Supplementary Materials

Table S1. Table showing publications included in the systematic review and year of publication.

Authors	Year of Publication	Article Title
Abid & Jie	2021	Impact of COVID-19 on agricultural food: A Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis
Acosta et.al.	2021	Immediate effects of COVID-19 on the global dairy sector
Adhikari et.al.	2021	COVID-19 impacts on agriculture and food systems in Nepal: Implications for SDG's
Asegie et.al.	2020	The effects of COVID-19 on livelihoods of rural households: South Wollo and Oromia Zones, Ethiopia
Benedek et.al.	2021	Farm diversification as a potential success factor for small-scale farmers constrained by COVID-related lockdown. Contributions from a survey conducted in four European countries during the first wave of COVID-19
Benedek et.al.	2021	The Kings of the Corona Crisis: The Impact of the Outbreak of Covid- 19 on Small- scale Producers in Hungary
Biswal et.al.	2020	Impact of COVID-19 and associated lockdown on livestock and poultry sectors in India
Blazy et. al.	2021	Immediate impacts of COVID-19 crisis on agricultural and food systems in the Caribbean
Bloem & Farris	2021	COVID-19 Working Paper: The COVID-19 Pandemic and Food Security in Low- and Middle-Income Countries: A Review of the Emerging Microeconomic Literature
Bright et.al.	2021	The impact of COVID-19 on agricultural extension and food supply in Zimbabwe
Ceballos et.al.	2020	Impacts of a national lockdown on smallholder farmers' income and food security: Empirical evidence from two states in India.
Ceballos et.al.	2020	Short-term impacts of COVID-19 on food security and nutrition in rural Guatemala: Phone-based farm household survey evidence
Ceballos et.al.	2020	Crop prices, farm incomes, and food security during the COVID-19 pandemic in India: Phone-based producer survey evidence from Haryana State
Das & Samanta	2021	Role of backyard poultry in South-East Asian countries: post COVID-19 perspective
Dilnashin et. al.	2021	Economic Shock and Agri-Sector: Post-COVID-19 Scenario in India
Dixon et.al.	2021	Response and resilience of Asian agri-food systems to COVID-19: An assessment across twenty-five countries and four regional farming and food systems
DU et.al.	2020	The short- and long-term impacts of the COVID-19 pandemic on family farms in China - Evidence from a survey of 2 324 farms
Goswami et.al.	2021	Multi-faceted impact and outcome of COVID-19 on smallholder agricultural systems: Integrating qualitative research and fuzzy cognitive mapping to explore resilient strategies
Guido et.al.	2020	Will COVID-19 be one shock too many for smallholder coffee livelihoods?
Haggag, W. M.	2021	Agricultural digitalization and rural development in COVID-19 response plans: A review article
Han et.al	2021	COVID-19 pandemic crisis and food safety: Implications and inactivation strategies
Harris et.al.	2020	Food system disruption: initial livelihood and dietary effects of COVID-19 on vegetable producers in India
Hirvonen	2021	Food prices and marketing margins during the COVID-19 pandemic: Evidence from vegetable value chains in Ethiopia
Hossain	2020	Impacts of COVID-19 on the Agri-food Sector: Food Security Policies of Asian Productivity Organization Members
Huss et.al.	2021	Improved storage mitigates vulnerability to food-supply shocks in smallholder agriculture during the COVID-19 pandemic
Iese et.al.	2021	Impacts of COVID-19 on agriculture and food systems in Pacific Island countries (PICs): Evidence from communities in Fiji and Solomon Islands
Ijaz et.al.	2021	Meat Production and Supply Chain Under COVID-19 Scenario: Current Trends and Future Prospects
Jaacks et.al.	2021	Impact of the COVID-19 pandemic on agricultural production, livelihoods, and food security in India: baseline results of a phone survey

