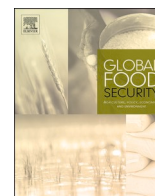




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Global assessment of the impacts of COVID-19 on food security

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ARTICLE INFO

Keywords:

COVID-19
Food security
Food systems
Global assessment

ABSTRACT

In this paper we present the first global assessments of COVID-19's impacts on food systems and their actors, focusing specifically on the food security and nutritional status of those affected in low and middle-income countries. The assessment covers 62 countries and is based on the analysis of 337 documents published in English, French, Spanish and Portuguese. The review confirms the magnitude and the severity of an unprecedented crisis that has spread worldwide and has spared only a few. The analysis shows that the dimension of food security that has been most affected is accessibility, with reasonably solid evidence suggesting that both financial and physical access to food have been disrupted. In contrast, there is no clear evidence that the availability of food has been affected. Overall, data suggests that food systems resisted and adapted to the disruption of the pandemic. This resilience came, however, at great costs, with the majority of the systems' actors having to cope with severe disruptions in their activities. In contrast, grocery stores and supermarkets made billions of dollars in profits in 2020.

1. Introduction

COVID-19 threatens to reverse years of progress on poverty, hunger, health care and education. The world has been said to face the worst economic recession since the Great Depression. Real gross domestic product (GDP) per capita has declined by 3.3% in 2020, and the economic instability created by the pandemic is estimated to have caused the equivalent of 114 million job losses globally (ILO, 2021).

For most of 2020, the documentation of these impacts has been mainly anecdotal. In late 2020, a growing number of peer-reviewed articles started to be published, raising the quality of information available. For the most part, however, these articles remain based on limited samples, focused on geographically specific areas, and case studies. Some broader assessments are available (e.g. HLPE, 2020) but those are not exhaustive or systematic and while some global model-based analyses are also available (e.g. McKibbin and Fernando, 2020; Sumner et al., 2020) they rely mainly on assumptions which, by the unprecedented nature and scope of the pandemic, have not been validated.

As a consequence, our ability to get the full picture of the situation,

identify patterns across countries or regions, and subsequently propose effective recovery policies that can lead to more resilient national food systems, is limited. There is a need, therefore, for a more comprehensive and systematic assessment of the initial impact of COVID-19 at global level, documenting the nature and scope of the disruptions that the pandemic has foisted on the different actors of food systems, from producers all the way to consumers.

The objective of the present review is to respond to that need. The review, based on a systematic mapping of the information available at national and international levels during the first 12 months of the pandemic, is structured to provide one of the first global-scale assessments of COVID-19's impacts on food systems, focusing specifically on the food security of people affected in low and middle-income countries (LMICs) where most of the poor and food insecure households currently live.

2. Analytical framework and approach

Several elements were considered in building the framework used for this assessment: First, *what* the effects of the COVID-19 crisis have been

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<https://doi.org/10.1016/j.gfs.2021.100575>

Received 12 June 2021; Received in revised form 20 August 2021; Accepted 25 August 2021

Available online 9 September 2021

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on people's food security; second, *who* those people are; and third, *how* these people have been affected (the causal pathways).

In line with the conceptualization of 'food system' now largely adopted in the literature (e.g., HLPE, 2017), two primary concepts were used to formulate the *what* and unpack COVID-19's effects: the concept of *Food Security* (FAO 1996, 2008) and the concept of *Food Environment* (Herforth and Ahmed, 2015; Downs et al., 2020). The complementary dimensions of those two concepts, including the four elements of food security (availability, access, utilization, and stability) and five elements critical to food environment (proximity, convenience, availability, affordability, and quality of food items) were considered. Several of those dimensions are common to both concepts.

Building on recent food system reviews (e.g., HLPE, 2017; Brouwer et al., 2020), several other elements were then added to the framework: the diversity of food items (Downs et al., 2020); the quantity of food waste and losses (Aldaco et al., 2020); and a series of criteria related to the potential impacts of COVID-19 on the health and wellbeing of actors within the food systems, including their agency and sense of self-efficacy (e.g. Yildirim and Guler, 2020), the occurrence of domestic violence and social unrests at household and community levels (e.g. Hamadani et al., 2020; Gumede, 2020); and the increased risk of exposure to COVID-19 due to the adoption of 'risky' coping strategies by those actors (Chan et al., 2020). Together these different elements are presented in Fig. 1.

The two other elements of the analysis (*which actors* are affected, and *how* they are affected) needed to be considered together, mainly because causal pathways are usually actor-specific. Building on some recent reviews of the impacts of COVID-19 on value chains (e.g., OECD, 2020a) and on people's food security (Béné, 2020; Devereux et al., 2020; Savary et al., 2020), a series of 25 related but distinct *potential* effects of COVID-19 on food system actors were identified. Those are listed in Table 1, along with the groups of actors which they are expected to affect, and organized along four generic steps: Direct effects and responses → Immediate consequences → Subsequent repercussions → Final impacts.

Using Table 1 as an analytical framework, we then systematically sought and identified which of those 25 effects were effectively reported in the different documents reviewed. The information was then used to compute a matrix of relative importance of the impacts along the different steps of the pathway which was then turned into a Sankey diagramme (Schmidt, 2008) where the relative importance of each connection between the different potential impacts was used to identify directionality and intensity between the different elements of the pathway.

