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Viewpoint, Policy Forum or Opinion

## On the susceptibility and vulnerability of agricultural value chains to COVID-19

John Morton

Natural Resources Institute, University of Greenwich, Central Avenue, Chatham Maritime, Kent ME4 4TB, United Kingdom



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### ABSTRACT

In the context of the major potential impacts of COVID-19 on agriculture and agricultural trade in developing countries, this Viewpoint discusses the advantages of adopting a conceptual framework previously used to discuss the impact of the HIV/AIDS pandemic on agriculture and rural livelihoods. The framework is made up of two pairs of linked concepts: 1) Susceptibility or the chance of an individual becoming infected; 2) Resistance or the ability of an individual to avoid infection; 3) Vulnerability or the likelihood of significant impacts occurring at individual, household or community level; and 4) Resilience: the active responses that enable people to avoid the worst impacts of an epidemic at different levels or to recover faster to a level accepted as normal. This framework allows the clear formulation of key questions for COVID-19: factors in the labor process itself that make people more or less susceptible; broader socio-economic and biophysical determinants of susceptibility; factors that make farm households, food enterprises and value chains more vulnerable to the impacts of the pandemic; and aspects of COVID-19 responses by governments and the private sector that might increase vulnerability. Brief examples of susceptibility of value chain operations and of their vulnerability to COVID-19 lockdown measures are given. A focus on resistance and resilience encourages investigation of local-level responses by communities and NGOs, which with appropriate monitoring and learning could be scaled up.

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The full impacts of COVID-19 on the global South are yet to be seen, and are still hard to predict in either scale or nature. This applies to infection, morbidity and mortality rates, and still more so to downstream effects on sectors like agriculture and agricultural trade. Yet it is clear that those effects will include impacts on both smallholder and commercial farming and on other links in agricultural value chains. At the same time, news from countries of the North suggests another causal relationship, that particular sorts of enterprises within agricultural value chains, most prominently meat-processing plants, are implicated in localized COVID-19 outbreaks, some of them extremely serious (Reuben, 2020 citing cases in UK, Germany, France, Spain and the US).

The great majority of reports on impacts already experienced in different countries of the South still concern the indirect impacts of lockdowns and travel bans, or of economic trends in more industrialized countries. To take a few examples:

- In Zimbabwe, rural people's lives have been "massively" affected by movement restrictions, shutdowns of agricultural produce markets and lack of access to agricultural inputs (such as veterinary supplies) and services (such as pump repair) (Scoones, 2020).

- In East Africa, exports of coffee, tea, fresh produce and cut flowers have been shut down, both by closing down of auctions as mass gatherings, and weakening demand on world markets (RBN, 2020). Movement restrictions, disruption of international veterinary supply chains, closure of livestock markets and falling urban demand for meat have all negatively impacted the livestock sector, though Somalia and Sudan have benefitted from reduction of meat exports to Arab countries from elsewhere in the world (ICPALD, 2020).
- In Ethiopia specifically, the vegetable trade has been disrupted by travel bans on trucks carrying produce, reduction of input importation from China, restrictions on would-be casual laborers gathering at hiring points, and also the fear by urban residents that fresh produce can carry the virus (Tamru, Hirvonen, & Minten, 2020a).
- In India, farmers have been affected both by lack of buyers in markets, and restrictions on transport of harvesting equipment (Lai, 2020).

Projections for agricultural trade that are emerging are largely driven by macroeconomic analysis of national export exposure and demand changes in export markets (see Tamru, Engida, & Minten, 2020b for coffee from Ethiopia, and RBN, 2020 for exports from East Africa more generally). For Kenya, the Strategic Policy

E-mail address: [j.f.morton@gre.ac.uk](mailto:j.f.morton@gre.ac.uk)

Advisory Unit (SPAU, 2020) presents a more nuanced model involving direct effects of COVID-19 (sickness and deaths) and three categories of indirect effect – government decisions, private-sector decisions, and consumer choices, that combine in short-term and long-term impacts on households, the economy, and progress towards the Sustainable Development Goals. Cullen (2020) discusses the need for government action to keep global food supply chains open, including addressing “logistics bottlenecks”, and support in physical market infrastructure, farmer credit, farmer-friendly e-commerce, and occupational health for farm workers, but these recommendations remain at a global and non-commodity-specific level.

