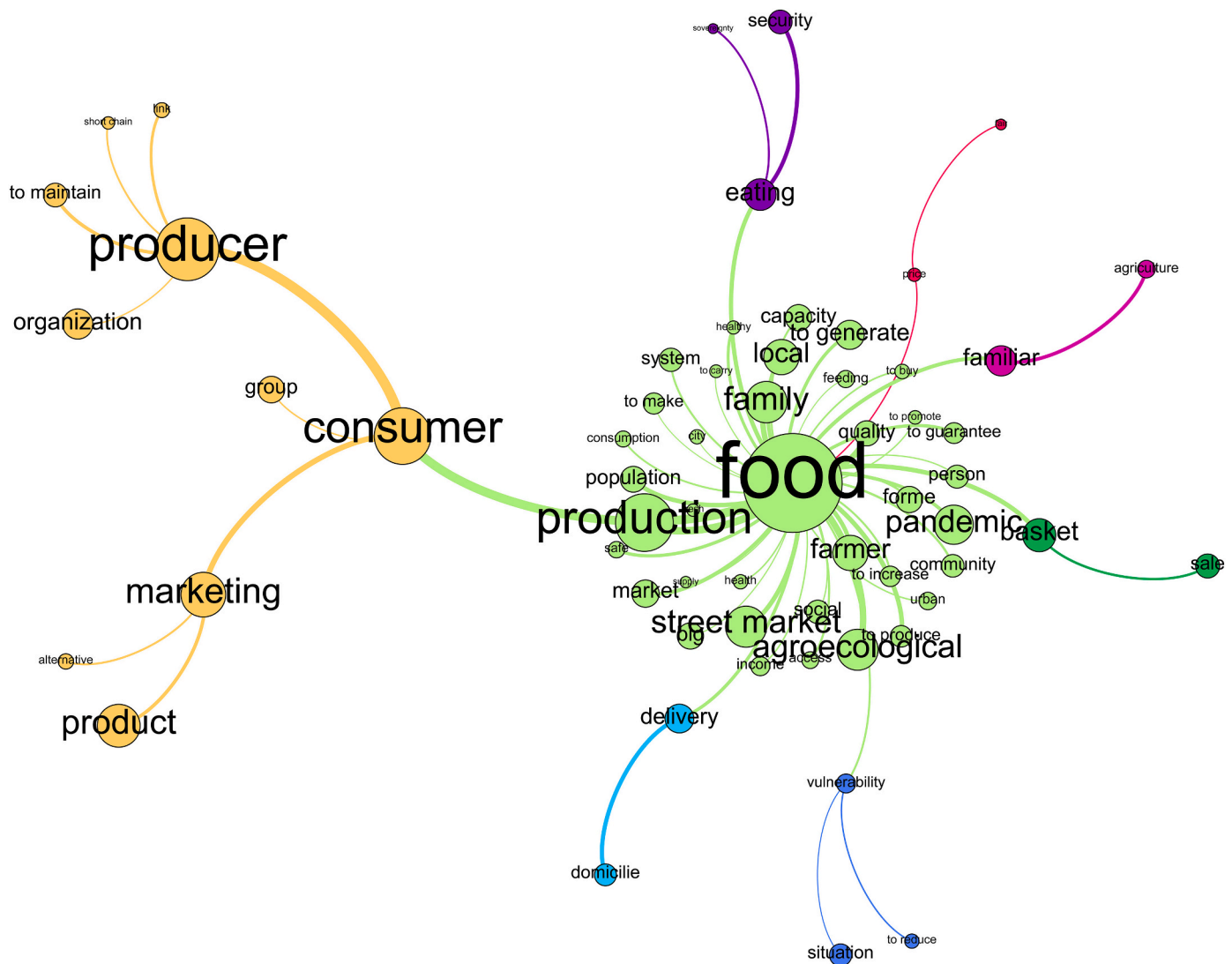


Fig. 7. Co-occurrence of terms in the description of the initiatives developed in response to the COVID-19 pandemic in Latin America ($n = 125$), on the basis of 9 text variables (cf. Fig. 2). The term food exhibited the greatest degree of co-occurrence with terms such as production, family, pandemic and markets (light green bubbles). The term producer co-occurred frequently with consumer, product and organization (orange bubbles). The network was based on a minimum of 15 co-occurrences between two terms, size of bubbles and text is proportional to term's frequency, and thickness of connections to the number of co-occurrence, colour of connections considering colour of origin bubble. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of this article.)

