

Letter to the Editor/Carta al Editor

6 The COVID-19 Pandemic and the Food System: From Health Emergency to Economic Crisis

La COVID-19 y el Sistema Alimentario: de la emergencia sanitaria a la crisis económica

***Andrea Alejandra Arrua**¹, **Danilo Fernández Ríos**²

¹Universidad Nacional de Asunción, Centro Multidisciplinario de Investigaciones Tecnológicas. San Lorenzo, Paraguay

²Universidad Nacional de Asunción, Facultad de Ciencias Exactas y Naturales, San Lorenzo, Paraguay

Editor Responsable: Florencia del Puerto. Universidad Nacional de Asunción, Instituto de Investigaciones en Ciencias de la Salud, San Lorenzo, Paraguay. Email: colepuerto@hotmail.com

**Cómo referenciar este artículo/
How to reference this article:**

Arrua AA. The COVID-19 Pandemic and the Food System: From Health Emergency to Economic Crisis. Mem. Inst. Investig. Cienc. Salud. 2024; 22(1): e22122401.

The COVID-19 pandemic has exposed the deep-seated vulnerabilities and inequalities in our global food systems. While the immediate health crises have subsided, the economic repercussions of the pandemic continue to affect populations worldwide, particularly the most vulnerable⁽¹⁾. What does the future hold? What could be the implications for agri-food systems?

The COVID-19 pandemic caused unprecedented disruptions in global food supply chains⁽²⁾. Mobility restrictions, border closures, and social distancing measures impacted food production, processing, transportation, and distribution⁽³⁾. These disruptions resulted in shortages of agricultural inputs, as farmers faced difficulties obtaining seeds, fertilizers, and other essential supplies due to transportation and logistical interruptions⁽⁴⁾. Delays in production occurred as movement restrictions and labor shortages impacted the planting, harvesting, and processing of agricultural products⁽⁵⁾. Transportation disruptions caused by border closures and mobility restrictions made it difficult to transport food to markets, leading to shortages and price increases⁽⁶⁾. Another significant aspect was the closure of businesses and job losses, which led to a decline in incomes and an increase in food insecurity^(7,8), this forced many people to rely on food banks and other forms of food assistance^(9,10). Another significant aspect was the sustained increase in food fraud as a consequence of all the previously mentioned factors⁽¹¹⁾.

These events prompted various responses to the disruptions in food supply. Among them was the diversification of distribution channels. Some agri-food companies responded to the contraction of national and international markets by diversifying their distribution methods, selling packaged products instead of whole commodities, or producing value-added products⁽¹²⁻¹⁴⁾. Another important aspect was the increase in automation, as some companies viewed it to reduce vulnerability to future crises and enhance efficiency. However, this shift also entails a reduction in employment opportunities for families⁽¹²⁾. It is important to highlight that the pandemic exposed existing inequities in access to nutritious and affordable food⁽¹⁵⁾. Marginalized populations, including low-income households, minorities, and those in rural areas, were disproportionately affected by supply chain disruptions and rising food prices⁽¹⁵⁻¹⁷⁾. In particular, vulnerable populations such as low-income households, women, children, and the elderly were severely affected⁽¹⁷⁾. Furthermore, the pandemic also exacerbated gender inequalities, as women, who

Recepción: 2 de diciembre de 2024. **Revisión:** 4 de diciembre de 2024. **Aceptación:** 20 de diciembre de 2024.

***Autor correspondiente: Andrea Alejandra Arrua.** Universidad Nacional de Asunción, Dirección General de Investigación Científica y Tecnológica Centro Multidisciplinario de Investigaciones Tecnológicas. San Lorenzo, Paraguay. Email: andrea.arrua@cemit.una.py

often bear the primary responsibility for caregiving and food security, faced greater challenges⁽¹⁸⁾.

Regarding the impact on food assistance systems in countries where they exist, the demand for food banks—an entity not present in Paraguay—and other food aid organizations increased drastically during the pandemic, testing their capacity and resources⁽¹⁸⁻²⁰⁾. In the case of Paraguay, Law 6603/2020 was enacted with the objective of providing support and assistance from the Paraguayan State to the community-led *Ollas Populares* (community kitchens) organized across the country's territory. This initiative aimed to address the negative social and economic consequences of the quarantine imposed by the Executive Branch to mitigate the health crisis caused by COVID-19^(21,22).

