

Review

The Effects of Pandemics on the Vulnerability of Food Security in West Africa—A Scoping Review

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Abstract: The purpose of this paper was to show the effects of the Ebola and COVID-19 pandemics on food security vulnerability in West Africa. The methodology is based on a scoping literature review using the PRISMA method. The study showed that food security was affected by the restrictive measures in the different West African countries. In addition, it shows that this region is highly vulnerable to such crises, which can combine their effects with those of other events such as climate change and civil unrest. In both pandemics, all pillars of food security were affected. The effects on urban and rural centers may be very different. The study suggests a better understanding of the differences between rural and urban centers and between men and women and how long-term restraint measures can affect rural areas where agriculture is the main lever for reducing food insecurity. Food security must be seriously considered by governments when implementing restrictive measures during a pandemic. Consideration of health factors alone at the expense of food security can greatly exacerbate health problems and even increase cases of disease.

Keywords: SDG 2; pandemics; food insecurity; restrictions; food availability; production



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1. Introduction

Food security is a basic human right, yet an estimated 26% percent of the world population (~2 billion people) were food insecure in 2019 [1,2]. World hunger continues to be on the rise, and it was predicted, even before the COVID-19 pandemic, that if trends continue to increase at the pre-COVID-19 rate, 2030 would result in more than 840 million hungry peoples rather than achieving the current goal of total hunger eradication [2]. This is a stark reminder of the urgency to reconsider how to achieve the UN 2030 Agenda for Sustainable Development, particularly around issues related to global food security, which is mainly related to Sustainable Development Goal (SDG) 2. From 2019 to 2020, the year that the COVID-19 pandemic spread around the globe, world hunger rose to an unprecedented rate of 30.4% [3].

SDG 2 calls for an end to hunger and food insecurity while simultaneously improving nutrition and promoting sustainable agriculture [1]. The five targets of SDG 2 mainly focus on access to food and market, nutrition, production, and preservation of genetic material. However, food security goes further and includes four main objectives or pillars. They are availability, access, utilization, and stability, all of which must be achieved simultaneously to ensure food security [2]. Availability generally depends on crop production and/or whether food supply is available on the markets [2,4]. Access relates to whether distribution

channels are working, if prices are affordable and sufficient household income is available for food [5], if households are able to physically and socially access food suppliers (i.e., markets) [4], and which share of the food individuals can socially access—related to gender and age discrimination within households [2]. For food to be utilizable, individuals must be able to store and prepare their food in a way that maintains its nutritional value [2], while stability applies to all three in that the reliability of production, access, and utilization must be predictable [5,6]. It is increasingly recognized that women play a central role in each of the pillars of food security, both as primary food producers and as primary caretakers of the household [7,8].

The Committee on World Food Security's High-Level Panel of Experts discuss two additional dimensions connected to the food security model, agency (the ability to choose what one produces and/or eats), and sustainability (the ability to support food security without the compromise of human wellbeing or the environment) [6], which have since been added to the concept of food security [2]. Fulfilling and supporting each of these pillars is crucial for the future of global food security and thus overall sustainability of all populations in the world. However, how do pandemics threaten to undermine any previous and continued progress made towards achieving these goals?

Emerging infectious diseases (EIDs), such as Ebola, influenza, and SARS, appear in populations and initially cause an epidemic. When EIDs spread rapidly in a country, a region, then a continent, and in some cases, across the world, we are then talking about a pandemic [9]. The most recent EID is the coronavirus (2019-nCoV) or COVID-19, which, by March 2020, had reached a global pandemic level [10]. During global pandemics, countries take public health measures to try to reduce the spread of the EID, which can include strict restrictions in terms of trade, travel, workplace, and non-essential and essential services including food production, trade, and market. In some cases, it can be localised or national-wide measures. Although it is not possible to fully account for the impact of the COVID-19 pandemic, after having remained virtually unchanged from 2014 to 2019 at around 8.4%, the prevalence of undernourishment (PoU) increased by 1.5% points on average in just one year (2019–2020). This increase was the sharpest in Western Africa, where the PoU raised from around 12.9 in 2019 to 18.7 in 2020 [2]. The impacts of COVID-19 on food security are predicted to continue through 2021 into 2022 and probably even beyond [10,11].