Although the cases studies were not selected based on the four classes derived from the Reinert's classification (cf. Table 2), each of them tended to be framed within a specific class. The case studies from Argentina (Municipal Program 'San Martín Agroecológico'), Brazil (Agroecological Farmers Markets and Producer-consumer network 'Raízes da Mata') and Peru (AGROPIA Native Potato Producers, Huanavelica) showed characteristics of the classes 3, 2 and 4 respectively. And these were the classes to which each of these countries were respectively associated considering results of the post-hoc correspondence factor analysis (cf. Table 2).

4. Discussion

Our current food systems, from the short and local to the more complex and globalised chains are facing many challenges to keep us fed during the COVID-19 crisis. The pandemic highlighted the key role played by local – often termed 'informal' – food systems and value chains and the need to strengthening them through public policies, as a way to build food resilience in times of crisis. But beyond their

contribution to addressing the various challenges associated with the COVID-19 crisis, strengthening local food systems appears also as an opportunity to improve urban people's nutrition and access to quality food while enhancing family farmers' income (ANA, 2020; Sambuichi et al., 2020).

This study reported main effects of the COVID-19 pandemic on different organizational levels of the food system and effect of these on the spread of COVID-19, as perceived by regional key informants in Latin America (cf. Fig. 1; Table 1). These perceptions strongly agree with the emerging patterns identified from the analysis of the online survey and were also related to the four major types of responses (Reinert's classes) deployed or adapted to face the COVID-19 pandemic (cf. Table 2).

The analysis of the textual and categorical information provided by local actors through the online surveys revealed four major types of initiatives that were deployed or adapted in response to the COVID-19 pandemic (cf. Fig. 8):

1. Direct producer-to-consumer food sales, through online or physical marketing and delivering, generally existing before the COVID-19

