



# Informal food chains and agrobiodiversity need strengthening—not weakening—to address food security amidst the COVID-19 crisis in South America

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Received: 15 May 2020 / Accepted: 10 July 2020 / Published online: 15 July 2020  
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## Abstract

The COVID-19 crisis is worsening food insecurity by undermining informal food chains. We focus on impacts involving the informal food chains that incorporate the resilience-enhancing biodiversity of food and agriculture known as agrobiodiversity. Our analysis addresses how informal food chains and agrobiodiversity are impacted by policies and interventions amidst COVID-19 disruptions. Our methodology relies on research in Peru with a focus on the cities and surrounding areas of Lima, Arequipa, Cusco, Huancayo, and Huánuco. We extend these insights to similar challenges and opportunities across western South America and other world regions. We utilize the four-part Agrobiodiversity Knowledge Framework to guide our examination of agrobiodiversity-related processes that interconnect governance, nutrition, agroecology, and the COVID-19 pandemic. Our results detail three links of informal food chains that are being disrupted and yet can offer resilience. These are food retailing, logistics and transportation, and seed systems. Utilization of the Agrobiodiversity Knowledge Framework cuts through highly complex issues to elaborate key food-security difficulties facing informal systems and how they can be strengthened to provide more resilience. We identify the specific roles of agrobiodiversity in resilience-enhancing processes that need strategic policy and program support. Results identify ways to augment the resilience of informal food chains using agrobiodiversity and the empowerment of social groups and organizations in urban food systems and rural communities. We conclude that the disruptions triggered by the global COVID-19 pandemic highlight the need to use agrobiodiversity as an instrument for resilience in informal food chains.

**Keywords** COVID-19 · Food security · Nutrition security · Informal food chain · Agrobiodiversity · Seed systems

The COVID-19 pandemic has triggered the extensive worsening of food insecurity worldwide and threatens to create long-term malnutrition and negative health consequences. Concentrated among the world's most food insecure, these negative impacts are being exacerbated by certain policies and interventions of governments, NGOs, and aid agencies. One major threat is the disruption of informal food chains and

the limited efforts to-date of leveraging their resilience capacity.

Informal networks of food retailing, low-cost transportation and distribution, processing, and agricultural production provide the most secure source of nutritious food for large populations in much of the world (Crush and Young 2019; Fan et al. 2017; Zimmerer et al. 2020). These informal food chains link poorer urban and rural consumers and workers with smallholder growers, thus providing both affordable food and extensive employment among persons that are food-insecure and near food-insecure (HLPE 2013; Maletta 2017).

In western South America (Colombia, Ecuador, Peru, and Bolivia) and elsewhere the functioning of informal food chains incorporates the extensive biodiversity of food and agriculture (agrobiodiversity). Agrobiodiversity produced and distributed via the informal sector is a vital and resilient source of lower-cost nutritious fresh fruit and vegetables,

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nourishing staples, non-perishables, and locally processed foods for poor urban and rural inhabitants. Agroecological resilience of this production includes stabilizing yield, insuring against extreme weather, and generally promoting agroecosystem sustainability. These benefits are vital to a wide spectrum of farmers including smallholders and indigenous people in addition to food chains and consuming populations in general (Zimmerer et al. 2019). Nonetheless, agrobiodiversity continues to decline in western South America and worldwide (Pilling et al. 2020).

Responding to the above, our analysis addresses how informal food chains have been impacted by policy responses to the COVID-19 pandemic. We utilize a recent multi-factor framework designed to understand the role of agrobiodiversity in food-system resilience (Zimmerer et al. 2019; Zimmerer and de Haan 2019). We draw on first-hand interviews and informal conversations with diverse stakeholders in western South America. Stakeholders consisted of food growers in the informal and formal sectors, organizers of food markets and distribution, and food system experts in governments and NGOs. Between 1 April and 10 May 2020, we conducted formal interviews with seven individuals and participation in more than 20 conversations with single persons, groups, and workshops representing these stakeholders. Subsequently we participated in more than 40 additional informal conversations with individuals and groups representing these same stakeholder groups. These additions were utilized in selectively updating our paper between 16 and 29 June 2020. We also draw on recent publications. For conciseness, our examples below focus on Peru, including the cities and surrounding areas of Lima, Arequipa Cusco, Huancayo, and Huánuco.

Our analysis is guided by each element of the four-part Agrobiodiversity Knowledge Framework (Zimmerer et al. 2019; Zimmerer and de Haan 2019). This framework examines the interactive functioning of agrobiodiversity in food and nutrition security together with the influence of food-system governance including markets, distribution and logistics networks, and seed systems. The third and fourth themes in the AKF are agroecology and global changes, respectively, with the latter including the COVID-19 pandemic, climate change, and urbanization.

This framework enables us to focus on key links of informal food chains that are particularly disrupted in the COVID-19 crisis and threaten to undermine food and nutrition security as well as agrobiodiversity. We then briefly describe how the interconnections of informal and formal food chains are important to both food and nutrition security in addition to agrobiodiversity resilience. Finally, we conclude with overarching insights and specific inputs to policy and program support.

The first example of a seriously disrupted link of informal food chains is retail marketing and vending sites that support the food-acquisition strategies of large vulnerable populations. Our sources specified numerous ways in which informal food markets are effectively relied upon by many urban populations in western South America to access affordable and diverse food species and varieties from the Andes, Amazon, and Pacific coastal regions. These details are supported by earlier related research (Almekinders et al. 2010). Yet, the COVID-19 crisis prompted strict regulations on food retailing during the first three months of the lockdown starting mid-March. Our interviews and conversations detailed these governance impacts including the closures of farmers markets and some informal markets in addition to the near disappearance of urban street vendors. Curfews further restricted access to informal food markets, although adjustments to-date have proven challenging.