The primary objective of this scoping review was to examine the level of vulnerability of the past and current food system in West Africa focusing on the four pillars of food security in the context of pandemics. Here, we have considered both Ebola and COVID-19 as case studies. This is a timely study that fulfills the UN's 2020 call for more data and analysis that focuses on the impacts and implications of COVID-19 to our critical systems, in this case, food and agricultural systems, in one of the most vulnerable populations on the globe [12]. Furthermore, it may help inform policy makers and humanitarian providers about how pandemics and various types of restrictions may affect food security.

It has been reported that COVID-19 (the disease itself as well as measures implemented to control its spread) has negatively impacted the global food system in a multitude of ways [2,13]. Broadly, factors leading to or causing food insecurity linked to the current pandemic include but are not limited to the reduction in food production/availability/demand [14,15], increased food waste, especially at harvest time or in markets [16–18], and labour shortages in the various sectors of the food system, as well as job and income losses [19,20]. As the pandemic brought additional workload for women in family care and formal and informal healthcare [13], it also added an additional pressure on their capacity in all pillars of food security as they were disproportionately affected by the socioeconomic fallout (job and livelihood losses) [8]. Confounding factors, such as conflicts, drought, insect infestations, and economic and political unrest, may also exacerbate the current situation in some countries [3,21,22]. This is particularly true on the African continent, including in many West African countries, where several of these factors were already pushing many countries into a food insecurity crisis [2,15]. Here, we analyzed through this scoping review the following question: What do we currently know about the impact of pandemics and

the implemented emergency measures on food systems and security in West Africa? Five subsections were then examined to further understand the following aspects: (1) linkage of pandemics (including measures implemented to control pandemic) to food security; (2) impact of pandemics on each of the four pillars of food security; (3) mitigation measures to reduce food insecurity; (4) impact of confounding factors; and (5) gaps in knowledge.

2. Materials and Methods

A scoping review typically represents a broad summary of what is known about a given topic [23,24]. In this study, a scoping review was conducted to identify what is currently understood about the impact of pandemics on the vulnerability of the food system and security in West Africa. The review followed the protocols and steps set forth by the PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and Explanation [20]. PRISMA is a review method developed by 29 researchers from the medical research community (e.g., clinicians, statisticians, editors, etc.) that is now applied to any discipline. It follows a series of checklists and registrations with the main objective of increasing the transparency and accountability of review methodologies and researchers [24]. Objective statements, methodologies and definition protocols for this review can be found in the Open Science Framework protocol registration number 5hfzn (doi: <https://doi.org/10.17605/OSF.IO/PKH98>; available as Document S1 in the Supplementary Material).

Searches were performed between February and March 2021 from Brock University, Niagara Region, Ontario, Canada (ISP address 70.54.102.247) using the Brock University EBSCOhost platform and included Academic Search Complete as well as Google Scholar (for specific parameter settings and search strings see Supplementary S1 Registered Protocol). To be used as evidence in this scoping review, retrieved resources must have: 1. Focused specifically on both food security (of individuals and/or communities, i.e., households, villages, displaced peoples, and the agricultural sector) AND pandemics/epidemics in West African countries; 2. Been written in the English language; 3. Included all forms of returned evidence (e.g., peer-reviewed, policy, pre-prints, models, reviews, opinion pieces, and media excerpts); 4. Included evidence returned from any period (search engine/database-dependent); 5. Included all evidence that presents direct, indirect, and/or theoretical effects of pandemics/epidemics on food security; and 6. Not included vector transmitted diseases (e.g., Malaria) or diseases transmitted through the exchange of bodily fluids (e.g., HIV/AIDS). If returned evidence was missing any of the six eligibility criteria, it was excluded from the study. The limiting factors during this review included a strict timeline (less than 6 months), obstacles acquiring additional personnel due to the pandemic, the increased number of returns that would have resulted from additional sources (greater than 60,000), and existing limitations for bulk export of Google Scholar return resources (the system only allows greater than 60,000), and existing limitations for bulk export of Google Scholar return resources (the system only allows the bulk export of 16 pages, which involves manually selecting each of the 320 included returns).