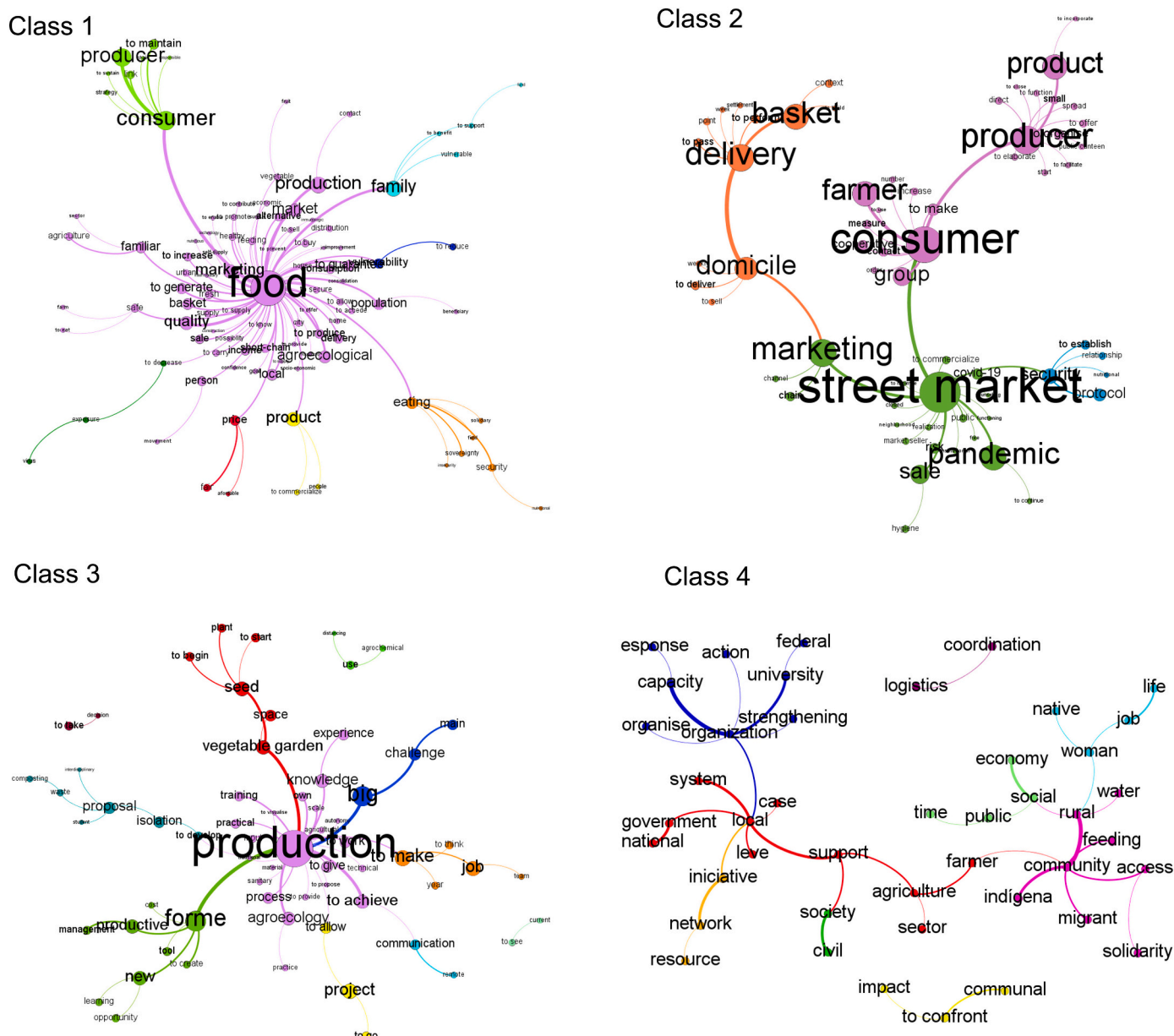


Fig. 8. Co-occurrence of terms in the text of the 4 classes derived from the Reinert’s classification. Network was based on a minimum of 3 co-occurrences between two terms, size of bubbles and text is proportional to term’s frequency, and thickness of connections to the number of co-occurrence, colour of connections considering colour of origin bubble.

crisis but adapted/strengthened to cope with it, with strong involvement of consumers (Fig. 8: ‘Food’);

2. Short value chains that linked rural and urban organisations and individuals supported by national or local governments, existing before the crisis but readapted to cope with it right after the onset or during the first month of the pandemic with an emphasis on new health and safety protocols (Fig. 8: ‘Consumer’);

3. Newly developed support and training programs on sustainable food production for self-consumption or local commerce, in rural, urban or peri-urban settings, starting after the second week of the lockdown, with support from governmental organisations (Fig. 8: ‘Production’);

4. Food assistance and aid initiatives developed about a month after the onset of the pandemic or later, focusing on vulnerable populations, relying on solidarity networks associated with the agroecological movement, large beneficiary populations generally rural or peri-urban (no main centroid term in Fig. 8).

These responses were non-mutually exclusive, as some of the

initiatives reported in the survey combined different types of responses, i.e., included characteristics of more than one class. Globally, they highlight the role played by family agriculture and the agroecology movement in different parts of Latin America to face the COVID-19 crisis and contribute to rural and urban food security. Moreover, the analysis revealed that in some cases top-down and bottom-up approaches led respectively by producers and consumers (Fig. 1) interacted in creating responses, by-passing or forcing the adaptation of the intermediate level (e.g. new forms of trading and distribution). The detailed case studies presented showed a diversity of mechanisms, strategies, actors and beneficiaries (Table 3), and represent three of the main types of responses identified through the online survey (Table 2). One of our initial hypotheses was that local and/or informal food systems reacted faster to cope with and adapt to the challenges imposed by COVID-19 than governments or the mainstream globalised food chains, hence contributing more strongly to food resilience. We can only partly confirm this hypothesis since, as the pandemic progressed, the role of the public

Table 2

Characteristics of the four classes from Reinert's classification, according to the associated categories identified from the factor correspondence analysis on the basis of 29 categorical variables (cf. Fig. 2).

