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Towards nutrition-sensitive lockdowns  
during Covid-19 and beyond**

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# **Between pandemics and famines: Towards nutrition-sensitive lockdowns during Covid-19 and beyond**

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## **Abstract**

In a moment of global unity, many governments across the world chose the same policy to address Covid-19: lockdowns. Lockdowns helped to “flatten the curve” but often undermined food and nutrition security. Taking a theoretical and empirical perspective, this paper disentangles the effects of different lockdown measures – such as movement restrictions, workplace closures, and banning public events – on different dimensions of food and nutrition security. The empirical explorations are based on a content analysis of 1,188 newspaper articles on lockdown effects published in five African countries: Zambia, Benin, Ghana, Uganda, and Kenya (ordered from lowest to highest lockdown stringency). The results highlight both the need and scope to design nutrition-sensitive lockdown strategies, which are effective from an epidemiological perspective but minimize trade-offs with food and nutrition security, when facing pandemics such as Covid-19 and potential future disease outbreaks.

## **Key Words**

COVID-19, lockdown, food security, nutrition, hidden hunger, Africa

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## 1. Introduction

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Facing Covid-19, governments across the world have enacted lockdowns to reduce contacts between people. Lockdown can comprise a variety of measures, ranging from banning public events to workplace closures and stay-at-home orders (Hale et al., 2020; Hsiang et al., 2020). Lockdowns have been effective to slow the contagion of the virus (Hsiang et al., 2020; Lau et al., 2020) but caused severe social and economic effects. Different studies have examined the overall effects of lockdowns on food and nutrition security (FNS). FAO et al. (2020) estimate that 80-130 million people became undernourished because of Covid-19 lockdowns and the associated global recession.

Lockdowns have affected job opportunities, reducing food consumption, even where food is available in principle (Devereux et al., 2020; Kansiime et al., 2020; Pereira & Oliveira, 2020). Lockdowns particularly affected poor, urban households who spend up to 70% of their income on food (Arndt et al., 2020; Laborde et al., 2020). The reduced food quantity particularly affects children. Headey et al. (2020) estimate that the pandemic causes a 14% rise in the prevalence of moderate or severe wasting – a proxy for acute undernutrition - among children. Robertson et al. (2020) estimate an increase of 18-23% in child mortality.

Lockdowns also reduced dietary diversity and access to micronutrients. This has been reported in low-income countries such as Kenya and South Africa (Arndt et al., 2020; Kansiime et al., 2020) but also among poor households in high-income countries such as the USA (Sharma et al., 2020). Nutritional shocks are particularly harmful to vulnerable population groups such as children. In the short-term, malnutrition affects the immune system, which explains, among other things, the sharp increase in respiratory diseases in children during the pandemic (Sinha et al., 2020). In the long-term, in particular, for children during the 1,000-day window from conception, nutritional shocks can cause irreversible effects on physical and cognitive development (Biesalski, 2017; Leddy et al., 2020). While disruptions to the access to calories typically become visible, e.g. in the form of food riots during the food price crisis 2007/2008 (Berazneva & Lee, 2013), and are likely to be corrected in more democratic regimes (Sen, 1981), effects on nutrition security are more hidden.

In this paper, we go beyond studying the overall FNS effects of lockdowns by disentangling how specific lockdown measures have affected different dimensions of FNS. Disentangling how different measures affected FNS can help to develop nutrition-sensitive lockdowns, which are effective from an epidemiological perspective but minimize the negative trade-offs with FNS. The effects of the different lockdown measures on FNS are explored from a

theoretical and an empirical perspective, building on the emerging literature and a content analysis of 1,188 newspaper articles on lockdown effects that were published by major newspapers in five African countries - Zambia, Benin, Ghana, Uganda, and Kenya. The newspaper articles provide unique and real-time insights into how different lockdown measures have affected different dimensions of FNS. The five case study countries were chosen to reflect different levels of FNS at the onset of the pandemic, different types of political regimes, and different combinations and stringencies of lockdown measures.

## **2. Materials and methods**

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### **2.1. Stringencies of lockdown measures**

The calculation of the stringencies of the different lockdown measures is based on data from the Oxford COVID-19 Government Response Tracker (Hale et al., 2020). The Tracker tracks the government responses to the Covid-19 pandemic of 186 countries. Its lockdown dimensions comprise eight different measures, whose stringencies are determined using three to four different levels on an ordinal scale. All but the lockdown measures on international movement restrictions have “flags”, indicating whether the measures are only applying in targeted regions or for the whole population. To calculate the individual stringency of the eight lockdown measures between 1/1/2020 and 17/5/2020, the daily lockdown scores (points according to the ordinal categorization) for each of the measures are aggregated and rescaled by their maximum possible scores to create an index between 0 and 100.