What seems to be missing is a more fine-grained analysis of how COVID-19 might affect different stages of different value chains. At this point it is worth going back to literature on an earlier pandemic and its effects on agriculture, namely the HIV/AIDS epidemic that gathered force, at least in developing countries, in the mid-1980s. Obviously the two viruses and their associated diseases are hugely different in terms of modes of transmission, infection rate, timing of onset of symptoms, demography of those affected and mortality rates. The impacts on communities, economies and societies will similarly be hugely different. For example HIV/AIDS had (until widespread access to antiretroviral therapy) 100% mortality, and disproportionately affected prime-age adults, therefore resulting in a proliferation of child-headed and grandparent-headed households, impacts we are not expecting with COVID-19. The HIV pandemic featured feedback loops of AIDS-related poverty forcing women and girls into transactional sex thus increasing susceptibility to further infection, feedback we assume will have limited significance for COVID-19 infection. At a more general level, the characterization of the rural impacts of HIV/AIDS as “insidious” (Barnett & Whiteside, 2002:227) or “long-acting, slow-burning” (Gillespie, 2006:13) will have limited applicability to COVID-19. But it is worth revisiting some of the concepts and analytical distinctions used in looking at the interactions of the HIV/AIDS epidemic with agriculture, largely but not exclusively in sub-Saharan Africa, to look at the interactions of COVID-19 and agricultural value chains.

Barnett and Whiteside introduced a distinction between the *susceptibility* of societies to epidemic spread and their *vulnerability*, “the greater or lesser likelihood of adverse impact” (2002:47). Wieggers, Curry, Garbero, and Hourihan (2006) trace this use of “vulnerability” to the rural famine and food security literature. Loewinsohn and Gillespie (2003) combined this dual concern for both the ‘downstream effects’ of AIDS on agricultural livelihoods and the way different livelihoods may hasten or slow the spread of HIV infection, with an aim of embedding within research methodologies the ways in which communities (and innovators within them) could resist HIV/AIDS and its effects, as well as suffer them. To this end they introduced a four-way distinction between two pairs of positive and negative concepts:

- *Susceptibility*: the chance of an individual becoming infected
- *Resistance*: the ability of an individual to avoid infection
- *Vulnerability*: the likelihood of significant impacts occurring at individual, household or community level
- *Resilience*: the active responses that enable people to avoid the worst impacts of an epidemic at different levels or to recover faster to a level accepted as normal.

Edstrom and Samuels (2007) have criticized the particular terminology on the grounds that vulnerability should have encompassed rather than been distinguished from susceptibility. This is reminiscent of the perennial and unresolved existence of two different definitions of “vulnerability” in the climate change literature (O’Brien, Eriksen, Nygaard, & Schjolden, 2007) and invites the same

response – a concept that is broader in scope but more clearly distinguished from the impact (in the climate change context “contextual vulnerability”) has distinct uses for policy and practice and fits in a “human security framing” of the problem. Gillespie (2006) went on to greatly elaborate the four-way framework, in particular categorizing responses to the epidemic, while Morton (2006) used it to think through the complex interconnections between pastoralist livelihoods and HIV/AIDS. It is used explicitly in the annotated bibliography on HIV/AIDS and agriculture by Müller (2004).