Class	Initiative	Beneficiaries	Stakeholders	Countries associated
Class 1	Functioning before lockdown and would like to continue. Combining relational and organizational capacities. Focused on short-chain, direct markets and food assistance.	Several types of populations, in rural contexts, different age groups	Represented by consumers, cooperatives and NGO, mostly of the adult and young age group	Puerto Rico, Chile
Class 2	Functioning before lockdown, but adapted to the new situation, uncertain continuity after the pandemic. Urban and rural contexts. Combining organizational, relational, technological and economic capacities. Focused on short-chain markets and safety protocols for commercialization	Consumer groups or consumers and producers. Mostly adults. Urban and rural contexts. Size of beneficiary populations between 50 and 500 individuals.	Represented by producers and consumers, with participation of national and local governments. Women and men in equal proportions, all ages involved.	Brazil
Class 3	New initiatives, starting between second and four weeks of lockdown. Urban or rural/peri-urban contexts. Combining organizational, relational and technological capacities. Focused on sustainable food production for self-consumption. Mostly at local scale.	Smallholder rural populations, mostly focused on adult and young individuals.	Represented by government institutions and associations	Argentina
Class 4	New initiatives, starting after four weeks of lockdown, uncertain continuity. Rural, peri-urban contexts, or other combinations. Combining organizational, relational and economic capacities. Focused on food assistance. The initiatives use agroecology to some extent, and operate at different scales.	African-American, native, migrants and vulnerable populations. Peri-urban and rural contexts, involving associations or organized groups, large beneficiary populations (> 500 individuals), mostly men, but including other genders.	Represented by governments (different levels), institutions and research centres. Producers and other stakeholders involved. Mostly adults and seniors.	Peru, Colombia, Ecuador

sector was also crucial, either at supporting the bottom up initiatives or deploying new ones, as revealed by our survey (Figs. 4, 5 and 6). The survey also revealed that fast responses often resulted from reinforcing or adapting ongoing actions and strategies (e.g. Classes 1 and 2).

4.1. Emerging patterns

The analysis of the ensemble of the surveys led us to identify five emerging patterns, namely “*producer-consumer links*”, “*food delivery*”, “*short value chains and solidarity economy*”, “*collective capacities*” and “*synergies, cooperation and networks*”. These emerging patterns were common to the various regional initiatives facing COVID-19 pandemic in Latin America, they originated from the three levels of the food system and impacted on the four pillars of food security (Fig. 9). These patterns were also consistent with the four types of initiatives (Classes – Table 2), as e.g. “*short value chains and solidarity economy*” and “*synergies, cooperation and networks*” were the emerging patterns related with Class 1, “*collective capacities*” and “*synergies, cooperation and networks*” were associated with Class 3, etc.

4.1.1. Producer-consumer links

Several initiatives identified in this study (22%) linked consumers to the agri-food chain in a responsible manner, by creating consumer awareness on the processes of food production, distribution and sale, valuing the work and societal role of food producer, and prompting the active participation of consumers, no longer seen as passive entities but as a key actor of the food system. More stable producer-consumer links prompted flexibility and adaptability, contributing to the ‘stability’ pillar of food security (Fig. 9), and reduced farmer vulnerability by allowing them to sustain production during the crisis. Their economic capacity increased as well due to expanded sales and greater margins than through conventional channels. Producer-consumer links also increase the ability of consumers to access fresh, often also higher quality food at affordable prices; contributing to the ‘access’ and ‘utilisation’ pillars of food security. Several initiatives of this type presented in the surveys as a response to the COVID-19 crisis were actually favoured by previously created structures and alliances and by pre-existing solidarity ties between a few producers and consumers.

4.1.2. Food delivery

The direct delivery of food bags, or boxes or baskets was reported in 30% of the initiatives. They included most fresh fruit and vegetables but also in some cases animal products (eggs, honey, meat, dairy), grains and flours. Food delivery involved both a new commercial channel emerging in response to the COVID-19 restrictions and also a new form of assistance to vulnerable people, by promoting short-chains, strengthening local markets, favouring direct relationships between producers and consumers, and securing fair prices. Food delivery was also associated with good practices in terms of safety and hygiene protocols, for the delivery and packaging personnel. During the pandemic, local fairs or farmer markets developed their own delivery systems, contributing to strengthen their production-marketing logistics to be able to respond to current demands, through means that had not been experienced previously. Food delivery, through its different implementations contributed to access, availability and utilisation pillars of food security (Fig. 9), and generated a wealth of new knowledge and tools that increased technical and practical capacities for future adaptation (e.g., use of new technologies, online applications or social media). WhatsApp, was a platform widely used to inform the weekly composition of the bags, their price and to receive orders. In most cases, the distribution was made with the vehicles of the producers themselves, who delivered at particular homes or to institutions hosting disadvantaged or vulnerable populations (elderly people, homeless families, hospitals, school canteens, etc.). Food delivery saw great public acceptance and, in several cases, total sales increased.