### **2.2. Content analysis of newspapers**

The empirical analysis is based on a content analysis of newspaper articles reporting on lockdowns in five African countries: Zambia, Ghana, Benin, Kenya, and Uganda. In each country, one of the largest public and private newspaper were chosen: The Lusaka Times and The Mast (Zambia), The Daily Graphic and My Joy Online (Ghana), La Nation and La Nouvelle Tribune (Benin), The Daily Nation and The Standard (Kenya), and The New Vision and The Daily Monitor (Uganda). Due to challenges with the search function of some of the newspaper’s online archives, articles were then identified with Google using the search terms “covid lock” and “covid cordon” (in Benin). The period analyzed goes from 1/1/2020 and 17/5/2020, when the lockdown measures in most countries were eased again. Newspaper articles merely covering case numbers were excluded. The remaining 1,188 articles (in Zambia: 136; in Ghana: 437; in Benin: 81; in Kenya: 231; in Uganda: 304) were coded using the Qualitative Data Analysis (QDA) Miner software. Articles were pre-coded by five people of the author team using a jointly developed coding structure and then coded

by the lead author to ensure consistency. Only actual, observed food security effects stemming from the lockdown policies in the respective country were coded: theoretical warnings of possible effects were not coded and lockdown effects reported from other countries were not considered.

### **3. Results**

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#### **3.1 Disentangling lockdown measures and food and nutrition security effects**

Table 1 conceptualizes the potential effects of different lockdown measures on different dimensions of FNS. The lockdown measures are based on the Oxford COVID-19 Government Response Tracker, which distinguishes eight lockdown measures (Hale et al., 2020). The different FNS dimensions are based on the four-pillar approach to food security of the FAO, which are 1) availability, 2) economic and physical access, 3) utilization and 4) the stability of the first three pillars over time (FAO, 2008). The four pillars are based on the FAO's definition of food security, which is defined to exist "when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2008).

Food availability is split into two categories: 1) agricultural production, which depends on the access to inputs such as fertilizer and labor as well as services such as finance, extension services, and veterinarians, and 2) food processing, sales, and trade. Separating the upstream and downstream agro-food value chain helps to better understand entry points for supply disruptions, an aspect that is emphasized in food systems thinking (Devereux et al., 2020; Harris et al., 2020). Table 1 distinguishes between economic access to food, which depends on the income and the price of food as well as savings and assets, and physical access to food, which depends on the food environment and market infrastructure. As shown by Sen (1981), access to food can also be based on transfer entitlements, which can be private (e.g., social safety nets) and public (e.g. public cash transfers and food aid). Sen's own-production entitlements, which are relevant for smallholder farmers, are captured under agricultural production.

The utilization of food depends on various aspects such as access to health, sanitation, food safety, and dietary quality. Any shocks undermining food utilization such as declining access to health precautions and medical treatment for childhood diarrhea particularly affect vulnerable groups (Biesalski et al., 2016; Leddy et al., 2020).

Stability is treated as a cross-cutting dimension and is not distinguished with a separate column. The dimension of stability is related to resilience, a term that conceptualizes how

well different systems can absorb, adapt, and recover from shocks (Ansah et al., 2019; Bené et al., 2016; Pingali et al., 2005). FNS resilience has both a short-term and long-term perspective (Bené et al., 2016).