We can use a similar framework for COVID-19, at the same time shifting the focus from the individual, household, community and national levels addressed by Barnett and Whiteside (2002) and Loewinsohn and Gillespie (2003) to value chains. The successive operations making up value chains can be viewed as involving different uses of space and technology, and degrees of dependence on business services (Albu & Griffith, 2006). Value chains also exhibit varying relations of power, between buyers and sellers of commodities, between labor and employers, and between government/parastatal representatives and other actors. Applying the conceptual framework above to value chains then allows the clear formulation of key research questions:

- Identifying factors in the labor process itself that make people more or less *susceptible*: field labor might be assumed to be a fairly socially-distanced activity, outside co-operative work parties, but laborers in processing facilities and packing-houses are likely to be more susceptible, as might be those buying and selling in traditional markets.
- Identifying broader socio-economic and biophysical determinants of susceptibility for particular categories of value chain actors, particularly the poorest: for example poor housing and pre-existing food insecurity among smallholder farmers and landless laborers.
- Factors that make farm households, food enterprises and value chains more *vulnerable* to the impacts of COVID-19, particularly short-term episodes of large numbers of prime-age adults being unavailable for work; this might apply to time-critical agricultural tasks like planting or harvesting, or potential short-term disruption to supply of perishable produce. High mortality among older people in smallholder communities might negatively affect the transmission of valuable indigenous knowledge. Responsibilities for caring for the sick might impact on women and girls.
- Aspects of responses (or lack of responses) to COVID-19 by governments, food companies and financial institutions that might increase those vulnerabilities: as with the impacts of lockdowns and travel bans on marketing, input supply and labor migration set out above. Even when formal-sector road transport is restricted, continuing restrictions on public transport might negatively affect smaller farmers who transport produce and inputs by bus, or those who migrate for agricultural labor.

These ideas are put forward as examples of the sorts of questions that should be asked about COVID-19 and value chains, by researchers and by those seeking to improve the lives of value-chain actors, especially poor people. At the time of writing there are few examples where susceptibility or vulnerability is documented in detail, but two cases can be highlighted.

Morocco has seen a dramatic example of susceptibility in the emergence of a major focus of infection among female workers in two strawberry processing plants and an associated ice factory in the town of Lalla Mimouna (Saih, 2020). 457 cases of coronavirus infection were reported in a 24-hour period with estimates of the number rising to 800 cases among the workers, without taking into account their families or other contacts. The

issue is not simply the proximity of workers intrinsic to the processing work: the Moroccan website Hespress has blamed the outbreak on the “disregard by the employers for measures announced by the Moroccan authorities in terms of social distancing, and the total absence of hygiene measures such as disinfection”. Hespress further alleges that lockdown policies were not enforced in the area through collusion between local authorities and the employers. Susceptibility in value chains is not simply a technical matter, but also a matter of power, including gendered power.

In Burkina Faso as elsewhere, examples of value chain vulnerability revolve around lockdown measures rather than the disease itself. The first cases were reported in early March, occasioning curfew, quarantine of affected areas, closure of borders, and closure of public spaces including livestock markets. These measures have led to: delays and higher costs in export of vegetables, especially tomatoes, to neighboring countries; decreased importation of agricultural inputs from China, especially vegetable seed, but also failure of local input traders to sell existing stocks because of movement bans on farmers; suspension of the significant trade in live animals to Côte d'Ivoire, leading to traders incurring costs in feeding animals; and restrictions on internal movements of fruit for sale in the capital Ouagadougou (AFAP, 2020).

Gillespie (2006:5) uses the resistance-resilience distinction in categorizing responses to HIV/AIDS, “those that are broadly preventive (or aimed at strengthening resistance)... and those aimed at mitigating impact (or strengthening resilience)”. He documents community responses largely in the latter category: “labor sharing, orphan support, community-based childcare, community food banks, credit schemes for funeral benefits, and new ways of reducing the time and energy of domestic tasks” (2006:20). Community responses are seen as innovative and an important untapped resource, and naturally more multi-sectoral than external initiatives. White and Morton (2005) analyze NGO responses (overlapping with community responses): promotion of low-input agricultural technology; agricultural extension to non-traditional clientele such as orphans, teenagers, widows, and women more generally; new or adapted credit institutions; and expansion of agriculturally-focused NGOs into health and diet messaging. In the latter case resistance-strengthening responses and resilience-strengthening responses were seen to be combined, but COVID-19 with its lockdowns and travel bans raises the different possibility that there may be trade-offs between the two categories of response. As with using the susceptibility/vulnerability distinction these responses are not necessarily appropriate for COVID-19. However, similar approaches involving innovation, participation, multi-sectorality and a holistic approach to the disease and its impacts can make a difference, as long as (Gillespie, 2006; White & Morton, 2005) there is effective monitoring of and learning from such local-level responses for well-planned upscaling.