All qualifying final search results lists were imported into Covidence review software (Veritas Health Innovation, Melbourne, Australia. Available at www.covidence.org (accessed on 10 April 2021)) for merging, duplicate removal, and initial screening and categorization. Two researchers independently screened the titles, abstracts, and full texts of all returned evidence according to the aforementioned screening protocol. The PRISMA flow diagram of included and excluded studies, including the inclusion and exclusion criteria used, can be found in Supplementary Document S2 PRISMA Flow Diagram. Snowballing is a technique commonly used in the review process where all reference lists are manually scanned for eligibility and consequent addition (if qualified) to the current study. While our protocol initially indicated that we would identify and add any additional studies found by snowballing all retrieved review papers, time constraints prevented our ability to thoroughly do so.

Data extraction methods were modified in that only manual extraction was performed due to the inconsistent performance of the proposed standardized data abstraction tool.

Extraction was performed by reading through each retained document in its entirety. Any discrepancies in data extraction were resolved by a third reviewer. Variables included basic criteria (i.e., article type, date, country, disease type) as well as more complex criteria (i.e., Pillar characteristics and interventions addressed) (see Supplementary Document S3 Data File for a complete list of variables). Analysis included a summary of findings as well as a qualitative assessment of how the findings linked to one another. It was determined that sentiment analysis (included in the registered protocol) would not be appropriate for this review due to the multiple types of documents that were retained (e.g., primary quantitative, qualitative, and mixed methods peer reviewed articles, government reports, and grey literature).

3. Results

Of the 51 retrieved West African documents, 24 were considered useful for background information only. The remaining 27 were retained for analysis/extraction purposes, 10 of which (37%) could be considered quantitative studies (9 were peer-reviewed) and were related to the following locations: Burkina Faso (1), Guinea (1), Liberia (2), Nigeria (3), Sierra Leone (1), and 2 were for West Africa in general (i.e., studied more than 1 country). The remaining 17 documents were considered to provide qualitative information (8 were peer reviewed, 9 qualified as grey literature) aimed at the following locations: Nigeria (2), Sierra Leone (1), and 5 were for West Africa in general. In the following paragraph, we examined the main question followed by the five sub-questions to further detail the various aspects regarding food security and pandemics. Most of the articles targeted COVID-19 (18) with a few on Ebola (8) and one that addressed both.

3.1. What We Currently Know about the Impact of Pandemics and the Implemented Emergency Measures on Food Systems and Security in West Africa

Overall, for West Africa, research regarding food security and pandemics suggests that food security had been affected by the restriction measures implemented in the various countries. For example, Abdul reported that the number of lockdown days and inter-states-countries movement restrictions due to COVID-19 had been very stressful for people in Nigeria and severely affected the economy (increased food prices and transport cost, hoarding by marketers, increases in postharvest loss at both farm and market levels, low purchasing power by household, etc.) [25] leading to adverse effects on food security [26]. Tougan and Théwis explained that the restrictions measures led to a reduction in household productivity and increased food prices, subsequently affecting food security in Sub-Saharan Africa [27]. Comparable conclusions were drawn for Algeria [28]. A similar report was provided from Burkina Faso, where the decline in household income led to a reduction in buying produce and an increase in spending on unrelated food items such as sanitation and health care [26]. Erokhin and Gao showed that food insecurity (i.e., the number of people experiencing insufficient food consumption) in the poorest West African countries (e.g., Burkina Faso, Guinea, Sierra Leone) increased by 5% between January and June 2020 [14,29]. However, Aggarwal et al. argued that, in Liberia, there was no evidence of a decrease in food security due to governmental programs that were implemented to mitigate the effects of the COVID-19 pandemic but rather because food security (40% of the population) was already low [30].

3.2. Linkage between Pandemics and Food Security

Looking at which pandemic could be linked to impacts on food security, the literature showed that the COVID-19 pandemic had a more serious impact than Ebola. Differences between Ebola (2014) and COVID-19 (current) were observed in terms of the speed and types of responses (e.g., implementation of sanitation measures) to the pandemic and impact on food security. Initial reaction to the global pandemic of COVID-19 was quicker, and restrictions were implemented faster than in the case of the Ebola outbreak in 2014. It was also suggested that, in the case of Ebola, the international health organizations were very slow to react and implement any restrictions [31]. A limited monitoring system was in