4.1.3. Short value chains and solidarity economy

Short value chains, low mileage or short marketing circuits refer to promoting, favouring and maintaining production and marketing on a local scale; products come from the area where those who consume also live. This form of marketing was reported in 48% of the initiatives,

Table 3

A summary of the four in-depth case studies selected to illustrate types of responses to COVID-19 in Latin America (detailed description of each case study in Appendix A).

Name of the initiative	COVID-19 threat and shocks experienced	Type of initiative	Strategies and emerging patterns	Vulnerability, exposure and capacity components
AGROPIA Native Potato producer association, Huancavelica, Peru	Communities' agricultural activities, harvesting and processing of products stopped. Roads and access were closed. Transport paralyzed in the country. Prices for agricultural products are very low. Production left in the fields.	Focused on food supply and value adding at local, regional and national levels. AGROPIA established in the 2000s with the support of the International Potato Centre in rural areas and indigenous communities. In 2020, 3 to 5 weeks after the start of the lockdown they engaged with Espiritu Andino, a Vodka producer, and started new commercialization circuits with local municipalities.	Cooperation and collective initiatives, with trust and communication synergies, reinforcing producer-consumer links. New markets and added value products. Partners in Lima facilitated solidarity economy through home food delivery & public agroecological fairs. Support of municipalities & public offices was key.	Strong communities' resilience and capacity to reduce vulnerability. Strong collective capacity of the producers to connect, collaborate and communicate with partners in Lima. Producers have more income to diversify production & processing of their products.
Agroecological Farmers Markets - Porto Alegre, Brazil.	Restrictions to mobility (people and products). Strong reduction in product demand affected farmers' income.	Focused on short-chain markets and safety protocols for commercialization. Started in 1989 in urban and rural contexts. Short supply chain with critical role on food security. Organizational, relational, economic and technological capacities.	New partnerships to set up a multidisciplinary working group. Contingency Plan for COVID-19 damages. Measures updated weekly to reduce exposure to COVID-19 while maintaining activities. Frequent negotiation with the local government.	Reduction of socio economic vulnerability and food insecurity. Local capacities increased and farmers better prepared to face future challenges. The pandemic prompted social networking with leisure and learning spaces.
Municipal Program 'San Martín Agroecológico, San Juan, Argentina'.	Mobility was restricted or interrupted. Job insecurity and possible growth in unemployment, declining of economic activity. Increasing reliance on food coming from other localities.	Development of local agroecological markets and cultivation of abandoned land available in peri-urban and rural settings. Before the pandemic it was led by two local women. Now has multisectoral and municipal government recognition. Involves unemployed families, rural workers, especially women.	Expanded multisectoral cooperation and networking. The Committee of Emergency was created for technical support and for dialogue. Development of a consultative & technical team. Services and support offered by municipality (tractor, seeds, technical aid). 57 families organized into 8 groups of producers, total of 9,5 ha.	Socioeconomic vulnerability was reduced and food security increased. Social inclusion and population access to healthy food. Ceased the dependence on food from other localities. Technical agroecological capacities enhanced.
Producer-consumer network 'Raízes da Mata', Viçosa, Brazil.	Restrictions imposed on the circulation of people and products. Small food entrepreneurs and peasants were squeezed, especially those who relied on fairs to commercialize their products.	Focused on short and local circuits, involves peasants, producers and consumers. Food, cosmetics, hygienic material etc. Based on agroecology, community and solidarity economic values. Emerged in 2011, in Zona da Mata, Minas Gerais. Peri-urban and rural context.	Strengthened producer-consumer link through material, organizational & technological resources. Expanded cooperation with other networks. Consumers increased from 25 to 70 weekly. Variety of products, farmers and producers' organisations, exchange increased by 37%, 237 products, from 15 peasants & 10 local organisations, weekly frequency.	Increased their reach by multiplying the number of suppliers and consumers during the pandemic. Increased food security in local peri-urban and rural areas, involving producers and consumers.

decreasing dependence on inputs from outside the region or territory, which in times of COVID-19 were generally hard to get by due to lack of or reduced mobility of goods and services. Proximity between production and consumption centres decreased vulnerability to the impacts of COVID-19 and contributed to locally ensure access, availability and stability pillars of food security.