The cases illustrating susceptibility and vulnerability to COVID-19 above, and the discussion of resistance and resilience in possible responses, demonstrate the need to recognize a broad spectrum of possible impacts, while maintaining a conceptual distinction between susceptibility and vulnerability. The resulting research agenda therefore responds to Bolwig et al.'s observation that “little attention has been paid to how participation in value chains exposes poor people to risk” (2010:174), and the inclusion by Riisgaard et al. (2010:211) of “sites and sources of risk along the chain” in value chain analysis. By distinguishing vulnerability to risks to value chain operations and susceptibility to risks from value chain operations, it creates opportunities for researching value chain dynamics, as well as providing tools for understanding the current and as yet unknown impacts of COVID-19.

## Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## References

- AFAP (2020). *COVID-19 impact – Effects on livelihoods in Burkina Faso*. African Fertilizer and Agribusiness Partnership. Available at <https://www.afap-partnership.org/covid-19-impact-effects-on-livelihoods-in-burkina-faso/>.
- Albu, M., & Griffith, A. (2006). Mapping the market: Participatory market-chain development in practice. *Small Enterprise Development*, 17(2), 13.
- Barnett, T., & Whiteside, A. (2002). *AIDS in the twenty-first century: Disease and globalization*. Basingstoke: Palgrave MacMillan.
- Bolwig, S., Ponte, S., Du Toit, A., Riisgaard, L., & Halberg, N. (2010). Integrating poverty and environmental concerns into value-chain analysis: A conceptual framework. *Development Policy Review*, 28(2), 173–194. <https://doi.org/10.1111/j.1467-7679.2010.00480.x>.
- Cullen, M. T. (2020). *COVID-19 and the risk to food supply chains: How to respond?* Rome: FAO. Available at <http://www.fao.org/documents/card/en/c/ca8388en/>.
- Edstrom, J., & Samuels, F. (2007). *HIV, nutrition, food and livelihoods in Sub-Saharan Africa: Evidence, debates and reflections for guidance*. Report to DFID by IDS and ODI. Available at [https://www.researchgate.net/profile/Jerker\\_Edstrom/publication/275640592\\_HIV\\_Nutrition\\_Food\\_and\\_Livelihoods\\_in\\_Sub-Saharan\\_Africa\\_Evidence\\_debates\\_and\\_reflections\\_for\\_guidance/links/595147f20f7e9b329234c875/HIV-Nutrition-Food-and-Livelihoods-in-Sub-Saharan-Africa-Evidence-debates-and-reflections-for-guidance.pdf](https://www.researchgate.net/profile/Jerker_Edstrom/publication/275640592_HIV_Nutrition_Food_and_Livelihoods_in_Sub-Saharan_Africa_Evidence_debates_and_reflections_for_guidance/links/595147f20f7e9b329234c875/HIV-Nutrition-Food-and-Livelihoods-in-Sub-Saharan-Africa-Evidence-debates-and-reflections-for-guidance.pdf).
- Gillespie, S. (2006). 'Aids, poverty and hunger: An overview' in Gillespie, Stuart, ed. 2006. *AIDS, poverty, and hunger: Challenges and responses. Highlights of the International Conference on HIV/AIDS and Food and Nutrition Security, Durban, South Africa, April 14–16, 2005*. Washington DC: IFPRI.
- ICPALD (2020). *Effects of Covid19 on livestock sector in the IGAD region and proposed policy/operational interventions*. Nairobi: IGAD Centre for Pastoral Areas and Livestock Development.
- Lai, L. (2020). COVID-19: India's Harvests also Locked Down. Inter Press Service News Agency April 24 2020. <http://www.ipsnews.net/2020/04/covid-19-indias-harvests-also-locked/>.