place, and the mobilization of medical personnel and resources was initially inadequate [32]. Restrictions measures also differed between these two pandemics. With COVID-19, sanitary and restrictions measures were implemented almost immediately when the WHO declared a global pandemic in March 2020, less than four months after the news of the epidemic in China. During the Ebola outbreak, concern of a possible global pandemic took longer to be communicated, and while some sanitary measures and international travel restrictions were implemented [32], they did not reach the amplitude of COVID-19. It is important to note that the impact of the restrictions put in place during Ebola were more place-specific than COVID-19. At least for Guinea, Liberia, and Sierra Leone, agricultural production in 2014 was little impacted, except in the main regions that were affected [33]. This contrasted with the current COVID-19 pandemic that showed very strong impacts on food production in all parts of a country, even sometimes more in urban and rural zones [26]. Erokhin and Gao showed that in Guinea, the increase in the number of COVID-19 cases led to income loss and thus an increase in food insecurity, while in Sierra Leone, food trade was an important factor contributing to the number of people with insufficient food consumption [29].

3.3. Impact of Pandemics on Each of the Four Pillars of Food Security

Our review showed evidence that all pillars of food security were impacted at various degrees by COVID-19 and Ebola and the measures implemented to control them. According to Kodish et al., in Guinea during the Ebola crisis, little attention was put on nutrition as everyone was focusing on the disease, leading to an increase in malnutrition and food insecurity [34]. The pillar of availability was impacted in both the Ebola and COVID-19 crises. Some differences were found between the two crises. For example, in Liberia, Ebola tended to be in specific locations, thus affecting food availability more severely in those regions [31]. In general, for both crises, the first affected factor was felt through a decline in crop production due to the reduction in the labour force and workforce mobility (e.g., for Ebola [34,35]; for COVID-19 [36]). This is exacerbated for women and girls facing a higher burden of childcare and household responsibilities since the pandemic (Zambia, Kenya and Ghana [37], and Nigeria [38]). According to Kodish et al., women also tend to fall ill more frequently [34], as their social role in family healthcare makes them particularly exposed to potential contamination [6], thereby affecting their capacity to work. However, during Ebola, another factor that contributed to the reduction in crop production was the migration of people from affected regions to safe zones, further reducing the workforce in Sierra Leone [35]. Gatiso et al. report that in Liberia during Ebola, 82% of the farmers continued cultivating but food production declined by 54% due to the reduction in the size of the farmlands, the closure of the markets, and the lack of middlemen present to purchase the produce [39]. However, they also mentioned that it greatly varied between affected and unaffected regions. For both crises, closures of the markets and the borders significantly affected food production. Gunjal and Senahoun added that during Ebola in Guinea, Liberia, and Sierra Leone, the low availability of material inputs such as fertilizers and pesticides contributed to the decline of production [33]. However, they also argued that it was localized, and at the national level, the impacts were moderate.

During the COVID-19 crisis, the challenge of the availability of food at times appeared to have been more predominant possibly due to the rapid closures of markets and trans-boundary travel and trade. Crush and Si, as well as Laborde et al., mentioned that the rapid closure, which happened in March 2020, only a few days after the declaration of the pandemic, took many people by surprise, thus limiting their trade and their capacity to find alternative livelihoods [40,41]. Similarly, phone survey results indicated that off-farm work was inaccessible to more than half of the households in Ghana and Nigeria during the first wave of the pandemic [37]. These conditions also reduced the possibility to cultivate or to continue to be employed in the agricultural industry and ultimately contributed to rapidly reduced food availability due to limited workforce, seeds, and agrochemicals [36,40].

With a decline in crop production, for both crises, access to food also decreased. In Guinea, Ebola resulted in higher prices of food, especially in affected regions where local

markets were closed [34]. In Sierra Leone, the situation was comparable, with less people in markets due to market closures with the consequences of high demand for food with low supply, overall, causing prices to increase [35]. The COVID-19 measures brought a similar scenario, albeit more generalized, over all of the spheres of society with some differences in terms of access and prices. For example, Adjognon reported that in Mali, food access was felt more severely in urban centres than in rural regions, as told by the respondents of a phone survey that mentioned the COVID-19 crisis as being the main factor [42]. According to Erokhin and Gao, food access (including physical, financial, or both, depending on location) had the strongest influence on food insecurity in most of Sub-Saharan Africa, although food inflation was the most important factor for Cote d'Ivoire and Nigeria [29].