These initiatives were implemented by various organizations and institutions across 12 departments of the country. The closures and movement restrictions forced food banks to adapt their operations, leading to the elimination of traditional face-to-face interaction models and a greater reliance on home delivery services^(2,19,20,23). This situation led to the loss of important aspects of food assistance, such as personalized attention and users' ability to choose—an issue that was not observed in Paraguay⁽²⁾. Regarding policy responses and lessons learned, it is important to note that governments worldwide implemented various policy measures to mitigate the pandemic's impact on the food system^(24,25).

These measures included financial support to farmers, as subsidies and loans were provided to help them cope with income losses and shortages of inputs^(26,27).

In Paraguay, this was not implemented directly; however, other types of subsidies were provided, such as subsidies for informal workers and exemptions for users of the National Electricity Administration (ANDE) with a monthly consumption of 0 to 500 kWh (approximately G. 250,000), who were fully exempt from payment, among other forms of assistance, under Law 6809. This led to the expansion of protection programs through the enlargement of cash transfer programs and other social protection measures to reach a larger number of people in need^(10,26,28-30).

Simultaneously, several countries worked on facilitating food trade, implementing measures to ensure the cross-border flow of food and avoid disruptions in international trade. Furthermore, actions were taken to facilitate online interactions with public institutions and the digital collection of the documentation required for agri-food production, aiming to reduce bureaucratic processes^(3,31). In certain cases, the processes for requesting and approving financial aid were often slow, bureaucratic, and inefficient, which hindered timely access to assistance. The lack of coordination between different levels of government and aid agencies often resulted in duplication of efforts and inefficiency in aid distribution⁽³²⁾.

The pandemic has highlighted the need for more resilient, sustainable, and equitable food systems^(2,33). In the future, it is crucial to expand and strengthen social protection programs, such as cash transfers and, in Paraguay, the creation of food banks and vouchers, to ensure that vulnerable populations have access to nutritious food⁽²⁸⁾. There is a need for greater coverage of the social safety net, particularly for vulnerable groups^(8,17). A recent study on Paraguay's response to the COVID-19 pandemic highlights that the country experienced the smallest economic contraction in Latin America and the Caribbean following the global health crisis. The study also emphasizes the moderate increase in poverty levels and the rapid recovery of employment in absolute terms. This context positions Paraguay favorably to focus not only on short-term measures, such as mitigation actions or immediate assistance, but also on medium-term strategies aimed at addressing the structural reforms required for the country's development⁽³⁴⁾.

Small-scale farmers play a vital role in food production; therefore, it is essential to provide them with financial support, access to technology, and resilient infrastructure^(27,35). Small-scale farmers play a vital role in food production; therefore, it is essential to provide them with financial support, access to technology, and resilient infrastructure⁽²⁷⁾. Policies should focus on diversifying

supply chains, reducing dependence on imports, and strengthening local and regional connections^(18,36,37). Greater investment in small- and medium-sized meat processing facilities is needed to enhance resilience during times of crisis⁽³⁸⁾. Comprehensive policies are needed to address the underlying inequalities in access to food, land, resources, and income⁽¹⁶⁾. Policies should consider the creation of an accurate farmer database to ensure the effective implementation of government policies and reach marginalized farmers⁽²⁷⁾.

It is essential to invest in research and development to improve agricultural productivity, develop climate-adapted crop varieties, and strengthen the resilience of food systems⁽³⁹⁾. Better governance of food systems at national, regional, and international levels is needed to ensure coordination, coherence, and accountability in food policies. This includes facilitating online communication and digital documentation⁽³⁾.

Consumers must be empowered to make informed and responsible food choices by promoting healthy and sustainable diets and reducing food waste⁽⁴⁰⁾.

The COVID-19 pandemic has been a wake-up call regarding the fragility of our food systems. To ensure food security and public health in the future, we must learn from this crisis and work toward building fairer, more sustainable, and resilient food systems. The COVID-19 pandemic has been a wake-up call regarding the fragility of our food systems. To ensure food security and public health in the future, we must learn from this crisis and work toward building fairer, more sustainable, and resilient food systems^(31,41).