- Loewinsohn, M., & Gillespie, S. (2003). *HIV/AIDS, Food Security and Rural Livelihoods: Understanding and Responding*. FCND Discussion Paper 157. Washington DC: International Food Policy Research Institute. Available at <https://reliefweb.int/sites/reliefweb.int/files/resources/52DC9F6DE7DA5071C1256DB1002A7101-ifpri-aids-sep03.pdf>.
- Morton, J. (2006). Conceptualising the links between HIV/AIDS and pastoralist livelihoods. *The European Journal of Development Research*, 18(2), 235–254. <https://doi.org/10.1080/09578810600708247>.
- Müller, T. R. (2004). *HIV/AIDS and agriculture in Sub-Saharan Africa: Impact on farming systems, agricultural practices and rural livelihoods- an overview and annotated bibliography*. Wageningen: Wageningen Academic Publishers.
- O'Brien, K., Eriksen, S., Nygaard, L. P., & Schjolden, A. (2007). Why different interpretations of vulnerability matter in climate change discourses. *Climate Policy*, 7(1), 73–88. <https://doi.org/10.1080/14693062.2007.9685639>.
- RBN (2020). *Impact of COVID-19 outbreak on livelihoods, food security and nutrition in East Africa*. World Food Programme Regional Bureau Nairobi. Available at <https://reliefweb.int/sites/reliefweb.int/files/resources/WFP-0000114452.pdf>.
- Reuben, A. (2020). Coronavirus: Why have there been so many outbreaks in meat processing plants? BBC June 23 2020. <https://www.bbc.com/news/53137613>.
- Riisgaard, L., Bolwig, S., Ponte, S., Du Toit, A., Halberg, N., & Matose, F. (2010). Integrating poverty and environmental concerns into value-chain analysis: A strategic framework and practical guide. *Development Policy Review*, 28(2), 195–216. <https://doi.org/10.1111/j.1467-7679.2010.00481.x>.
- Saih, Y. (2020). Coronavirus/Maroc: Les dessous du scandale sanitaire de Lalla Mimouna. Hespress June 19 2020. <https://fr.hespress.com/151715-coronavirus-maroc-les-dessous-du-scandale-sanitaire-de-lalla-mimouna.html>.
- Scoones, I. (2020). COVID-19 lockdown in Zimbabwe: a disaster for farmers. Zimbabwean blogpost at <https://zimbabwean.wordpress.com/2020/04/27/2991/>.
- SPAU (2020). *Articulating the pathways of the socio-economic impact of the coronavirus (COVID-19) pandemic on the Kenyan economy*. Policy brief, Issue 4/2020. Nairobi: Strategic Policy Advisory Unit in the UNDP Kenya Country Office. Available at <https://www.undp.org/content/dam/rba/docs/COVID-19-CO-Response/Socio-Economic-Impact-COVID-19-Kenya-Policy-Brief-UNDP-Kenya-April-2020.pdf>.

- Tamru, A., Hirvonen, K., & Minten, B. (2020). *Impacts of the COVID-19 crisis on vegetable value chains in Ethiopia*. IFPRI Blog, Research Post at <https://www.ifpri.org/blog/impacts-covid-19-crisis-vegetable-value-chains-ethiopia>.
- Tamru, S., Engida, E., & Minten, B. (2020). *Impacts of the COVID-19 crisis on coffee value chains in Ethiopia*. Washington DC: IFPRI. Available at [http://essp.ifpri.info/files/2020/04/coffee\\_blog\\_April\\_2020.pdf](http://essp.ifpri.info/files/2020/04/coffee_blog_April_2020.pdf).
- White, J., & Morton, J. (2005). Mitigating impacts of HIV/AIDS on rural livelihoods: NGO experiences in sub-Saharan Africa. *Development in Practice*, 15(2), 186–199. <https://doi.org/10.1080/09614520500041757>.
- Wiegiers, E., Curry, J., Garbero, A., & Hourihan, J. (2006). Patterns of vulnerability to AIDS impacts in Zambian households. *Development and Change*, 37(5), 1073–1092. <https://doi.org/10.1111/j.1467-7660.2006.00513.x>.