3. Key-findings

In total, more than 9630 documents published between January and December 2020 and discussing the impact of COVID-19 on the different actors of food systems were identified, using a combination of keywords specifically chosen to address the objectives of the study. Those documents were identified using electronic search engines in four different languages (English, French, Spanish and Portuguese). After removal of duplicates and low representativity and/or low reliability documents (mainly news media and personal social media reports), we were left with 337 documents covering 62 countries from Africa, Asia, Europe, Oceania and the Americas (Fig. 2). The list of those 337 documents is available at <https://a4nh.cgiar.org/impacts-of-covid-19-on-peoples-food-security-documents-reviewed/>

3.1. Loss of income and jobs

There is a large consensus among the documents reviewed that with the notable exception of those who lost members of their family to the virus, the major direct effect of COVID-19 during the first 12 months of the pandemic has been through its impact on the employment, income and associated purchasing power of all those whose jobs and livelihoods have been affected by the measures put in place by the local and national authorities (FSIN and GNAFC, 2020; Robins et al., 2020; FAO, 2020; CARICOM et al., 2020; Grupo de Investigación en Economía Regional GIER, 2020; Arévalo et al., 2020; UN/MEPD, 2020). In Ethiopia for instance, about 60% of the households interviewed in Addis Ababa between May and July 2020 reported a loss of income (Hirvonen et al., 2020a); in Nepal 31% (WFP, 2020); in Myanmar 80% (Headey et al., 2020a), in Nigeria around 75% (Amare et al., 2020) and in the Caribbean about 45% of households surveyed mentioned a loss of job or a reduction in income/salaries (CARICOM et al., 2020). In Bangladesh, 96% of the women surveyed by Hamadani et al. (2020) reported a reduction in monthly family income from US\$212 at baseline (prior to COVID) to \$59 during lockdown. Several of those reports also highlighted that the financial impacts were usually higher for urban households than for rural ones (e.g. Headey et al., 2020a) and for women than for men (CARICOM et al., 2020).

3.2. Clear but difficult-to-assess impact on food security

Although not always relying on the same methods or techniques, all the documents reported that those sudden reductions of income have had repercussions on different aspects of households' food security and

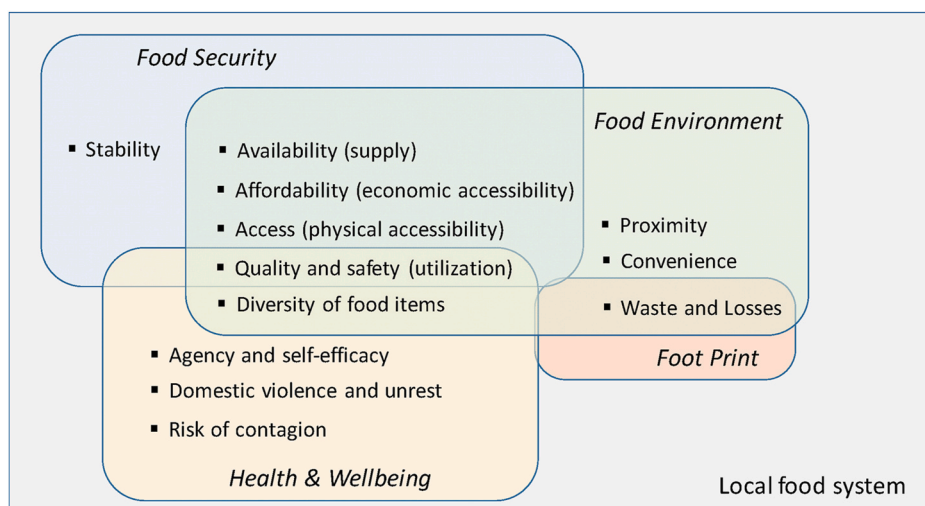


Fig. 1. The different elements of the framework used in this review to assess COVID-19 impact on people's food security.

Table 1
Typology of COVID-19 impacts and affected actors in the context of food systems.