Short marketing circuits allowed the creation of rural-urban networks but to a lesser extent as compared with the direct producer-consumer links described earlier. In the initiatives captured through the survey, short value chains were closely associated with the notion of solidarity economy: fair prices, both for the producer and for the consumer. In the 11% of the initiatives identified in our survey, solidarity during the COVID-19 crisis was associated with aid and assistance, made evident through the distribution of food bags to vulnerable people. In other cases, it referred to psychological assistance in times of crisis and uncertainty. In most of these cases the aid came from a State organization or the Government itself or from individuals or organized groups, such as the indigenous community of the potato park *El Parque Chalaku de Lares*, in Peru, who distributed their potatoes to the most underprivileged population of Cusco, a form of solidarity based on ancient Andean principles.

4.1.4. Collective capacities

The initiatives reported two clearly distinct approaches to capacity development – i.e. the transformations that empower individuals, leaders, organisations and societies (UNDP, 2009): top-down versus

peer-to-peer learning. Top-down learning (reported in 31% of the initiatives) was used to increase capacities and practical skills of people directly affected by the COVID-19 crisis, especially on agricultural practices, use of social media applications or hygiene and safety protocols. In the majority of these cases, the expert in charge of the capacity development process is a member of a research & development institution university staff or public administration servants. Top-down learning approaches were useful to face threats of COVID-19 crisis. Experiences that promoted mutual learning, or peer-to-peer approaches, were reported in 7% of the initiatives. For example, people who received different forms of aid were requested to teach or show others what they had learned or acquired through aid. This form of learning was an economic and effective way to engage with and empower people, as well as to share knowledge. Through peer-to-peer and community-based approaches measures tend to gain relevance and better fit the realities of a community, contributing to their capacities to deal with hazards and challenges (self-confidence, knowledge, team-working, planning, etc.). As the community is not only the beneficiary but also the main actor in the initiative, their felt and real needs as well as their inherent resources are better considered, propending to the emergence of 'collective capacities'. Both learning approaches contributed through increased capacities and practical skills to the 'access' and 'availability' pillars of food security (Fig. 9).