Jha et.al.	2020	Projecting potential impact of COVID-19 on major cereal crops in Senegal and Burkina Faso using crop simulation models
Kang et.al.	2021	Differences in the early impact of COVID-19 on food security and livelihoods in rural and urban areas in the Asia Pacific Region
Lal et.al.	2020	Managing Soils for Recovering from the COVID-19 Pandemic
Lang et.al.	2021	Effect of social capital on agribusiness diversification intention in the emerging market.
Lioutas & Charatsarri	2021	Enhancing the ability of agriculture to cope with major crises or disasters: What the experience of COVID-19 teaches us
Lopez-Ridaura et.al.	2021	Immediate impact of COVID-19 pandemic on farming systems in Central America and Mexico.
Meuwissen et.al.	2021	Impact of Covid-19 on farming systems in Europe through the lens of resilience thinking
Middendorf et.al.	2021	Smallholder farmer perceptions about the impact of COVID-19 on agriculture and livelihoods in Senegal
Middendorf et.al.	2021	Impacts of the COVID- 19 pandemic on vegetable production systems and livelihoods: Smallholder farmer experiences in Burkina Faso
Mtimet et.al	2021	Zoonotic diseases and the COVID-19 pandemic: Economic impacts on Somaliland's livestock exports to Saudi Arabia
Nayal	2021	Are artificial intelligence and machine learning suitable to tackle the COVID-19 impacts? An agriculture supply chain perspective
Nchanji et.al.	2021	Immediate impacts of COVID-19 pandemic on bean value chain in selected countries in sub-Saharan Africa
Nchanji & Lutomia	2021	Regional impact of COVID-19 on the production and food security of common bean smallholder farmers in Sub-Saharan Africa: Implication for SDG's
Priyadarshini & Abhilash	2021	Agri-food systems in India: Concerns and policy recommendations for building resilience in post COVID-19 pandemic times
Stojcheska et.al.	2021	Disrupted Market Relations in Agriculture in North Macedonia: the COVID-19 Crisis
Surni et.al.	2020	Socio-economic impact of the Covid-19 pandemic: Empirical study on the supply of chicken meat in Indonesia
Štreimikienė et.al.	2021	Negative effects of covid-19 pandemic on agriculture: systematic literature review in the frameworks of vulnerability, resilience and risks involve
Magar et.al.	2020	Pathways for building resilience to COVID-19 pandemic and revitalizing the Nepalese agriculture sector
Thulasiraman et.al.	2021	Need for a balance between short food supply chains and integrated food processing sectors: COVID-19 takeaways from India
Uyanga et.al.	2021	Coronavirus Disease 2019 (COVID-19) and Poultry Production: Emerging issues in African Countries
Van Hoyweghen et.al.	2021	Resilience of global and local value chains to the Covid-19 pandemic: Survey evidence from vegetable value chains in Senegal
Varshney et.al.	2020	India's COVID-19 social assistance package and its impact on the agriculture sector
Workie	2020	Deciphering the impact ofCOVID-19 pandemic on food security, agriculture, and livelihoods: A review of the evidence from developing countries
Xie	2021	Determinants of Farmers' Confidence in Agricultural Production Recovery during the Early Phases of the COVID-19 Pandemic in China
Yegbemey	2021	COVID-19 Effects and Resilience of Vegetable Farmers in North-Western Nigeria

Table S2. Table showing a summary of policy recommendations.

Author/s	Authors' Proposed Adaptations (Summary)
Abid & Jie	Government invests in new technologies, sustains the flow of agricultural products along the supply chain, encourages banks to create easy and quick transaction methods, controls food security and food prices and launches commercial transaction apps. Farmers increase direct sales to consumers. The expansion of delivery methods such as 'click and collect' purchasing by retailers. Middlemen be removed from the supply chain. Digital platforms connect retail chains closer to farm locations.
Acosta et al.	Not discussed.
Adhikari et al.	Government increases mechanisation, digitisation, increases food reserves, and provides cash support to develop fallow land. Increase the output of smallholder farmers to increase food reserves and nutritional value