Lockdown measures	Dimensions of food and nutrition security (FNS)						Total dimensions of FNS affected
	Availability		Access			Utilization	
	Upstream: Agricultural production	Downstream: Processing, sales, and trade	Economic access	Physical access	Transfers		
<b>Workplace closing</b>	Limited (if agriculture is exempted)	Limited (if food-related activities are exempted)	Strong (can affect incomes and savings/assets)	Limited	Strong (can affect private transfers)	Strong (loss of access can affect diets)	3/6
<b>Close public transport</b>	Strong (can affect labor)	Strong (can affect labor)	Strong (can affect incomes and savings/assets)	Strong (can affect access to markets)	Strong (can affect private/public transfers)	Strong (can affect diets and access to health care)	5/6
<b>Restrictions internal movement</b>	Limited (if agricultural laborers are exempted)	Limited (if food-related laborers are exempted)	Strong (can affect incomes and savings/assets)	Strong (can affect access to markets)	Strong (can affect private/public transfers)	Strong (can affect diets and access to health care)	4/6
<b>Stay-at-home requirements</b>	Limited (if agricultural laborers are exempted)	Limited (if food-related laborers are exempted)	Strong (can affect incomes and savings/assets)	Strong (can affect access to markets)	Strong (can affect private/public transfers)	Strong (can affect diets and access to health care)	4/6
<b>Restrictions private gathering</b>	Limited	Limited	Limited	Limited	Strong (can affect private transfers)	Limited	1/6
<b>School Closure</b>	Limited	Limited	Limited (but long-term effects on physical and mental development possible)	Limited	Strong (can affect school feeding programs, but such effects can be avoided)	Strong (can affect diets)	2/6
<b>Cancel public events</b>	Limited	Limited	Limited	Limited	Limited	Limited	0/6
<b>Restrictions international movement</b>	Limited	Limited	Limited	Limited	Limited	Limited	0/6
<b>Lockdown measures affecting FNS Dimension</b>	1/8	1/8	4/8	3/8	5/8	5/8	

**Table 1. Potential effects of Covid-19 lockdown measures on food and nutrition security.**

Source: Authors

Table 1 shows that not all lockdown measures equally affect FNS. *Workplace closures* have limited direct effects on food availability as long as essential workplaces are exempted<sup>1</sup>, but indirect effects are possible. For example, closing banks may affect farmers' access to

<sup>1</sup> During Covid-19, this was often but not always done. For example, wet markets were often closed, disrupting food supply chains and physical access to food (Pereira & Oliveira, 2020)

credits for seed and fertilizer (Devereux et al., 2020). Workplace closures affect wage labor, i.e. for workers in the informal sector, in which jobs often require physical attendance and are not covered by unemployment schemes (Arndt et al., 2020; Barrett, 2020; Devereux et al., 2020); Wouterse et al., 2020). Income drops may be mitigated by using savings or selling assets - undermining future resilience - but many households do not have such buffers (Laborde et al., 2020). Where private food and cash transfers are common, losing jobs does not only affect the breadwinner's households but also people who receive food and cash from these households. Falling food demand may cause price declines, affecting farmer's revenues and future investments (Harris et al., 2020).

The *closure of public transport* and *restrictions of internal movements* have similar effects but public transport closures do not affect people, who have private means of transportation (unless private vehicles are included). Both can disrupt agricultural production and the food supply chain, for example, by affecting the movements of agricultural workers as well as inputs and outputs (Ayanlade & Radeny, 2020; Huber et al., 2018; Minten et al., 2020; Wouterse et al., 2020). Movement restrictions are likely to particularly affect the production of nutritious but perishable food such as dairy and horticulture products (Harris et al., 2020; Kansiime et al., 2020, Minten et al., 2020; Torero, 2020). Movement restrictions are likely to slow down the overall economy, thereby affecting own-labor entitlements, and may also undermine physical access to food (Kansiime et al., 2020) and private transfers as social networks can become disrupted – at a crucial moment (Devereux et al., 2020). They can also affect access to health care, thus undermining food utilization. *Stay-at-home requirements* are an extreme lockdown measure affecting the economic and physical access to food but also private and public transfer entitlements. Stay-at-home requirements particularly affect the physical access to non-storable and perishable food, which can affect food utilization by reducing dietary diversity (Harris et al., 2020).