Very few articles discussed the impacts of pandemics on food utilization and most related to Ebola. Kodish et al. mentioned that the distrust (i.e., fear of contamination or disease transmission from humanitarians) to accept food from humanitarian aid resulted in wastage of that food as people did not want to use it [34]. Similarly, the mistrust of Ebola survivors was so strong that people did not want to buy and use food from farmers [35]. In Sierra Leone, the fear of Ebola resulted in the full stoppage of breastfeeding due to the "no contact" order; if the caregiver became sick the infant was immediately removed [35]. Price reported that in Sub-Saharan Africa, with the increase in food prices during the Ebola crisis, many rural people reverted to hunting and eating bushmeat, even though Ebola could be transmitted from this meat, and this might have significantly contributed to the increase in cases [43]. Abdul also reported that since staples increased in prices, people tended to buy cheaper and less nutritious food [25].

Pandemics affected food stability, especially in terms of supply and prices. Depending on the region or country there was, in general, a greater volatility of the markets, pushing prices to vary greatly for some food types, especially staple food, while others did not vary as much. In Guinea during the Ebola crisis, food prices varied depending on whether a region was affected or not while in Nigeria, the COVID-19 crisis resulted in changes in household spending patterns with a reduction in incomes and increased variability and a general rise in food prices leading people to buy cheaper items [25]. Liberia's food vendors saw their incomes decline by as much as 52% during COVID-19 as food prices increased by 9%, except staple food, which increased by 12 to 20% [30]. Market chain disruptions during pandemics was also identified as negatively affecting food security and nutrition, as was shown during Ebola in Sierra Leone [35].

3.4. Mitigation Measures to Reduce Food Insecurity

From both the Ebola and COVID-19 literature, there was strong evidence that food access was the most important (and most written about) pillar to be impacted, with people consuming less than the nutritional standards in terms of quantity and sometimes quality. During such crises, most attention, emergency measures, and policies focus on health care and medical responses, with nutrition and social aid being secondary and often not really considered. Kodish et al. summarized that in Guinea, under such circumstances, social behaviour changes resulted in people not trusting food aid, and thus reducing food intake [34]. In Sierra Leone, restriction measures such as the 21 days of quarantine for Ebola, further increased economic and social burdens, with unintentional effects depending on communities and cultural differences [35]. COVID-19 restriction measures came so fast that the anxiety of individuals was greatly increased, exacerbating social behaviour towards mistrust of the system [42,44].

Few countries' mitigation measures were suggested in the literature and in some cases, those that were mentioned had contradictory results. For example, Abdul proposed that food transfer and donations including cash transfer would help reduce food insecurity [25]. However, Aggerwal reported that in Liberia with COVID-19, cash transfer modestly improved food security, noting though that most respondents of their study were subsistence farmers who had no restrictions for cultivation or selling and that the markets were open [30].

In the case of Nigeria, other mitigation measures that were suggested during the COVID-19 crisis included the increased use of subsidies and mechanisms such as price ceilings to reduce price volatility and improve food access [25]. Yendork and James analyzed the role of local food production on ensuring food security in Ghana during the COVID-19 pandemic, proposing reforms to reduce the reliance on importation in favour to local production to reduce insecurity [44]. Chiwona-Karltun et al. suggested that while some aspects of the connections between agriculture and food might have been considered, the COVID-19 responses were not coordinated, especially among African countries [26]. They reported on some mitigation measures that were included to reduce the food security burdens, including social protection (e.g., food aid and donations), bills (e.g., electricity, taxes) relief programs, removal of transaction fees (e.g., credit cards, money transfers), and sanitation and hygiene in Benin, Ghana, Ivory Coast, and Nigeria.