	of reserves. Increase research concerned with indigenous plants and relevant machinery to increase growth intensity.
Asegie et al.	Government and NGOs need to focus on immediate and long-term intervention strategies in order to assist most impacted family households using social security and revolve funding mechanisms. The development of market linkages for agricultural products may improve the resilience of farm households.
Benedek et al.	Decreasing specialisation and increasing diversification of both production and marketing has been a successful strategy adopted by smallholder farmers. However, comprehensive diversification can be beyond the ability of most farmers.
Benedek et al.	Small-scale farmers should develop an online presence and use a risk-spreading marketing approach.
Biswal et al.	The government needs to research all forms of farming in order to acquire the holistic information required to attract support for all sectors and revive value chains.
Blazy et al.	Not discussed
Bloem & Farris	Not discussed
Bright et al.	Development of online marketing services and specification of purchase or delivery times. Farmers have access to insurance.
Ceballos et al.	Increased mechanisation to overcome labour shortages, strengthen transportation and communication networks, and increase use of technology. Policy to increase diversity of produce.
Ceballos et al.	Support poor households with money for nutritious food and household utilities.
Ceballos et al.	Support tomato growers who are more vulnerable. Contract growing, the targeting of producers of crops that face substantial price and insurance risk, and introducing policies that stabilise market prices are important in efforts to aid recovery and build resilience of smallholder farmers.
Das & Samanta	Increase backyard production of poultry.
Dilnashin et al.	Increase investment in logistics. Create employment offices. Expand institutional lending. Government to purchase surplus product. Improve nutrition benefits of foods. Unlock supply chains affected by mobility regulations. Increase health testing. Provide greater support. Government should avoid export bans and import restrictions. Farmers need access to markets, and governments should thus lift mobility restrictions.
Dixon et al.	System resilience, food and labour markets, and farm and food chain economic benefits are key priorities for recovery policies and programs.
DU et al.	Government provides vocational education and training for family farm owner; develops a policy and market environment supporting long-term, stable operation of family farms; and improves the agricultural insurance market by making it accessible to more agents.
Goswami et al.	The development of short- and long-term adaptations. Short-term strategies: irrigation, improvement of the livestock sector, enhancing incomes and farm investments. Long-term strategies: labour availability and market stabilisation (see article for further details).
Guido et al.	System must ensure smallholder coffee farmers receive fair prices and ensure price is enough to support their household.
Haggag	Digitisation adoption to recover from CVOID-19. Government intervenes in predatory price increases. Address distribution inefficiencies.
Han et al.	Further studies regarding hygiene, surfaces, and spread of COVID-19.
Harris et al.	Did not specify.
Hirvonen	Monitoring of price movements and the factors contributing to those movements is paramount. Increase research on diversification of crop systems. Governments need to ensure availability of nutritious food for households.
Hossain	Global and regional responses required. Support essential businesses and local, regional, national, and international supply chains. Moreover, policies must ensure that both the economic and physical elements of food security are met amidst the COVID-19 pandemic. In Sri Lanka, the home gardening plan is provided as a successful strategy.
Huss et al.	Postharvest losses and the risk of foodborne pathogens can be mitigated by improved storage (Fanzo et al., 2018), which renders investing in improved on-farm storage solutions even more important. Greater efforts are required to increase low-cost land and easy-to-use technologies for storage.
Iese et al.	Further monitoring of the income and food security status of households in urban, rural, formal, informal, island-level, and isolated communities in all PICs to provide early warnings of household hunger and hardships and inform intervention design.
Ijaz et al.	To ensure continuity of meat production and supply chains, livestock farmers should communicate with input suppliers and consumers such as feed distributors, veterinarians, and meat processors, and find solutions to secure inputs, supply, and farm services. Farmers associations need to reach out to policymakers to