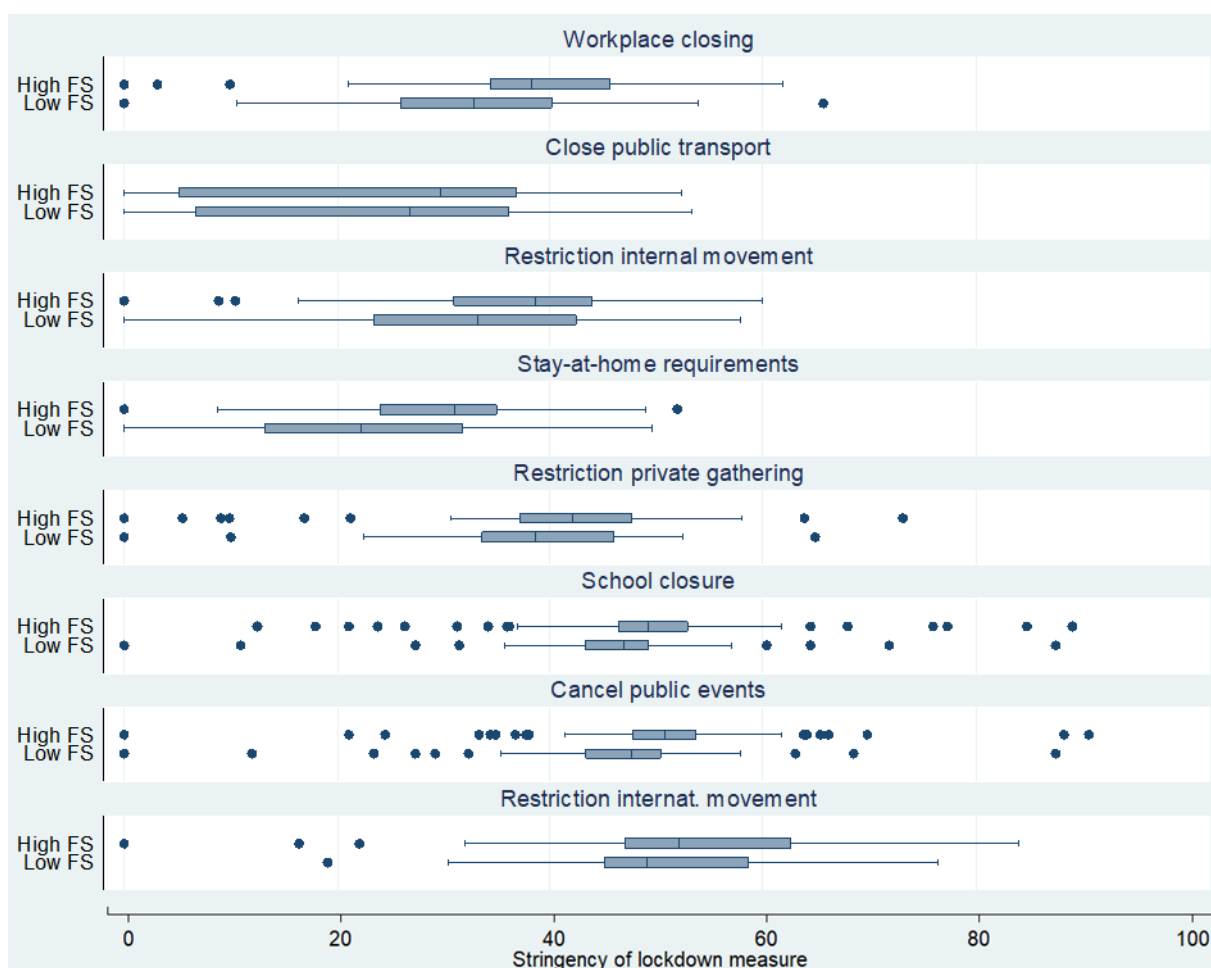
*School closures* can affect food transfer programs, which are often organized via schools, thereby affecting children, who are among the most vulnerable to food and nutrition shocks (Ali et al., 2020; Laborde et al., 2020). In principle, alternative ways to distribute school meals during school closures can be used, for example, take-home rations, vouchers, and cash transfers, however, targeting problems may occur. Prolonged school closures can affect educational achievements and, subsequently, job opportunities.

Lastly, some measures are likely to have limited effects on FNS, in particular, *restrictions on private gatherings*, *cancelation of public events*, and *international movement of people*. This is not to say that they have no effects. For example, restricting private gatherings may affect private transfer entitlements. Cancelation of public events such as banning public church services may affect the ability of food/cash programs run by faith-based organizations to raise funds. Also, group-based extension delivery to farmers may be



affected. Lastly, restrictions on international movements have disrupted supply chains for horticultural products, e.g., cut flowers and fruits that are typically transported in passenger planes (Laborde et al., 2020), and border control measures may lead to disruptions even where agricultural and food commodities are exempted (Torero, 2020).

Figure 1 compares the lockdown response for countries with low and high levels of food security before the pandemic. The figure shows that countries with a higher prevalence of (hidden) hunger were - on average - more likely to refrain from measures that have large effects on FNS such as workplace closures and stay-at-home orders or enact them over a shorter period. ANOVA and pairwise Tukey tests show that differences are significant for internal movement restrictions (10% level), school closures (5%), the cancellations of public events, workplace closures, and stay-at-home requirements (1% level).