4.1.5. Synergies, cooperation and networks

They key role of cooperation and synergistic relations developed

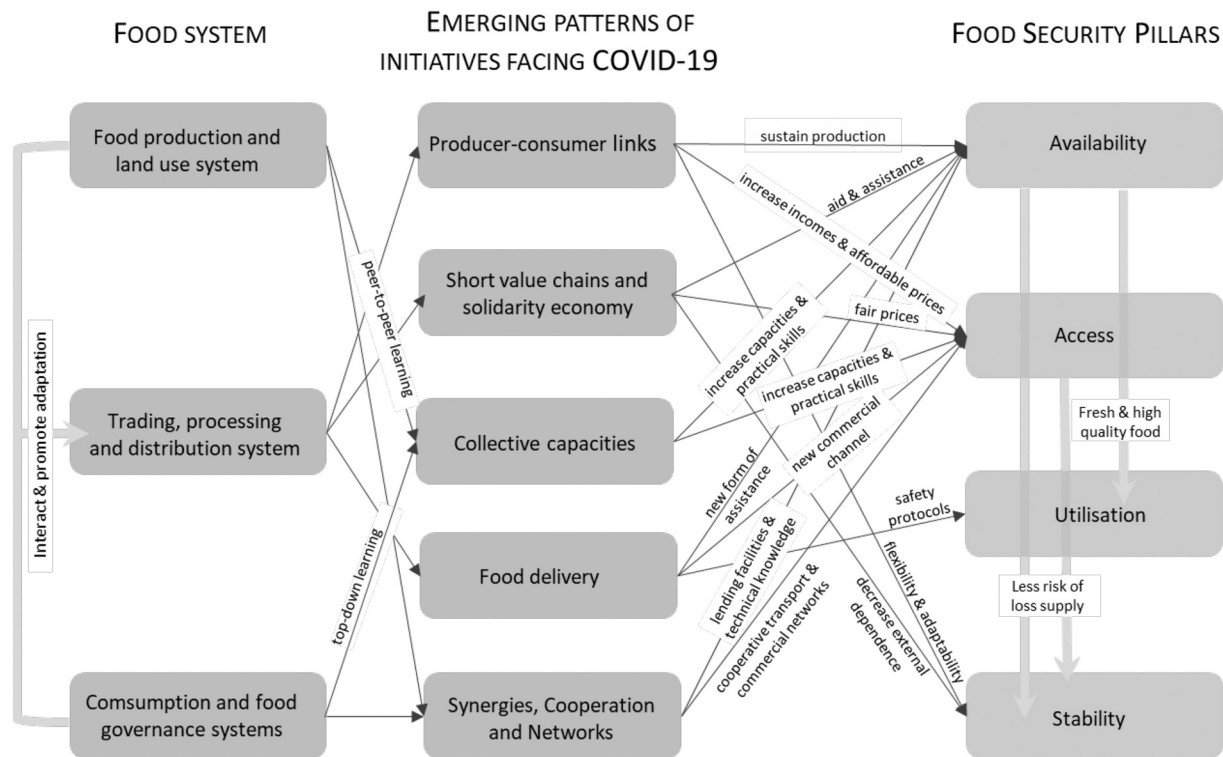


Fig. 9. Relationships (black arrows) between hierarchical levels of the food system, emerging patterns identified from the initiatives of the online surveys (n = 125) and food security pillars. Grey arrows indicate the relationships among levels of the food system and food security pillars.

groups of individuals or institutions to achieve, a common goal was reported in 46% of the initiatives. Horizontal associativity models were conspicuous, facilitating access to resources and benefits for small producers, and greater capacity to the family farming sector to influence public policies. In the survey, cooperation was often associated with the notions of mutual support or mutual help, reciprocity and teamwork, all of which entail mutual benefit for cooperating individuals. Cooperation, contributed to the access and availability pillars of food security (Fig. 9) during the crisis. In the initiatives reported in the survey, cooperation took place between peers (producer-producer) and between agents from different sectors, NGOs-producers, associations, families, government, etc. and it entailed cooperative transport of goods, organization of commercial networks, lending of facilities and hardware (machinery, workshops, houses, etc.) and cooperative provision of technical knowledge.

Precisely as a result of this cooperation process, the development of networks emerged. Several initiatives were presented in the survey as aiming to strengthening networks, relationships, understanding that networking is about sharing, not taking. Cooperative networks were also presented as sources of new perspectives and ideas, places to exchange information on challenges, experiences and goals, and to access new opportunities. The survey highlighted the establishment of networks as an essential step to promoting sustainable food systems.

4.2. Crisis as an opportunity

The negative effects of the COVID-19 crisis and its associated hazards on the food systems in Latin America and elsewhere are undeniable, and they have been widely documented (cf., articles in this Special Issue). Yet in this study we focused on identifying responses rather than impacts, and through them we were able to learn that family agriculture supported by governments and by non-governmental organisations (i.e., the agroecology movement) exhibited resilience and adaptability in the face of COVID-19. Another key lesson is that urban people appear to be more food aware: they seem to have rediscovered the value of food, of

food producers and of collective action. Several governments seem to have recognized the challenges, benefits and advantages of family agriculture.

The analysis of the initiatives reported in the online survey revealed that 13% of the actors saw this crisis as an opportunity to showcase family farming and put agroecology in practice, to gain spaces, enlarge their market shares, and challenge the establishment. This enthusiasm for new opportunities to redesign our food systems towards greater sustainability has been captured in some of the ‘open comments’ that were allowed in one of the fields of the online survey, of which we reproduce a few examples here:

- “The context of crisis and isolation made more visible than ever the importance of food production at the local level. The pandemic has allowed us to reaffirm that the organization and production of food are essential pillars to achieve a better quality of life, both because of the social ties that are formed and because of the assurance of safe and innocuous food” (Survey no. 31).
- “The crisis has demonstrated that local family farming is capable of supplying in a sustained manner with quality products, at affordable prices and that producers have the will to do so, without pettiness or the intention to take advantage of the crisis situation” (Survey no. 52).
- “Since the quarantine stopped me in Buenos Aires, it gave me the time and the opportunity to dedicate myself to the creation of internet networks at regional and national level; I met many people with whom we push together, energize and nurture each other. The pandemic forced us to stop and rethink established beliefs and structures, and open people’s heads. What is close to us is revalued, both in terms of nature and people” (Survey no. 61).
- “The crisis represented an opportunity for the academy to have greater engagement and participation with the civil society, strengthening agroecology” (Survey no. 64).
- “The confinement of families changed consumption habits and options, they prefer to prepare their own food, the consumption of fresh

products increased. Home deliveries were the preferred option for the provision of food and other services. In this context, the interruption of sales at agroecological street fairs was overcome by delivering baskets at home, promoted associativity and cooperative work between producers, between neighbourhood groups and producers, also between neighbourhood groups from various sectors. Another aspect of growth was solidarity, practices of exchange, barter, and knowledge exchange multiplied” (Survey no. 94).