| Typology of impacts induced by COVID-19 | Actor affected by the event |
|--|--|
| Direct effects of COVID or directly-related responses by authorities | |
| a. COVID related illness or death | All actors ^(a) |
| b. Mobility restriction and lockdown | All actors |
| c. Safety or sanitary decrees/regulations | Primarily mid-stream actors |
| Immediate consequences on food system actors | |
| 1. Disruption in upstream supply chain (e.g. fertilizer) and/or subsequent effects on prices or quantity/accessibility/quality of inputs | Producers, workers and/or mid-stream actors |
| 2. Disruptions in actors' own activities due to mobility restriction and lockdown | Producers, workers and/or mid-stream actors |
| 3. Loss of or reduced connectivity with established downstream actors (direct consumers, contracted business partners, e.g. processors, retailers, etc.) | Producers, workers and/or mid-stream actors |
| 4. Reduction in labour/workers availability (due to mobility restriction, increase in public transport costs, or fear of exposure to virus) | Producers, workers and/or mid-stream actors |
| 8. Forced closure of business due to safety or sanitary decrees/regulations | Producers, workers and/or mid-stream actors |
| 9. Degradation in Rules of Law (e.g. contractual issues, enforcement issues, information access issues, etc.) | Producers, workers and/or mid-stream actors |
| 13. Disruption in food supply due to hoarding behaviour | Producers, workers, mid-stream actors and/or consumers |
| Subsequent repercussions on food system actors and/or other (non-food system) actors | |
| 5. Drop in (agri)food business profitability | Producers, workers and/or mid-stream actors |
| 6. Reduction in downstream demand | Producers, workers and/or mid-stream actors |
| 7. Increased wasted food/post-harvest losses due to disruption in supply chain (upstream or downstream) | Producers, workers and/or mid-stream actors |
| 10. Increased gender discrimination against women in particular subsectors (processing, retailing, selling) | Producers, workers and/or mid-stream actors |
| 11. Increased abuse against marginalized individual or groups in particular subsectors (processing, retailing, selling) | Producers, workers and/or mid-stream actors |
| 14. Loss of job and/or reduction in income/revenues (due to mobility restriction, forced closure of business, etc.) | Producers, workers, mid-stream actors and/or consumers |
| 15. Voluntary or involuntary increased risk of exposure to COVID health impact (contagion) due to the adoption of particular copying strategies | Producers, workers, mid-stream actors and/or consumers |
| 17. Disruption in access to (usual) food outlets | Consumers ^(a) |
| 18. Increased price of food – lower purchasing power | Consumers ^(a) |
| Final impacts on consumers' food security dimensions and food system actors' health & well-being | |
| 12. Drop in perceived self-efficacy or agency among individuals or particular groups | Producers, workers and/or mid-stream actors |
| 16. Domestic violence and/or increased tension in households | Producers, workers, mid-stream actors and/or consumers |
| 19. Degradation in food choice and diversity (e.g. shift to cheaper, fewer or less nutritious food items) | Consumers ^(b) |
| 20. Reduction in proximity and/or convenience – due to mobility restriction, increase in public transport costs, or fear of exposure to virus | Consumers |
| 21. Increased risk of consumption of unsafe food due to reduced access to usual/traditional food suppliers/outlets | Consumers |
| 22. Forced shift to more expensive food outlets due to closure of those outlets or due to mobility restriction | Consumers |

Notes.

^(a) Actors are grouped into three 'meta-groups': producers (including wage workers), mid-stream actors and consumers. The 'mid-stream' meta-group includes several distinct generic sub-groups: processors, transporters, wholesalers/retailers, and food vendors, in line with the main types of activities usually recognized as present in food systems (e.g. [HLPE, 2017](#)).

^(b) 'Consumers' includes producers, workers and/or mid-stream actors as consumers.

nutrition. In Nigeria the comparison of pre-COVID LSMS-ISA data (collected in 2018) with the 2020 LSMS-ISA data shows significant difference for all four indexes used: skip meal, run out of food, went without eating for a whole day, and food insecurity ([Amare et al., 2020](#)). Using the Food Insecurity Experience Scale (FIES), [Headey et al. \(2020a\)](#) show that in Myanmar it was mainly the access to healthy food that was affected. Likewise, in India, 62% of the farm households interviewed by [Harris et al. \(2020\)](#) described disruptions to their diets. In particular, around half the households reported a large decline in consumption of fruit and animal source foods other than dairy. In Mexico, using the Latin American and Caribbean Food Security Scale (ELCSA) included in three waves of a phone survey, [Gaitán-Rossi et al. \(2020\)](#) show that the COVID-19 lockdown was associated with an important decline in food security from 39% in 2018 to 25% in June 2020 in households with children. An online cross-sectional survey conducted in two favelas in Sao Paulo (Brazil) between March and June 2020 shows that 47% of respondents experienced moderate or severe food insecurity ([Manfrinato et al., 2020](#)). Data from Nigeria also suggests that households living in remote and conflict-affected areas were more likely to experience deterioration in food security ([Amare et al., 2020](#)). Those declines in different aspects of food security did not affect only populations in low-income countries. In Vermont (USA), using the six-item validated food security module, [Niles et al. \(2020\)](#) showed that there was nearly a one-third increase in household food insecurity since COVID-19, with 35.5% of food insecure households classified as newly food insecure.

Reductions in incomes/revenues were one of the main reasons for higher food insecurity but other reasons were also mentioned. In Nepal, among the households who reported food insufficiency, 21% identified shortage of food in markets and food outlets as the main reason ([WFP, 2020](#)). In Odisha (India), travel restrictions were reported as the main reason for insufficient quantities of food ([IAG and WFP, 2020](#)). In Vermont, food access challenges included 'not finding as much or the kinds of food that someone wanted', 'going to more places than usual to find food', and 'not being able to afford the food a household wanted' ([Niles et al., 2020](#)).

In sum, while the overall detrimental effect of COVID-19 on different aspects of people's food security is unquestionable, the intensity and forms that this food insecurity takes is more difficult to establish precisely. Many reasons can explain this: the very fluid and rapidly evolving situation and the fact that the impact on people appears to be time- and geography-specific but also dependent on the food item/value chain considered and the socio-economic group interviewed; and the fact that multiple and heterogeneous sets of various, mixed and sometimes modified indicators and approaches were used during those surveys.