**Figure 1. Stringencies of different lockdown types, comparing high and low food security (FS) countries**

**Notes:** Lockdown stringencies between 1/1/2020 and 17/5/2020 based on data from the Oxford COVID-19 Government Response Tracker (Hale et al., 2020) (see Methods). Countries with a prevalence of undernutrition above 10% (World Bank, 2020), using data from 2018, or a severe/alarming food security status according to the World Hunger Index 2019 (von Grebmer et al., 2019), using data from 2016-2018, were classified as having low food security (low FS). Levene's test shows that the variances between the groups are equal. Sample size: 176 countries.

### 3.2. Lockdown effects on food and nutrition security in five African countries

In this section, the effects of lockdowns on FNS in five African countries – Zambia, Benin, Ghana, Uganda, and Kenya – are explored empirically. Table 2 shows some characteristics of these countries that may be relevant to understand lockdown decisions and their effects on FNS.

Country characteristics	Zambia	Benin	Ghana	Uganda	Kenya
Share of urban population (FAOSTAT, 2018)	44	47	56	24	27
Global Freedom Index (Freedom House, 2020)	54 (partly free)	66 (partly free)	82 (free)	34 (not free)	48 (partly free)
Global Hunger Index 2019 (von Grebmer et al., 2019)	38 (alarming)	24 (serious)	14 (moderate)	31 (serious)	25 (serious)
GDP/capita 2018 (2011 PPP \$) (UNDP)	3750	2150	4200	1800	3100

**Table 2. Case study country characteristics**

**Notes: The Global Freedom Index ranges from 0-100, with 100 indicating the highest degree of freedom. The Global Hunger Index ranges from 0 to 100, with values above 10 indicating moderate levels, above 20 indicating serious, and above 35 alarming levels.**

Table 3 shows the Covid-19 lockdown strategies of the five case study countries. Zambia has never restricted the movement of people but closed schools and entertainment workplaces. A stricter lockdown was ruled out because of food security concerns, with the president noting: *“I am aware that some of you have been saying, ‘We would rather die from Covid-19 than from hunger’<sup>2</sup>*. Benin established a cordon sanitaire - a quarantine zone - around the major cities for three weeks. People were allowed to move freely within and outside of the zone but were not allowed to cross the borders of this zone. Food security concerns influenced Benin’s lockdown, with the president saying: *“Who can wait two, three, or four weeks even without working and living on monthly income?”<sup>3</sup>* Ghana followed a more stringent approach but only in its metropolitan areas, where stay-at-home requirements were enacted and non-essential businesses had to close. Many measures were lifted after three weeks because of the "severe" FNS impacts on the poor and vulnerable (Adebayo, 2020). Uganda enacted a hard lockdown, banning public and private transportation, public gatherings, closing all non-essential workplaces, closing schools, and applying a dusk-to-dawn curfew. Similar to Uganda, Kenya applied a nationwide dusk-to-dawn curfew, but

<sup>2</sup> [https://www.zambiahc.org.uk/news\\_events/president-lungus-second-address-on-covid-19/](https://www.zambiahc.org.uk/news_events/president-lungus-second-address-on-covid-19/)

<sup>3</sup> <https://www.jeuneafrique.com/918313/politique/au-benin-patrice-talon-assume-limpossibilite-dun-confinement-general>

Kenya was less strict regarding the closure of businesses (focusing only on entertainment workplaces) and public transportation (only restricting the number of passengers).

Type	Zambia	Benin	Ghana	Uganda	Kenya
<b>Workplace closing</b>	Entertainment workplaces (30 days*)	Entertainment workplaces within cordon sanitaire (65 days)	Non-essential workplaces in major cities (21 days)	Non-essential workplaces (40 days#)	Entertainment workplaces (121 days#)
<b>Close public transport</b>	No	Ban of (mini)buses (65 days)	In major cities (21 days)	Yes (61 days#)	Reduced capacity (>250 days)
<b>Restrictions internal movement</b>	No	Cordon sanitaire (43 days)	In major cities (20 days)	Yes (50 days)	Yes (90 days#)
<b>Stay-at-home requirements</b>	No	No	In major cities (20 days)	Dusk-to-Dawn-Curfew (>250 days)	Dusk-to-Dawn-Curfew (>250 days)
<b>Restrictions private gathering</b>	Max. 50 people (>250 days)	Max. 10 people within cordon sanitaire (43 days)	Yes (81 days)	Max. 5 people (>250 days)	Yes (163 days#)
<b>School closure</b>	Yes (214 days)	Yes (43 days)	Yes (>250 days)	Yes (212 days)	Yes (168 days#)
<b>Cancel public events</b>	Max. 50 people (42 days)	Yes (77 days)	Yes (>250 days)	Yes (>20 days)	Yes (153 days#)
<b>Restrictions international movement</b>	Screenings and quarantines (>250 days)	Screening and quarantines (>250 days)	Ban of non-nationals/residents (166 days)	Screening and quarantines (>300 days)	Ban of non-nationals/residents (136 days)