This requires collaboration among governments, businesses, civil society organizations, and individuals to address the root causes of food insecurity and build food systems that are resilient to future crises.

BIBLIOGRAPHIC REFERENCES

1. Schusler T. Responses to the Impacts of COVID-19 Reclaiming the Food System: Learning from Community Responses to the Impacts of COVID-19. 2022.
2. Dudek M, Śpiewak R. Effects of the COVID-19 Pandemic on Sustainable Food Systems: Lessons Learned for Public Policies? The Case of Poland. *Agric*. 2022;12(1).
3. Engemann H, Jafari Y. COVID-19 and changes in global agri-food trade. *Q Open*. 2022;2(1):1–26.
4. Ben Hassen T, El Bilali H. Three years into the pandemic: Insights of the COVID-19 impacts on food security and nutrition in low and middle-income countries. *Heliyon* [Internet]. 2024;10(7):e28946. Available from: <https://doi.org/10.1016/j.heliyon.2024.e28946>
5. MERCOSUR. Reglamento Técnico MERCOSUR para Rotulación de Alimentos Envasados [Internet]. 2003. p. 13. Available from: https://normas.mercosur.int/simfiles/normativas/13541_RES_026-2003_ES_FERR_RTM%20Rotulaci%C3%B3n%20Alimentos.pdf
6. Hassan HF, Rizk Y, Chalak A, Abiad MG, Mattar L. Household food waste generation during COVID-19 pandemic and unprecedented economic crisis: The case of Lebanon. *J Agric Food Res* [Internet]. 2023;14(August):100749. Available from: <https://doi.org/10.1016/j.jafr.2023.100749>
7. Wolfson JA, Leung CW. Food insecurity during covid-19: An acute crisis with long-term health implications. *Am J Public Health*. 2020;110(12):1763–5.
8. Haque MK, Zaman MRU, Rahman MA, Hossain MY, Shurid TI, Rimi TA, et al. A review on impacts of COVID-19 on global agricultural system and Scope for Bangladesh after pandemic. *Environ Sci Pollut Res* [Internet]. 2022; 29(36): 54060–71. Available from: <https://doi.org/10.1007/s11356-022-21016-0>
9. Boughton D, Goeb J, Lambrecht I, Headey D, Takeshima H, Mahrt K, et al. Impacts of COVID-19 on agricultural production and food systems in late transforming Southeast Asia: The case of Myanmar. *Agric Syst* [Internet]. 2021;188(September 2020):103026. Available from: <https://doi.org/10.1016/j.agsy.2020.103026>
10. Coluccia B, Agnusdei GP, Miglietta PP, De Leo F. Effects of COVID-19 on the Italian agri-food supply and value chains. *Food Control* [Internet]. 2021;123(January):107839. Available from: <https://doi.org/10.1016/j.foodcont.2020.107839>
11. Frera M, Elahi S. Has COVID-19 caused a significant increase in observed food fraud incidents?
12. Coopmans I, Bijttebier J, Marchand F, Mathijs E, Messely L, Rogge E, et al. COVID-19 impacts on Flemish food supply chains and lessons for agri-food system resilience. *Agric Syst* [Internet]. 2021;190(March):103136. Available from: <https://doi.org/10.1016/j.agsy.2021.103136>
13. Espitia A, Ruta M, Rocha N. Covid-19 and