3.3. Expected impact on nutrition

For nutrition the current situation also appears difficult to assess accurately. While there is a large consensus that COVID-19 is likely to increase all forms of malnutrition in the long-run ([FSIN and GNAFC,](#)

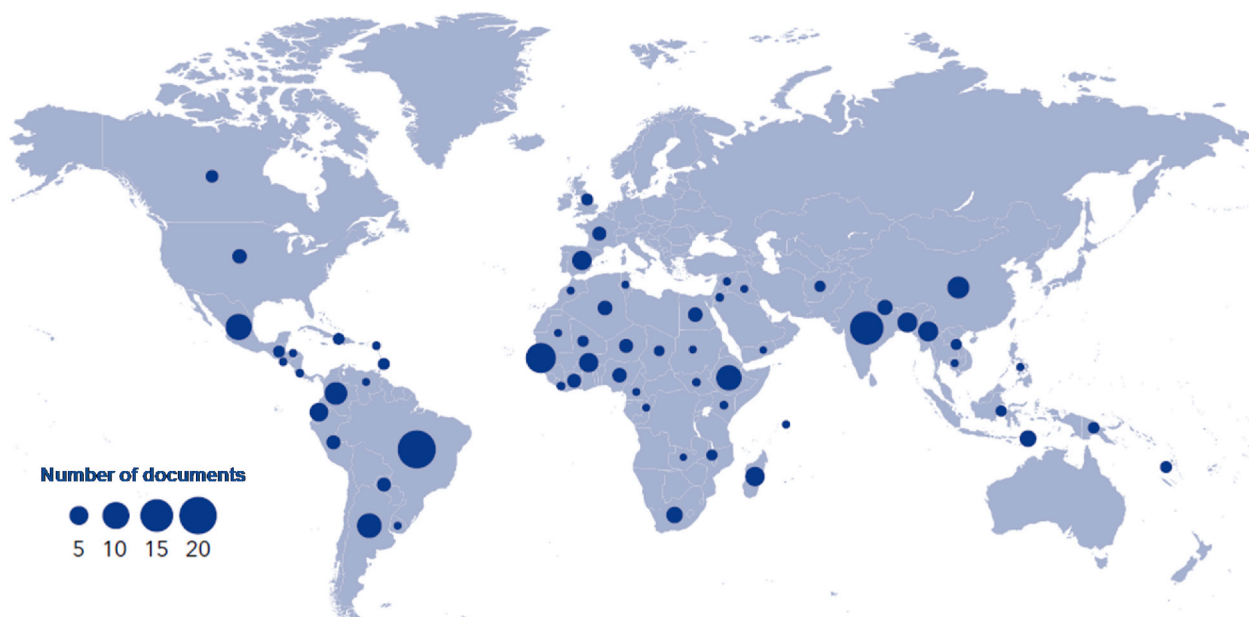


Fig. 2. Geographical coverage of the review (i.e. countries discussed or mentioned in the documents included in this review).

2020), primary data are still not available at global level to confirm these predictions. As a consequence, current discussions on nutrition are still primarily based on macro or micro-level simulations (e.g., Akseer et al., 2020; Headey and Ruel, 2020; Roberton et al., 2020). These predict a potentially substantial increase in the prevalence of moderate or severe wasting among children younger than five years of age (Headey and Ruel 2020). If these projections are correct this would translate into an additional estimated 6.7 million children with wasting in 2020 compared with projections for 2020 without COVID-19 (Headey et al., 2020b).

In parallel, the disruption of health services during lockdowns is expected to have further compromised maternal and child health (Roberton et al., 2020) as well as other forms of malnutrition with the deepening of economic and food systems crises, including child stunting, micronutrient malnutrition, and maternal malnutrition (Akseer et al., 2020). With few exceptions -e.g. Werneck et al. (2020) who look at the incidence of elevated consumption of ultra-processed food consumption and lower consumption of fruits and vegetables during the COVID-19 pandemic- there was little attempt in the literature reviewed to assess the effects of COVID-19 on over-weight and obesity, even if change in consumers' behaviour and general degradation in food choice and diversity had been widely reported (Villaseñor Lopez et al., 2021; Casco, 2020; Harris et al., 2020; Zidouemba and KindaOuedraogo, 2020; Hamadani et al., 2020).

3.4. Effect on different actors of the system

In parallel to the reported impact on consumers, a large number of documents highlighted the disruptive effects of the pandemic on the livelihood and economic activities of the other food system actors, starting with the primary producers (e.g. Termeer et al., 2020; Rosen, 2020; Reis-Filho and Quinto, 2020; Urioste Daza et al., 2020; Quiroga Mendiola et al., 2020; Tounkara, 2020). These disruptions included the loss or reduction of access to farming input supplies or the sharp increase in their prices. Burkart et al. (2020), for instance, reported that urea fertilizer prices had increased on average by 9% between March and April 2020 in Colombia, severely restraining the livestock sector. In Andra Pradesh (India), Nedumaran et al. (2020) reported that due to transport and contact restrictions, agriculture input suppliers lost up to 75% of their business. Still in India, Harris et al. (2020) also reported

that 87% of the vegetable producers they interviewed had their production interrupted. In some areas the figure was 94%. Aggarwal et al. (2020) found large reductions in profits among farmers in Liberia, declining to almost zero by May 2020, and smaller but still substantial losses in Malawi in April and in June. The same authors also reported that almost all market vendors had been forced to close or reduce business hours. In Ethiopia Hirvonen et al. (2020b) observed disruptions in traders' business practices, including increased costs of transport, decrease in downstream demand, and subsequent losses in business. In China, using a multiplier model built on 2017 social accounting matrix, Zhang et al. (2020) estimated that more than 46 million agri-food system workers temperately lost their jobs during the initial lockdown phase. While many of these jobs resumed afterward, the level of agri-food system employment continued to be lower in 2020 than prior to the COVID-19 outbreak (Zhang et al., 2020).