**Table 3. Lengths of lockdown measures in case study countries**

Notes: \*Except bars and taverns, # Gradual re-opening. Source: Authors. Days were calculated from 1/1/2020 to 15/11/2020.

Table 4 shows how the Covid-19 lockdown strategies of the five case study countries translated into the stringency assessments of the Oxford COVID-19 Government Response Tracker (between January to mid-May 2020). Uganda and Kenya followed the most stringent approach of the five countries. On average, the five countries chose lockdown measures with fewer implications on FNS such as restrictions of private gatherings, school closures, canceling public events, and restrictions on international movement (see Table 4). However, Uganda and Kenya, in particular, enacted lockdown measures that potentially have severe FNS implications such as workplace closures and stay-at-home orders.

Lockdown measures	Zambia	Benin	Ghana	Uganda	Kenya	Average
Workplace closing	11	19	23	40	36	26
Close public transport	0	26	26	42	31	25
Restrictions internal movement	21	22	10	45	41	28
Stay-at-home requirements	11	0	12	29	30	16
Restrictions private gathering	33	31	39	38	52	39
School Closure	46	37	49	46	50	46
Cancel public events	12	48	49	48	52	42
Restrictions international movement	48	35	58	54	60	51
<i>Average</i>	23	27	33	43	44	

**Table 4. Lockdown stringencies in the case study countries.**

Note: Between 1/1/2020 and 17/5/2020. Source: Oxford COVID-19 Government Response Tracker. Colors based on conditional formatting of the unrounded values, ranging from dark green (0) to dark red (60).

Table 5 shows how lockdowns have affected FNS in the five case study countries, based on a content analysis of articles published by the major newspapers in these countries (see Methods). Table 5 suggests that FNS effects occurred in all countries, but that they were most prevalent in countries with stricter lockdowns such as Uganda and Kenya.

Dimensions of food and nutrition security	Zambia (n=136)	Benin (n=81)	Ghana (n=437)	Uganda (n=304)	Kenya (n=231)	Average
Agricultural production	1	0	1	5	1	2
Food processing, sales, trade	4	0	2	10	6	4
Economic access	7	5	13	23	11	12
Physical access	3	1	6	7	4	4
Transfers	2	0	1	2	2	1
Utilization	2	0	0	2	0	1
<i>Average</i>	3	1	4	8	4	

**Table 5. Share (%) of newspaper articles reporting food and nutrition security effects.**

Source: Authors. Colors based on conditional formatting of the unrounded values, ranging from dark green (0) to dark red (23).

Across all countries, economic access to food was the most affected FNS dimension. Economic access was particularly undermined in Uganda, which imposed the most far-reaching *workplace closures*, followed by Ghana and Kenya, which also enacted *workplace closures* but for a shorter period (in Ghana) or applying to fewer workplaces (in Kenya). The effects of workplace closures on economic access are illustrated by the following two quotes, of which the latter highlights the long-term effects of prolonged lockdowns:

*“There has been loss of lives and devastating blows to economies and, particularly, livelihoods of citizens who live from hand to mouth.”* (The Daily Nation, Kenya, 13/5/2020)<sup>4</sup>

*“I have a family of three children and before receiving relief I was using my savings to buy food every day. Later, the money was exhausted when the President extended the lockdown for the extra 21 days”* (Daily Monitor, Uganda, 15/5/2020)<sup>5</sup>

4 <https://www.nation.co.ke/oped/opinion/Let-us-give-the-devil-his-due/440808-5538232-ge94a9/index.html>

5 <https://www.monitor.co.ug/News/National/How-residents-of-Kabarole-donated-and-rescued-vulnerable-people/688334-5553538-s6ljk/index.html>