3.5. Impact of Confounding Factors

In West Africa, many countries were already food insecure prior to the pandemics. Restriction measures implemented during these crises only exacerbated the level of insecurity. For example, in Nigeria, conflicts between farmers and pastoralists for land resulted in increased challenges for food production [25]. Terrorism and civil unrest experienced in some of the countries also had severe consequences on food production prior to COVID-19 [45]. Low technologies for food processing and storage caused an increase in food wastage, especially initially with rapid implementation of restrictions, such as market and transboundary trade closures, due to the COVID-19 pandemic [25]. Another factor, often not considered during pandemics, was variability in weather during crop production. A reduction in precipitation by 10% could result in a significant increase in the number of people with insufficient food consumption [46]. Mishra et al. underlined the importance that climate change, especially droughts, could have on increasing the severity of pandemics (thus the severity of the food insecurity during pandemics) and the need for climate change mitigation and adaptation to reduce these risks [46].

During the Ebola crisis, the stigmatization of people who had recovered from the disease was very strong. In Sierra Leone, those people were often excluded from the workforce leading to an increase in inequality [47]. No article was identified mentioning this phenomenon for COVID-19. However, it is possible that this reaction changes over time or that this issue has not yet been investigated.

3.6. Gaps in Knowledge

The review helped identify some of the major knowledge gaps in the current literature including how social relationships may have been affected. Chiwona-Karltun et al. argued that counting the number of people in food-insecure situations during pandemics would not be enough as social relationships and behaviours and power relations might not be well represented, although they could play a significant role in all four pillars of food security [26]. Authors were unclear as to whether such a limited approach might lead to social inequalities, especially for marginalized groups. Sociological studies in general appeared to be lacking with most articles identified in this review focusing on numbers and the economics of pandemics. Another major gap that might demonstrate the danger of rapid survey (especially by phone) was the analysis of the four pillars of food security from a gender perspective. Very few articles even mentioned the differences that men and women had experienced in the case of pandemics. Indeed, out of the reviewed papers related to food security (excluding the general FAO reports), only one took gender as a serious issue and only four others used the word women once or twice, among which only Chiwona-Karltun et al. highlight the intersection between gender and age with food insecurity and mentioned this lack of a gendered lens in food-security-specific policy tracking studies [24].

4. Discussion

This review demonstrates the impacts of pandemics on food security and how West Africa is highly vulnerable to such crises. Compounded with other factors (e.g., climate change, civil unrest, conflicts, terrorism, migration, internal movement of people) that already exist, pandemics such as COVID-19 further exacerbate the social and humanitarian issues and gender disparities related to food insecurity and overall sustainability. Some countries in West Africa were still recovering from Ebola when COVID-19 appeared. As stated by FAO et al., “It has been predicted that peoples with insufficient food consumption may increase from 14.3% (2018) to 23% (2030) of the total population before COVID-19” [2].

In developing countries, the impacts of the pandemics can negatively affect food security as well as many other aspects of life, including social relationships and behaviours. In both pandemics, all pillars of food security have been impacted. If farmers cannot cultivate farmlands due to restrictions or being affected by the disease, food production will be reduced. The reduction of the workforce and material inputs also influenced crop production in terms of quality and quantity. If the workforce is unavailable early in the season, the overall amount of production may be jeopardized, while at harvest time, it may reduce quality due to slow harvest and more overripe produce. Combined with the possibility of weather unpredictability such as droughts, it is more likely that food insecurity increases. When looking at SDG 2, pandemics such as COVID-19 have the potential to result in a major setback on the achievement of this goal.

The speed of response to Ebola versus COVID-19 can be related to the fact that Ebola originated from Africa and has often been associated to this continent where international mobility may not be as high compared to COVID-19, which was coming from a very populated Asian country that has a huge level of international trade and mobility. The spread of COVID-19 was therefore faster than in the case of Ebola, where the first case outside of the African continent was in Spain in September 2014, while the spread started in December 2013 [32]. Furthermore, unlike COVID-19, Ebola does not become contagious until the onset of physical symptoms, thereby making the implementation of more localized restrictions feasible. The application of restrictions to only the affected localized regions would likely have had a lower impact on food security relative to the more broadly applied COVID-19 restrictions impacts.

While responses to the Ebola crisis were slower to be communicated and acted upon than to COVID-19, in all cases, restriction measures have impacted people, their income, and social behaviour. The major difference appears to be related to the locations of the affected regions for Ebola, often being more site-specific than COVID-19, which is considered to be spreading in all spheres of society. One of the major factors during the Ebola crisis that may have complicated the response to the crisis has been the utilization of bushmeat, which led to an increase in the number of cases. In rural regions, to supplement food (especially with mistrust of humanitarians) farmers prefer to hunt and use bushmeat. One major consequence of Ebola has been the stigmatization of survivors who had difficulty finding employment, especially in the food industry.