3.5. Has anyone benefited from the crisis?

The consensus that emerges from the specialized (financial) literature is that amid the devastating fallout of the COVID-19 crisis, at least two groups of formal actors have been thriving: home delivery, and grocery stores and supermarkets (Financial Times, 2020; AmTrust Financial, 2020). Those larger businesses which remained open throughout the pandemic, were able to 'capture' and concentrate the largest part of the consumer population in the aisles of their establishments or on their e-shopping platforms. In the US, an estimate of grocery stores' daily revenues over the 12 months of 2020 compared to the closest day of the same weeks in 2019 reveals an average 25% higher daily revenues (Womply, 2020). In Australia, the supermarket and grocery store chain Woolworths announced the creation of 20,000 new jobs in March 2020 "to meet the surge in demand" (Financial Review, 2020). In the UK, the six major supermarket and discounter chains (Sainsbury's, Tesco, B&M, Morrison, Aldi, and Asda) announced in December 2020 that they would have to return in aggregate more than £1.8bn in business rates to the local authorities (The Guardian, 2020).

In other regions of the world where supermarket penetration is more limited, small stores operating with family labor and other informal sector businesses were impacted, but restrictions were often only temporary and, in many cases, small businesses carried on regardless, even though this has been under much more difficult operating conditions

than usual (Kinner and Watson, 2020). In parallel, many of those businesses also rapidly developed informal e-commerce and delivery services through non-dedicated platforms such as Whatsapp and Facebook (Shah, 2020; Digital Future Society and Inter-American Development Bank, 2021). However, although some global estimates have been offered (e.g., UNCTAD, 2021) those are still mainly based on formal economies' statistics, thus missing a large part of the informal sector in the lower incomes countries. Assessing accurately the magnitude of the impact and the adaptability/responsiveness of the informal sector through the development of e-commerce is therefore still relatively challenging.

4. Impact pathways of COVID-19

The documents included in the synthesis presented above provide an initial good overview of the impacts of COVID-19 on food systems and their local actors. Those documents, however, generally focused on specific aspects/activities or particular groups of actors and, as such, did not necessarily adopt approaches that allowed capturing the systemic, interactive nature of food systems. To palliate this, we complemented the synthesis' results presented above with the information generated through the Sankey diagramme, where emphasis had been put on the interactions between the different types of disruptions reported in the documents (Fig. 3).

The Sankey diagramme confirms the relevance of adopting a systemic approach - 56 forward and backward links were observed across the whole system. Those different interactions form not just one single impact pathway but a whole web of intermingled, non-linear paths characterized by multiple 'branches' and loops. Not all these pathways appear equal in importance, however. One of the most prominent paths (between 'loss of job/reduction in income/revenues' and 'degradation in food choice and diversity') (see Fig. 3) involves all actors (primary producers, midstream actors and consumers), confirming that the impacts of COVID-19 have been general and impacting economically *everyone* in the food system.

The diagramme also shows several other predominant paths that were not directly related to the economic affordability of food. One of these paths involves the 'disruption in access to (usual) food outlets'. Likewise, at the final impact stage, the process with the second largest link is 'reduction in proximity and/or convenience'. Together the presence of those two elements ('disruption in access' and 'reduction in proximity/convenience') suggests that, in parallel to economic constraints, COVID-19 has also affected people's physical accessibility to food. In contrast, no major path involving food availability issue was observed.

Finally, none of the three indicators of wellbeing included initially in the framework (sense of self-efficacy, risk of exposure to the virus, and level of domestic violence) appears prominently in the impact pathway. This outcome is likely to be due to the relatively low number of times those three indicators were mentioned in the documents reviewed. We acknowledge however that domestic violence was reported elsewhere as one major issue during the pandemic (see e.g., Sharma and Borah, 2020; Moreira and da Costa, 2020).

5. Synthesis: the big picture after the first 12 months of the pandemic ...

5.1. Some potential limitations

One of the major limits of this global assessment relates to the fact that the majority of the documents included in the review had been posted or published during the first months of the crisis (Feb–Dec 2020) when it was still difficult for researchers to operate in the field and to obtain direct primary data. As a consequence, the information made available through those documents were largely anecdotal or based on experiential knowledge. Even when more reliable and representative

protocols had been applied, the nature of the survey deployed to generate the information (mainly telephone interviews) has led to a systematic bias toward tangible, easily or quickly 'measurable' or quantifiable data/indicators, to the detriment of more nuanced or qualitative data which often require more time-intensive methods.