*Stay-at-home orders*, which were enacted in parts of Zambia and Ghana and across Uganda and Kenya, can equally undermine the economic access to food (unless traveling to workplaces is specifically exempted). Unlike the closure of formal workplaces, such measures also affect informal workplaces. The effects of *stay-at-home orders* on economic access are illustrated by the following quote:

*“Vulnerable homes whose livelihoods depend on hand to mouth small scale businesses (...) have now reached their lowest ebb due to, among others, the stay at home preventive measure”* (Lusaka Times, Zambia, 11/5/2020)<sup>6</sup>

Economic access was also affected by the mere anticipation of stay-at-home orders. In all of the countries, this led to panic buying and, subsequently, price spikes, which undermines the economic access of poorer people to food, as the following quote from Ghana illustrates:

*“Amid the scramble for essential foodstuffs and products, price gouging and hoarding has been the order of the day”* (My Joy Online, Ghana, 30/3/2020)<sup>7</sup>

*Stay-at-home orders* are an extreme form of movement restriction. Similar to more mild forms of movement restriction such as *restrictions of internal movements* and *closing public transport*, such measures can undermine the physical access to food and destroy private social safety nets, as the following quotes illustrate:

*“Our markets are mostly far from our residential areas especially in Accra and Kumasi where the lockdown is biting.”* (My Joy Online, Ghana, 11/4/2020)<sup>8</sup>

*“Lockdowns are also very difficult for people (...) whose survival is provided by friends and relatives through our African ‘Ubuntu’ culture.”* (Lusaka Times, Zambia, 18/4/2020)<sup>9</sup>

*Restrictions on the internal movement of people* and *closing public transport* systems also affected agricultural production and food processing and sales, as the following quote illustrates:

*“The restrictions on movement of vehicles is disrupting the supply-chain [of poultry] at various levels - hatcheries, feed mills, poultry farms and retail outlets. The fact that there is mortality and perishability involved in the trade makes it vulnerable”* (Daily Monitor, Uganda, 16/5/2020)<sup>10</sup>

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6 <https://www.lusakatimes.com/2020/05/11/lockdown-has-triggered-rise-in/>

7 <https://www.myjoyonline.com/business/economy/lockdown-scare-panic-buyers-in-accra-meet-empty-shelves-at-supermarkets/>

8 <https://www.myjoyonline.com/opinion/ghanas-pandemic-lockdown-encounter-with-the-situation-on-the-ground/>

9 <https://www.lusakatimes.com/2020/04/18/covid-19-it-is-time-to-temporarily-legalise-kachasu/>

10 <https://www.monitor.co.ug/Magazines/Farming/Covid19-poultry-farmer-afloat-Kenya-Uganda-market/689860-5554478-11y3fksz/index.html>

*“With the ban of public transport, the food prices will increase because most of the vendors buy food from farmers who have been transporting it” (Daily Monitor, Uganda, 27/3/2020)<sup>11</sup>*

In principle, the negative effects of lockdowns on FNS, in particular, the loss of economic access to food following workplace closures, can be buffered with cash transfers and food aid, as long as governments can afford such programs and food is available. The case study countries that enacted strict workplace closures – Ghana, Uganda, and Kenya – set up such programs. However, such programs suffered from various political economy and governance challenges. In Uganda, public food aid was misused to ensure votes for the upcoming presidential elections and providing food aid outside of the official government channels was forbidden (Anguyo, 2020). The politicization of food aid was particularly frequently reported in Uganda but also appeared as a problem in Kenya and Ghana:

*“A woman has further lamented her ordeal of being denied food at Shiashie because she was not a card bearing member of the ruling NPP (...). This action if not curtailed with immediate effect will lead to satisfying party supporters rather than the targeted vulnerable women and children” (My Joy Online, Ghana, 11/4/2020)<sup>12</sup>*

## **Discussion**

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The results suggest that all types of lockdown measures affect FNS, highlighting the advantage of soft measures such as face masks and test-and-trace strategies to contain the spread of contagious diseases. Yet, there can be situations, where such strategies fail and lockdowns become necessary. In such cases, there is a large scope for nutrition-sensitive lockdowns, which maximize epidemiological benefits and minimize effects on FNS. For example, banning public events can reduce “super-spreading” (Ebrahim & Memish, 2020; Haug et al., 2020), without compromising FNS. Other measures such as workplace closures and stay-at-home orders are effective to slow contagion, but they can heavily undermine the economic and physical access to food. In the case study countries that have relied on such measures – in particular, Uganda and Kenya - negative FNS effects were more frequently reported, confirming Kansime et al. (2020), who found that these measures had “significant ramifications on food security” (p. 2).