Knowledge-based governance and enhanced communications connectivity are needed to ensure resilient and affordable, socio-culturally inclusive access to food retailing amidst the COVID-19 crisis. Interviewees described innovations that include more spacious open-air market sites and decentralized food-selling directly from trucks and motorcycles. Many informal retailers shifted to customized food delivery, accelerating the pace of innovation in these food chains. Logistical innovations have encompassed the creation of WhatsApp groups, individual residence and neighborhood clustering of product delivery, customized preparation of multi-food baskets, and coordinated delivery schedules. This wave of innovation is supporting the provision of agrobiodiverse food. Yet, as was detailed in our interviews, the actual transition is most feasible among those with existing capabilities to access social media, cash-free payments, and transport. New solutions need to span the digital divide and empower those with fewer resources to enable further retailing that strengthens food and nutrition security.

The second threatened link stems from the bias of COVID-19-triggered regulations against the transport logistics, distribution networks, and urban-rural links of informal food chains during the initial lockdown. Analysts have highlighted that these typically rely on legions of decentralized buyers and timely transport options to transfer food from farms to wholesale and retail markets (Asensio 2020). But, as several interviews and conversations outlined, this sector is crucial not only to informal food buying and supply but also to the affordable, nourishing agrobiodiversity consumed among poorer populations. Moreover, its importance expanded at the national level as imports declined amid the initial COVID-19 crisis.

Unfortunately, according to several interviews, initial restrictions undermined the regular harvest-season shipments of foods from smallholder farmers that represent 97% of farms and account for approximately 80% of Peru's food production (Maletta 2017; UNDP 2020). Farm-gate prices and buyer options were lowered among members of this group, many of whom are already food insecure (Zimmerer et al. 2020). These bottlenecks contributed to higher consumer prices, and reduced supplies of agrobiodiverse food from smallholder farmers.

Seed is a third major challenge in informal food chains amidst the COVID-19 crisis. Informally sourced, affordable seed accounts for 95% or more of supply in western South America and many regions, being generally critical for food security and agrobiodiversity access globally (Almekinders et al. 1994; McGuire and Sperling 2016). Both farmers and food-system specialists interviewed in the current research placed emphasis on importance of the agrobiodiverse seed lots of multiple food varieties and species in the context of large-scale reverse migration. This COVID-19-driven migration phenomenon is comprised of reverse migrants known as *retornantes* who have left poor urban neighborhoods in the coastal cities of western South America, such as Lima, Arequipa, and Guayaquil, to return to rural areas of the Andes and Amazon.

Many *retornantes* to rural communities have begun to engage in agriculture and will require seed sources well-suited to locales within these areas. One interviewee located in an area populated by many *retornantes* highlighted that seed availability has become as important to the food and nutrition security of *retornantes* as their access to land and water.

Aid programs and policies should strengthen existing informal seed networks to ensure locally available planting material of the most preferred and well-adapted crop species and varieties. Food and seed aid policies and projects often entail single crop and variety types sourced from formal systems (Paredes 2020). Farmers in informal food systems often find these latter seeds less suited to local conditions. Interviews for this study reinforce our broader research and work activities in highlighting that local seed directories, seed fairs and digital marketplaces. These can help increase seed supply and meet new demand. The multi-faceted, COVID-19-triggered shifts faced by *retornantes* and other vulnerable, demographic groups signal that now is the time to create agrobiodiversity-based seed approaches to support the expanded reliance on community and locally based food chains.

Formal food chains of agribusinesses, supermarkets, and exporters are dependent upon the effective functioning of informal food chains. Throughout western South America and regions worldwide (e.g., in Africa; Crush and Young 2019;

Zurayk 2020), formal food chains rely on farmworkers whose sustenance is derived from informal channels. One interviewee, a quinoa exporter, underscored that this mutual reliance could be threatened by the COVID-19 crisis. Food retailing, logistics and distribution, and dynamics of seed networks show similar interdependencies between formal and informal food systems. Formal systems of supermarkets and agribusinesses provisioning niche agrobiodiverse foods to middle- and upper-class consumers depend on varied retail outlets, multi-scale transportation options, and seed inputs linked to smallholder and indigenous crops and people. In short, the threats described here impact not only informal food chains but may also impact their formal counterparts.

The preceding analysis provides headway in cutting through complex, wide-ranging issues by utilizing the Agrobiodiversity Knowledge Framework to identify and elaborate key points. It leads to our call to strengthen the resilience of informal food chains through coordinated support of agrobiodiversity. Adequate management knowledge already exists in western South America and countries elsewhere. These approaches should be built upon policies and programs empowering social groups and organizations and their informal, agrobiodiverse food chains in both urban and rural areas. Building deeply participatory institutional, informational, and innovation support of agrobiodiverse seed networks can maximize global-scale benefits to food security, agriculture, and potential sustainability beyond the COVID-19 crisis (Baranski and Ollenburger 2020).

Finally, the disruptions to informal food chains triggered by the global COVID-19 pandemic highlight urgency of the broad-based integration of agrobiodiversity. Innovative support of such initiatives can deliver immediate benefits to food- and nutrition-insecure people while they offer the vitally important potential to promote long-term food sustainability that is environmentally sound and socially just.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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