5.2. No global collapse of the system but a lot of suffering (for many) and some huge profits (for a few)

The evidence extracted from the different documents reviewed here suggests that in 2020 the biggest impact of COVID-19 on the different dimensions of food security has been on *food access* and not on food availability as it had been feared initially when fractures/disruptions in value chains were identified as a major potential risk of the pandemic. While some disturbances (affecting the stability of the system) have been indeed reported at local (hoarding) and international (restrictions on exports) levels (Erokhin and Gao, 2020; Ciuriak et al., 2020), those took place primarily during the early stages of the pandemic/lockdown and did not lead to any major episode of "global famine," contrarily to the catastrophic scenario that some experts initially dreaded (e.g., UN, 2020).

The main function of food systems (as a food supplier) has thus been maintained; food systems did not collapse and continued to work and to deliver food throughout 2020. This outcome, however, does not mean that the actors of these food systems have not been severely affected. On the contrary, evidence collated in this review demonstrates that the vast majority of these actors have faced serious economic difficulties in 2020 (especially the informal self-employed and/or small-scale entrepreneurs), essentially as consequence of the preventive measures of mobility restriction, lockdown and curfews that had been imposed by local and/or national authorities in order to reduce the spread of the virus (FSIN and GNAFC, 2020; FAO, 2020; OECD 2020a). At the same time, a small number of other actors including grocery stores and supermarkets benefited greatly from the COVID-19 crisis, reporting billions of dollars of benefit in 2020 (Financial Times, 2020; The Guardian, 2020). Overall, this means that a (hidden but important) consequence of the COVID-19 crisis has been the redistribution of the profits away from the small-scale food outlets, open air/wet markets and other informal enterprises that had been forced to shut down or have seen their activities significantly disturbed, toward a smaller group of actors, mainly the larger-scale local groceries and international supermarket chains and their shareholders.

5.3. Not just economic but also physical hurdles

In their assessment of the pandemic's impacts, the OECD concluded that "the risk to food security (...) does not come from disruptions along supply chains, but rather from the devastating effects of COVID-19 on jobs and livelihoods" (OECD, 2020a, p.1). Our analysis concurs with these statements. The results of the impact pathway analysis confirmed in particular the central impact of the degradation in food affordability on people's food security. The review suggests, however, that this degradation was not due to a rise in food stuff price (IMF, 2020) but instead resulted principally from a decline in purchasing power at the consumer level. The main direct effect of COVID-19 has therefore been, and continues to be, its impact on the salaries and revenues of all workers (within and outside the food systems). In other terms, although the final outcome of COVID-19 is a sharp degradation in food security, the cause of this deterioration was not the collapse of the food systems but the disruption of the global economy.

The review highlighted two other important findings: the first is that it is not just the economic accessibility of food that has been affected during the early part of the pandemic, but also the *physical accessibility*. While the contraction of the economy was at the origin of the degradation in the economic accessibility to food (see above), the lockdown and other forms of mobility restriction were what triggered the decline