In several initiatives reported, awareness was generated through communication, training, or spontaneously, thanks to the visibility of the actions and achievements of the family agriculture and agroecology movements during the COVID-19 crisis. Greater external consciousness about food and the complexity of current food systems was often associated with increased sales or demand for healthy and proximity food. Consciousness on the possible effects of current food systems on the emergence and spread of COVID-19 (cf. Fig. 1) was also conspicuous among green and sustainability movements, and especially among young people. The COVID-19 crisis prompted change, led people to adopt new ways of consuming food, showed the benefits of local food systems, allowed producers to adopt new techniques and recover unproductive land, motivated urban people to start home gardens, etc. Yet resilience against future threats will depend partly on the long-term commitment of consumers to this form of commercialisation, maintaining a closer bond with farming families. This in turn will affect farmers’ ability to sustain newly introduced production and sale processes as well as profits.

5. Concluding remarks

Our analysis of the early emerging responses (first three months) of the family farming and agroecology movements in several countries of Latin America to the challenges on the food system imposed by the COVID-19 pandemic revealed key features of local food systems that were essential to overcome this and other potential crisis:

- The pre-existence of social organisations and institutions (e.g. agroecological movement, farmer unions, consumer organisations, etc.) and their ability to cope and re-orient themselves in the face of a crisis;
- The functioning of alternative market channels that were instrumental in their early response to the restrictions to mobility and new safety protocols imposed by the pandemic (e.g., local fresh markets, online sales, food delivery, etc.)
- The role that social networks and online tools can play at connecting people (producers and consumers, networks, short value chains, etc.) and the consequent benefits of generalised IT literacy;

- The support given by local to national governments to existing initiatives in the fields of family farming and agroecology, previously seen as alternative, marginal or even contesting to their views and policies;
- The awareness, consciousness and increasing involvement of urban consumers in local food systems, recognising their essential nature and contribution to their health and well-being.

These represent important learning outcomes to delineate strategies that improve the preparedness and resilience of societies to future threats, or to contribute ideas for successful recovery and reconstruction in situations where these mechanisms were not yet in place. Key lessons to inform policy making.

The backbone of most of the responses to COVID-19 identified in this study was the existence of highly dynamic, biodiverse and adaptable farming systems associated with family agriculture in Latin America. In particular, farming systems located in peri-urban ‘green belts’ around large and small cities for the production of fresh food (and other ecosystem services) played a crucial role in the development of new producer-consumer, food delivery and short chain commercialization circuits. The flexibility exhibited by rural areas and their production systems, largely independent from international markets, was also a key element of resilience and adaptability in the face of COVID-19. The COVID-19 pandemic contributed to connect people with food, people with farming, and people with people. In virtue of this, the global COVID-19 crisis is not yet a global food crisis. But the threat is not over. Let us not let the market speculate. There is enough food for everyone globally. Let us take this opportunity and the lesson learnt during the pandemic to change the rules of the game in our global and local food system.

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Declaration of Competing Interest

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CRediT Statement

Role	Contributors
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Design methodology	MF, LL, SS, VEM, VA, PT
Validation	SS, MF, LL, VEM, VA, PT
Data collection	MF, PT, EC, SSA, CB, PA, BG, GL, CN
Investigation	MF, LL, PVP, GPS, JCS, GF, VA, IC, PPE, PT
Survey development	MF, SS, LL, VEM, VA, PPE, PT
Data – case studies analysis	MF, GF, SS, PVP, LL, VA
Data – survey analysis	MF, SS, GF, VEM, PT
Data Curation	VEM
Textual analysis with Iramuteq software	VEM
Writing (original draft)	PT
Writing (sector summaries etc in supplementary)	MF, SS, VEM, PT
Writing case studies	MF, PVP, SS, GF, MAM, AFF, IC, NCC
Writing (review and editing)	MF, GF, SS, PO, NSF, LFC, AAA, IC, MAM, AC, VEM, VA
Visualisation	PT, VEM
Supervision	PT
Project coordination	MF, PT

Appendix B. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.agry.2021.103098>.

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