- Food Protectionism The Impact of the Pandemic and Export Restrictions on World Food Markets [Internet]. 2020. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3605887
14. Benítez M, Velasco C, Rita A, Henríquez J, Menezes FM, Paolucci F. Responses to COVID-19 in five Latin American countries. *Heal Policy Technol.* 2020;9:525–59.
 15. Kharroubi S, Naja F, Diab-El-harake M, Jomaa L. Food insecurity pre-and post the covid-19 pandemic and economic crisis in lebanon: Prevalence and projections. *Nutrients.* 2021;13(9):1–15.
 16. Thilmany D, Canales E, Low SA, Boys K. Local Food Supply Chain Dynamics and Resilience during COVID-19. *Appl Econ Perspect Policy.* 2021;43(1):86–104.
 17. Kazancoglu Y, Sezer MD, Ozbiltekin-Pala M, Lafçı Ç, Sarma PRS. Evaluating resilience in food supply chains during COVID-19. *Int J Logist Res Appl* [Internet]. 2024; 27(5): 688–704. Available from: <https://doi.org/10.1080/13675567.2021.2003762>
 18. Power M, Doherty B, Pybus K, Pickett K. How COVID-19 has exposed inequalities in the UK food system: The case of UK food and poverty. *Emerald Open Res.* 2020;2:11.
 19. Kumar P, Singh SS, Pandey AK, Singh RK, Srivastava PK, Kumar M, et al. Multi-level impacts of the COVID-19 lockdown on agricultural systems in India: The case of Uttar Pradesh. *Agric Syst* [Internet]. 2021;187(September 2020):103027. Available from: <https://doi.org/10.1016/j.agsy.2020.103027>
 20. Kumar P, Kumar Singh R. Strategic framework for developing resilience in Agri-Food Supply Chains during COVID 19 pandemic. *Int J Logist Res Appl* [Internet]. 2022;25(11):1401–24. Available from: <https://doi.org/10.1080/13675567.2021.1908524>
 21. Colmán Benítez KB, Yampey Díaz OT. Ollas populares en el Paraguay de la pandemia COVID-19: apuntes para una tipología. *Kera Yvoty reflexiones sobre la cuestión Soc.* 2020;5(esp.):13–22.
 22. Congreso de la Nación Paraguaya. Ley N° 6603 de apoyo y asistencia a las ollas populares organizadas en todo el territorio de la república del Paraguay durante la pandemia declarada por la organización mundial de la salud a causa del covid-19 [Internet]. Ley 6303. 2020. p. 3. Available from: <https://www.bacn.gov.py/leyes-paraguayas/9365/ley-n-6603-de-apoyo-y-asistencia-a-las-ollas-populares-organizadas-en-todo-el-territorio-de-la-republica-del-paraguay-durante-la-pandemia-declarada-por-la-organizacion-mundial-de-la-salud-a-causa-del-covid-19>
 23. Lopez-Ridaura S, Sanders A, Barba-Escoto L, Wiegel J, Mayorga-Cortes M, Gonzalez-Esquivel C, et al. Immediate impact of COVID-19 pandemic on farming systems in Central America and Mexico. *Agric Syst* [Internet]. 2021;192:103178. Available from: <https://doi.org/10.1016/j.agsy.2021.103178>
 24. Galanakis CM. The Food Systems in the Era of the Coronavirus (COVID-19) Pandemic Crisis. *Foods* [Internet]. 2020 Apr 22 [cited 2020 Aug 29];9(4):523. Available from: <https://www.mdpi.com/2304-8158/9/4/523>
 25. Nasereldin YA, Brenya R, Bassey AP, Ibrahim IE, Alnadari F, Nasiru MM, et al. Is the Global Food Supply Chain during the COVID-19 Pandemic Resilient?
A Review Paper. *Open J Bus Manag.* 2021;09(01):184–95.
 26. Popescu GC, Popescu M. COVID-19 pandemic and agriculture in Romania: effects on agricultural systems, compliance with restrictions and relations with authorities. *Food Secur* [Internet]. 2022;14(2):557–67. Available from: <https://doi.org/10.1007/s12571-021-01239-8>
 27. Weersink A, von Massow M, Bannon N, Ifft J, Maples J, McEwan K, et al. COVID-19 and the agri-food system in the United States and Canada. *Agric Syst* [Internet]. 2021;188(December 2020):103039. Available from: <https://doi.org/10.1016/j.agsy.2020.103039>
 28. Zhan Y, Chen KZ. Building resilient food system amidst COVID-19: Responses and lessons from China. *Agric Syst* [Internet]. 2021; 190 (January 2020): 103102. Available from: <https://doi.org/10.1016/j.agsy.2021.103102>
 29. Ministerio de Relaciones Exteriores del Paraguay. COVID-19: El Poder Ejecutivo promulgó la Ley de Emergencia que establece medidas administrativas, fiscales y financieras [Internet]. Noticias. 2020. Available from: <https://www.mre.gov.py/index.php/noticia-s-de-embajadas-y-consulados/covid-19-el-poder-ejecutivo-promulgo-la-ley-de-emergencia-que-establece-medidas-administrativas-fiscales-y-financieras>
 30. Congreso de la Nación Paraguaya. Ley N° 6809 / Establece Medidas Transitorias De Consolidación Económica Y De Contención Social, Para Mitigar El Impacto De La Pandemia Del Covid-19 O Coronavirus [Internet]. Asunción, Paraguay; 2021. Report No.: 6809. Available from: <https://www.bacn.gov.py/leyes-paraguayas/9663/ley-n-6809-establece-medidas-transitorias-de-consolidacion-economica-y-de-contencion-social-para-mitigar-el-impacto-de-la-pandemia-del-covid-19-o-coronavirus>
 31. Adelodun B, Yusuff K, Kumar P, Kumar V, Choi S, Kumar K, et al. Understanding the impacts of the COVID-19 pandemic on sustainable agri-food system and agroecosystem decarbonization nexus: A review. *J Clean Prod* [Internet]. 2021; 318 (July): 128451. Available from: <https://doi.org/10.1016/j.jclepro.2021.128451>