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<sup>11</sup> <https://www.monitor.co.ug/uganda/new/national/vendors-opt-to-sleep-in-markets-walk-to-work-1882730>  
<sup>12</sup> <https://www.myjoyonline.com/news/national/politicisation-of-food-sharing-in-lockdown-areas-unacceptable-group>

Integrating the FNS effects of specific lockdown measures into epidemiological models (for an overview of Covid-19 models see Holmdahl & Buckee, 2020) can help to optimize lockdown measures – balancing between pandemic and potential famines – to maximize overall public health. Such models can capture the trade-offs between different lockdown measures regarding the efficiency to slow contagion (Haug et al., 2020) and FNS effects - which are likely to be country-specific - while taking into account health care capacities and the susceptibility of the population to become severely affected. In some developing countries, Covid-19 fatality has remained lower than assumed because of the low age of the population and a low prevalence of cardiovascular diseases, among other factors - a phenomenon referred to as the African paradox (Gosh et al., 2020), however, this was not known to policymakers during the first wave of Covid-19. In such countries, the FNS effects of lockdowns may quickly outweigh epidemiological benefits. Coupled models could also help to explore whether “circuit breaker” lockdowns – which are planned and repeated short-term lockdowns – are preferable to prolonged lockdowns (see also Chowdhury et al., 2020). The results suggest that lockdown effects on food availability can be minimized with careful exemptions (e.g., allowing the free movements of agricultural laborers). However, some lockdown measures undermine the economic access to food, in particular, of non-farming households living “hand-to-mouth” (see also Arndt et al., 2020; Devereux et al., 2020; Kansiime et al., 2020; Laborde et al., 2020). Sustained lockdown measures can undermine the long-term resilience of households to shocks. Households that seemingly cope well with lockdown measures may - under the radar screen of governments – use up all their savings and have to sell their assets – making them vulnerable to a potential second lockdown or other shocks. Even where households continue to access enough calories, dietary shifts towards cheaper, less nutritious diets, may affect health, and, in the case of children, also mental and physical development, affecting them long after lockdowns are lifted (Leddy et al., 2020; Kansiime et al., 2020).

While cash transfers and food aid programs have helped to buffer FNS effects of lockdowns (Gerard et al., 2020; Wouterse et al., 2020), merely accompanying otherwise nutrition-

insensitive lockdowns with such social protection programs may not only be a costly but also a dangerous strategy. All of the case study countries relying on food transfers - Ghana, Uganda, and Kenya - faced governance challenges such as targeting problems and political patronage, albeit to different degrees. In Uganda, for example, public food aid was misused for political patronage given the upcoming presidential elections, and food aid provided outside of the official government channels was charged with “attempted murder” (Anguyo, 2020). Moreover, food aid typically consists of starchy foods such as grain (Ong et al., 2020; Webb et al., 2017). This can cause hidden hunger as starchy foods are satiating, but not sufficiently nutritious and because its minerals are poorly absorbed, since the phytic acid contained in the grain inhibits this (Biesalski, 2017). Cash-transfer programs are preferable over food aid where food is available as they are less costly and less prone to governance challenges (Gentilini, 2017; Ravallion, 2020), but some lockdown measures can affect the physical access to food, undermining the effectiveness of cash transfers, and setting-up cash-transfers program ad-hoc is a major challenge (Arndt et al., 2020).

The paper suggests that governments, which face a contagious, deadly disease such as Covid-19 and have a population that is susceptible to (hidden) hunger should prioritize test-and-trace strategies, given that all types of lockdown measures can affect FNS (and other aspects of public health such as access to vaccinations and health precautions, which can have a large effects on the health of children (Zar et al., 2020)). Lockdown measures are the second-best strategy, but if they become necessary, they can be designed nutrition-sensitive. This in turn may help to ensure compliance with lockdown measures, as food secure people are more likely to follow the enacted rules (Haug et al., 2020). Imposing strict lockdown measures and hoping to mitigate their negative effects on FNS with cash transfers and food aid seems to be a risky strategy given the governance challenges of such programs, in particular when they are set up ad-hoc (Arndt et al., 2020). A long-term goal should be to design more resilient food systems (Ali et al., 2020; Torero, 2020).



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