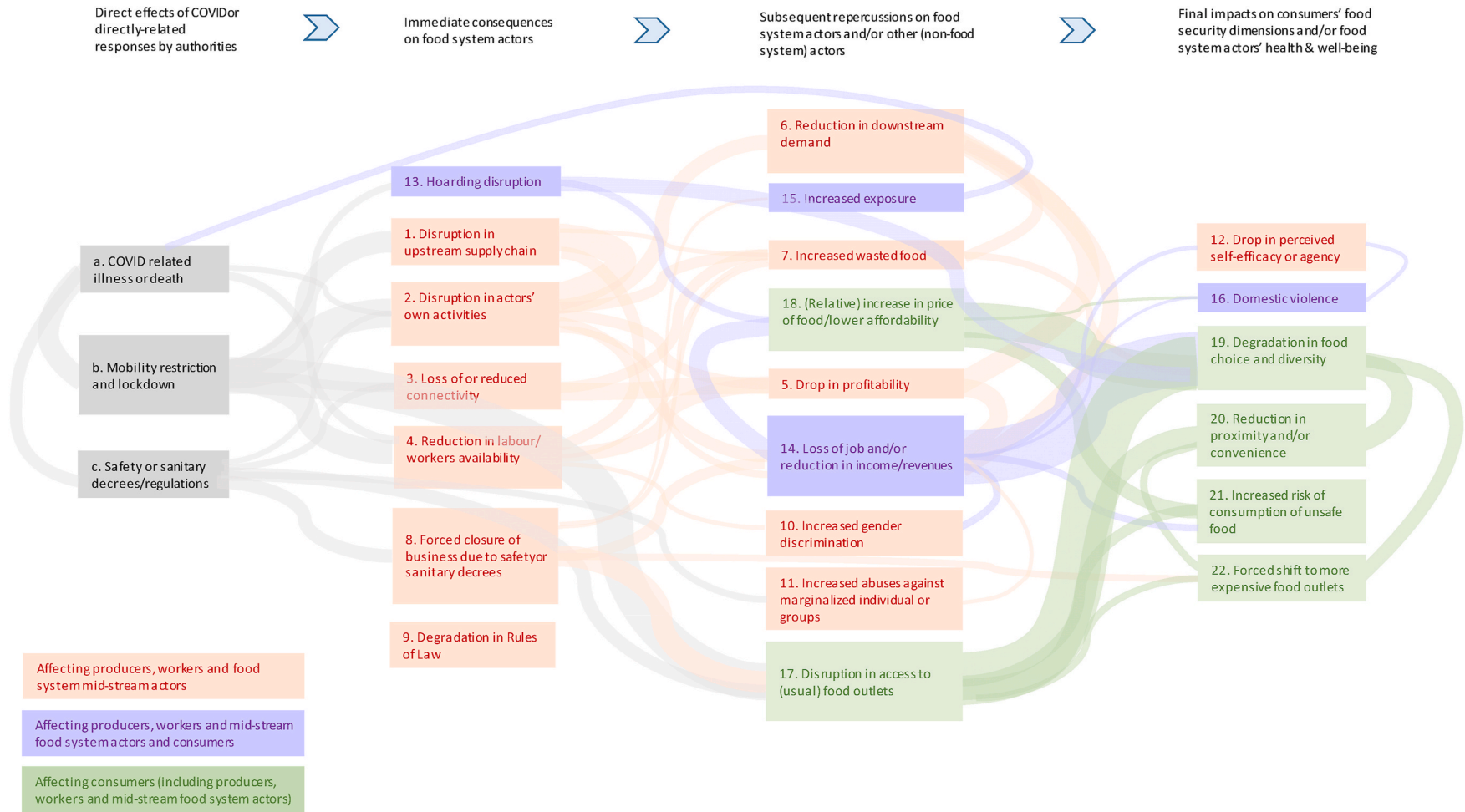


Fig. 3. Impact pathway of COVID-19 on food systems and their different actors based on a Sankey approach. The thickness of the connecting lines is proportional to the number of times a connection between two elements was mentioned across the different documents. Numbers in the diagram refer to the numbering system used in Table 1.

in physical access to food. In many countries, this reduced access has been transitory, however, as adaptive and ‘workaround’ strategies were soon developed and policies revisited (changes in policies affecting markets and transport, development of e-commerce, etc.) so that by the time the second and third waves of lockdown occurred, physical access was no longer the major issue it had been in the early weeks of the pandemic.

The second important finding highlighted by the review is that this combined decline in both economic and physical accessibility eventually led to a degradation in the *choice of food* purchased by households. This result became clear during the construction of the impact pathways when the analysis revealed that the two final impacts with the largest causal links were both related to the issue of food choice (see Fig. 3). Note, however, that the data reviewed in this assessment did not permit us to determine whether this degradation in food choice led simply to a decline in diversity of food sources or whether it also led to a decline in food diversity. This question remains to be explored more thoroughly.

5.4. From convenience and proximity to ‘constrained choice’

From a consumer perspective, the shift in the way food could be accessed during the pandemic, and in particular the fact that (poor) consumers had to turn to larger, formal – and possibly more expensive – food suppliers such as grocery stores and supermarkets, as opposed to their usual food suppliers, also means that the conventional criteria of ‘convenience’ and ‘proximity’ – recognized as important elements in consumer choice (e.g. Herforth and Ahmed, 2015) and a large part of the comparative advantage of small, “around the corner” mum-and-pop shops and other open air/informal caterings and markets, has been replaced during the pandemic by a different criterion: ‘constrained choice’. Because their usual food suppliers were temporary inaccessible or in some cases shut down or banned (e.g., open air/wet markets, street vendors), many consumers turned to the remaining open grocery/supermarket or ordered on-line – often from the same groceries/supermarkets.

This shift from ‘convenience/proximity’ to ‘constrained choice’ goes hand-in-hand with another important transition that emerged during the COVID-19 crisis, from the phenomenon of ‘food-consumed-away-from-home’ (FCAFH) recognized as a major symbol/symptom of today’s rapidly transitioning food systems (e.g. Saksena et al., 2018), to the new phenomenon of ‘food-entirely-consumed-at-home’ (FECAH). The implications of these drastic changes from a consumer’s diets perspective have yet to be assessed. While FCAFH is known to be generally associated with consumption of ‘unhealthy’ foods and high total energy intake (e.g., Lachat et al., 2012; Nago et al., 2014), the consequences of this new FECAH on people’s nutritional and health status will need to be better understood. In theory, being “forced” to eat at home during COVID-19 could help reverse the current unhealthy diets associated with FCAFH (see, however, Werneck et al., 2020). But the accompanying change/decline in household income induced by the economic contraction will certainly introduce some complications in the analysis, along with the fact that much of this FECAH was purchased online.

In parallel, the impact of COVID-19 on the nutritional status of people is expected to be substantial in the long-run, especially on diversity, as consumers were reported to substitute staples for fruits, vegetables, and animal source foods (e.g., Harris et al., 2020). This aspect, however, is still scantily documented and poorly understood. In some LMICs, the closure of (informal) markets and selling outlets was short-lived and partly bypassed. Consequently, the nutritional impact of these closures may not have been as severe as initially thought – at least for rural dwellers who rapidly found alternatives. More worrying and probably more impactful is the closure of schools and school restaurants (often supported by outside agencies), which lasted longer. In that case, poor families were not able to compensate, possibly leading to substantial nutritional consequences for the children.