- [8451](#)
32. Frank M, Kaufmann B, Ejarque M, Lamaison MG, Nessi MV, Amoroso MM. Changing Conditions for Local Food Actors to Operate Towards Agroecology During the COVID-19 Pandemic. 2022;6(June).
 33. Geng J, Haq SU, Abbas J, Ye H, Shahbaz P, Abbas A, et al. Survival in Pandemic Times: Managing Energy Efficiency, Food Diversity, and Sustainable Practices of Nutrient Intake Amid COVID-19 Crisis. *Front Environ Sci.* 2022;10(July):1–16.
 34. OECD. A Multi-dimensional Approach to the Post-COVID-19 World for Paraguay [Internet]. Paris; 2024. 153 p. Available from: https://www.oecd.org/en/publications/a-multi-dimensional-approach-to-the-post-covid-19-world-for-paraguay_30fea9fe-en.html
 35. Kakaei H, Nourmoradi H, Bakhtiyari S, Jalilian M, Mirzaei A. Effect of COVID-19 on food security, hunger, and food crisis [Internet]. *COVID-19 and the Sustainable Development Goals.* Elsevier Inc.; 2022. 3–29 p. Available from: <https://dx.doi.org/10.1016/B978-0-323-91307-2.00005-5>
 36. Khojasteh D, Davani E, Shamsipour A, Haghani M, Glamore W. Climate change and COVID-19: Interdisciplinary perspectives from two global crises. *Sci Total Environ* [Internet]. 2022;844(June):157142. Available from: <https://doi.org/10.1016/j.scitotenv.2022.157142>
 37. Mugabe PA, Renkamp TM, Rybak C, Mbwana H, Gordon C, Sieber S, et al. Governing COVID-19: analyzing the effects of policy responses on food systems in Tanzania. *Agric Food Secur* [Internet]. 2022;11(1):1–13. Available from: <https://doi.org/10.1186/s40066-022-00383-4>
 38. James TY, Kauff F, Schoch CL, Matheny PB, Hofstetter V, Cox CJ, et al. Reconstructing the early evolution of Fungi using a six-gene phylogeny. *Nat* 2006 4437113 [Internet]. 2006 Oct 19 [cited 2022 Nov 21];443 (7113): 818–22. Available from: <https://www.nature.com/articles/nature05110>
 39. Kumareswaran K, Jayasinghe GY. Systematic review on ensuring the global food security and covid-19 pandemic resilient food systems: towards accomplishing sustainable development goals targets. *Discov Sustain* [Internet]. 2022;3(1). Available from: <https://doi.org/10.1007/s43621-022-00096-5>
 40. Raptou E, Mattas K, Tsakiridou E, Baourakis G. Assessing the Aftermath of COVID-19 Outbreak in the Agro-Food System: An Exploratory Study of Experts' Perspectives. *Front Nutr.* 2022; 9 (April): 1–19.
 41. Snow V, Rodriguez D, Dynes R, Kaye-Blake W, Mallawaarachchi T, Zydenbos S, et al. Resilience achieved via multiple compensating subsystems: The immediate impacts of COVID-19 control measures on the agri-food systems of Australia and New Zealand. *Agric Syst* [Internet]. 2021; 187 (September 2020): 103025. Available from: <https://doi.org/10.1016/j.agsy.2020.103025>