In the case of COVID-19, the fast responses of countries with very strict restrictions may have taken people by surprise, increasing anxiety, loss of employment, and instability in food prices. Social behaviour and anxiety are reported to be higher in the urban centres than in rural regions [48]. This has been attributed in some cases to the possibility, especially for subsistence farmers, for rural people to have the capacity to grow their own food, which is often not possible in urban centres. Compounded factors such as weather variability, however, need to be monitored to understand how local food production, as well as the number of infections, may be impacted. In all cases, food insecurity has increased in West Africa due to reduced availability and trade restrictions resulting in limited food access and price instability. According to Vos et al., a slowdown of their economies of only 1% can lead to a reduction in exports of their agricultural produce by almost 25% [49].

The differences between rural and urban centres will need to be better understood and how long-term restrictions may affect further rural regions where farming is often

essential for reducing food insecurity of developing countries. Trade restrictions can affect disproportionately urban zones that rely on imports for more speciality food that often does not reach rural regions. Several developing countries, however, strongly rely on food imports to ensure a minimum level of food security (although generally with inequalities among regions within a country). While this may have an equalizer effect between regions, trade restrictions increase food insecurity for all, the urban being unable to access food and the rural being unable to sell and thus access income. If there is a low capacity of local food production, countries are therefore more vulnerable to volatility in food prices and supply [29].

Food security needs to be seriously considered by governments when restriction measures are implemented during a pandemic. This is especially important when control measures are taken at the national or even regional level as the impact on the food system and therefore security can be severe compared to localized measures. To focus on health care during a crisis with little attention given to food security can only exacerbate the challenges of health and indeed increase the number of cases as it was seen during the Ebola crisis with the use of bushmeat. Food security is a complex topic that is not limited to food production. Many factors from seed availability to weather uncertainty affect production as well as workforce and trade and health restrictions. Even going from the harvest at the farmland/farm gate to local markets or even distribution centres in urban zones may not be possible if there is no middle person for the transport, or, if trade restrictions limit the capacity of farmers to sell to another country.

The limited information of the gender issues in food security during pandemics is troublesome. Most countries and research conducted in those countries appear to put a blanket on society when examining the impacts of pandemics and the types of policies to be applied. It demonstrates that the gender viewpoint is missing and can limit the capacity of countries to develop measures that can help improve food security. As a large part of the family responsibilities are the burden of the women, not considering their conditions may limit the capacity of a country to recover. The latest report on the State of Food Security and Nutrition in the World 2021 reports that the gender gap in the prevalence of moderate or severe food insecurity has increased worldwide during the year of the COVID-19 pandemic, as women are 10% more likely to be moderately or severely food insecure than men in 2020 as compared to 6% in 2019 [3,8]. Future research and analysis of the impacts of pandemics, and later the recovery from these events, most consider the differences on how men and women are affected and what measures each sex may take to reduce food insecurity. This observation is confirmed by Visser and Wangu who argue that such lack of gender lens in publications related to food systems lead to gender blind solutions and policy making in food systems' transformation [7].

To ensure the sustainability of a country during pandemics, it is clear that a more holistic approach needs to be considered where various aspects, including food security and social aspects such as gender relations, are considered. This holistic approach should be implemented at the community level where the needs are the greatest. This aspect was not discussed as mitigation measures in the articles that were examined. Further studies are required to better understand the power relations and inequalities among all the players in the food production chain, how they may vary over time, and whether these changes can be reversed once the crisis is passed. This review puts the foundation for the current research project entitled "COVID-19, food security, and opportunities for reconfiguring unequal gender relations in Burkina Faso and Senegal" and was funded by the International Development and Research Centre of Canada. The review demonstrates that much remains to be understood as to the complexity of the system and the influence of other societal factors that may greatly affect not only the responses to the pandemics but also the sustainability of communities dealing with issues such as food insecurity.

Supplementary Materials: The following are available online at <https://www.mdpi.com/article/10.3390/su132212888/s1>, Document S1: Registered Protocol, Document S2: PRISMA Flow Diagram, Document S3: Data File.

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