5.5. Some unknowns

Several important questions remained unanswered at this stage. The first one concerns the impact of COVID-19 and subsequent lockdown measures on specific socio-demographic groups, including those economically or politically more vulnerable or marginalized (youth, women, migrant workers, households depending on remittances, indigenous groups, etc.). This relates to the economic element of the impact (reduction in income/revenues/remittances and subsequent implications for food security and nutrition) but also to the more general degradation of those individuals’ or groups’ wellbeing, with possible aggravation of their marginalization (increased or new forms of discrimination introduced by the authorities e.g. municipal police forces, or by other food system actors, with subsequent decline in self-efficacy, increased domestic violence, etc.) (Hamadani et al., 2020). From past experience, evidence indicates that pandemics have the potential to exacerbate inequalities (e.g., Lowcock et al., 2012; Lee and Cho, 2016), especially within the most deprived communities. We can therefore assume that some groups have been more severely impacted than others, but it is not clear who those groups are and how much worse-off they are in comparison to others. While some studies have been published recently and provide some initial information on this question, those are so far mainly based on data collected in higher income countries (see e.g., Gray et al., 2021) and have not been able to capture and report on the longer-term consequences of those different processes. In sum, the role and contribution of socio-economic or political factors in the impact and severity of the pandemic are not yet fully established.

6. Conclusions

The objective of this study was to conduct a global assessment of the impacts of COVID-19 during the first 12 months of the pandemic, focusing specifically on the food security of those affected by the disruptions. We based our assessment on a systematic mapping of the information that was collected at national and international levels in 62 countries during that period.

The review revealed the magnitude and severity of an unprecedented crisis that spared only a few. The analysis showed in particular how *accessibility* of food has been the most affected dimension of people’s food security, with reasonably solid evidence suggesting that food *affordability* has been severely impacted through declines in purchasing power of most households in LMICs. In contrast, there is no clear evidence that the *availability* of food has been affected beyond some initial disruptions due to panic buying; and there is not enough information to provide robust conclusions about the effects of the pandemic on the *utilization* dimension (food safety or quality). We note however that those various disruptions in access (or even temporarily in availability) could be re-interpreted as disturbances in the *stability* dimension of the concept of food security. Beyond these direct effects, anecdotal accounts of degradation in people’s *wellbeing* were also noted but the absence of detailed analyses in the documents reviewed here prevented more robust conclusions.

The impact pathway analysis provided additional important insights that enriched the initial findings. The analysis showed in particular that the disruption in access to food has not been limited to its financial component (affordability) following people’s loss of job or reduction in income/revenues. Another important pathway related to the disruption in people’s *physical access* to food outlets especially during the initial periods of complete lockdown. This disruption was then shown to affect proximity and convenience, while the combination of loss of job/decrease in revenues and disruption in (physical) accessibility eventually led to a *degradation in food choice and diversity*.

The major conclusion of the assessment, however, lies at a ‘higher’ level. The analysis shows that while serious concerns had been initially expressed about the severe disruptions that the successive waves of

lockdowns and similar regulations would induce on food system actors and more generally on local and global levels of food security, the evidence suggests that, overall, food systems have ‘resisted’ the pandemic and no major episodes of severe food shortage were observed in 2020.

This apparent resilience of the food systems was achieved, however, at great costs, with the majority of the actors in those food systems having to cope with severe disruptions in their activities and some subsequent financial losses. The exception has been the formal groceries, retailers and supermarkets that were allowed to remain open to serve customers throughout the pandemic. Those reported huge financial profits in 2020, in particular in high income countries. In other parts of the world, food system actors managed to ‘stay afloat’, essentially because the food sector as a whole had been rapidly declared “essential service” in every country and the restrictions initially imposed by local or national authorities removed or bypassed. Formal and informal e-commerce also developed very rapidly.

These capacities to resist, to innovate and to adapt in the face of the huge challenges created by the pandemic have led several experts to praise the intrinsic “resilience of the system” (e.g., Reardon and Swinnen, 2020; OECD 2020b). Our interpretation is more ‘reserved’ in the sense that this resilience comes with two (political economy) corollaries: first, as mentioned above, a large part of this resilience simply resulted from the special status of “essential services” that had been granted to the food sector, allowing many actors in the system (in particular the formal ones) to continue operating without interruptions while the rest of the economy (tourism, aerial transportation, hostelry, etc.) was shut down; and second, this resilience has also been built at the cost of many small-scale/informal food system actors in LMICs, who, due to the informal nature of their businesses, were not entitled to access the financial supports that had been put in place in many countries (Gentilini et al., 2020). Those actors (uneducated women/men, poor, unskilled workers) subsequently lost a large part of their investments and assets, or even went bankrupted, during the first few weeks of the pandemic. However, because many of these actors were already “invisible” to the national statistical systems of their own countries, their economic ‘disappearance’ is difficult to document or to quantify, even though they are possibly the group in the food system that has been the most severely affected.

Declaration of competing interest

We declare that we do not have any conflict of interest of any sort in publishing this manuscript.

Acknowledgments:

The initial research was funded under the CGIAR COVID-19 Hub. The Open Access fees were covered by the Food System for Healthier Diets flagship under the Research program Agriculture for Nutrition and Health.

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