	ensure exemptions for the transportation of feed, animals, and personnel. Strict precautionary and management measures must be taken to avoid disease spread from farms. Professionals must monitor farm biosecurity. Meat processors must adopt online business models and introduce modern automation at the plant to reduce labour involvement. Policies be developed to reduce the impacts on meat production and the supply chain. Communication with the government must occur to ensure continuous flow of inputs and outputs. A review of animal disease prevention and control policies must be conducted. Governments must ensure policies to control market prices. Communication with across the border governments regarding flow of goods must occur. Meat scientists must develop cultured meat and plant-based alternatives.
Jaacks et al.	Scientific monitoring of agricultural production.
Jha et al.	Policymakers understand the benefits of multiple scenario analysis.
Kang et al.	To mitigate the impact of successive lockdowns and mobility restrictions imposed by COVID-19 in the Asia Pacific region, our findings suggest governments and aid organizations should be actively involved in securing supply chains for producers, advocating for fair labour, investing in resources, and providing monetary support directed towards households affected by the lockdown measures and weakened economic activities. Providing dry rations and fortified foods to especially vulnerable groups in the short term, enhancing food production in the medium term through supplying inputs, and strengthening critical commercial food supply chains in the long-term should be implemented (see publication for details). Urban farming. Governments need to deliver social security and provide a social security net.
Lal et al.	Soil testing will enable smallholder farmers and urban crop and home crop producers to provide quality produce.
Lang et al.	Practical implications: agribusiness diversification is an important strategy that agribusinessmen can apply to overcome their current difficult situation badly impacted by COVID-19.
Lioutas & Charatsari	Resilience-promoting policies should focus on the development of crisis management plans and enhance farmers' capacity to cope with external disturbances. Develop community marketing conduits that ensure an income floor for farmers. Facilitate consumer access to agrifood products when mainstream distribution channels underserve them. Utilise smart technology and big data to help farmers overcome external shocks.
Lopez-Ridaura et al.	Use an alternative development model based on the sustainability of the agrifood systems.
Meuwissen et al.	Develop anticipatory capacity. Policymakers must decide whether regional and short value chains are more resilient and therefore become a policy priority. Develop a resilience framework. Enhance the transformative capacity of many farming systems.
Middendorf et al.	Research required to identify the characteristics that strengthen small-scale farming systems resilience to adjust to shocks. Government documents research findings in relation to impacts on farming systems including social impacts including impacts on women to be utilised in framing food policy and subsidies.
Middendorf et al.	Develop regional and state strategies. Ensure the delivery of healthy, nutritious food.
Mtimet et al.	Develop better animal health systems, border controls, quarantine stations and animal traceability capacity.
Nayal et al.	More rigorous investigation of how to best use and implement supply chain information using AI. Engage smallholder farmers in discussions of development of AI.
Nchanji & Lutomia	Government develops a range of policy interventions to revitalise and improve farmers' resilience.
Nchanji et al.	Governments supports actors across the food supply system with input subsidies, livelihood relief, supporting innovation, further digitisation, and supporting bulk purchasing.
Priyadarshini & Abhilash	Decentralise cold storage facilities.
Stojcheska et al.	Agricultural and rural policy needs to be adapted to the needs of producers.
Surni et al.	Not discussed.
Štreimikienė et al.	To enhance agricultural resilience through technical measures, organisational measures, economic measures, and social measures.
Magar et al.	Develop response planning. Government assists farmers with technical services. Institutionalise research and extension services. Governmental coordination within the 3 tiers of government.
Thulasiraman et al.	The agricultural systems of India would be better served by developing a balanced system by increasing short food supply chains and local processing.
Uyanga et al.	Improve nutrition, food security, farm productivity, protection of workers against COVID-19, and biosecurity.

Van Hoyweghen et al.	Remove tariffs and other trade barriers. Support domestic production.
Varshney et al.	Not discussed
Workie et al.	Devise prevention and risk-reduction strategies, rejuvenate the agricultural sector, and develop self-reliance.
Xie et al.	Not discussed
Yegbemey et al.	Policymakers design strategies to promote farmer adoption of innovative market-oriented strategies with the assistance of government extension services. Invest more in innovations enabling and improving vegetable storage and processing.