Impact of COVID-19 pandemic on diet and nutrition outcomes

A systematic literature review

NUTRITION
RESEARCH
FACILITY
Knowledge and Research for Nutrition

About the Nutrition Research Facility

The Knowledge and Research for Nutrition project of the European Commission (2020-2024) aims to provide improved knowledge and evidence for policy and programme design, management, monitoring and evaluation in order to reach better nutrition outcomes.

The project is implemented by Agrinatura - the European Alliance on Agricultural Knowledge for Development – which has established a Nutrition Research Facility, pooling expertise from European academia, with the ability to mobilise internationally renowned scientific networks and research organisations from partner countries.

The Nutrition Research Facility provides expert advice to the European Commission and to the European Union (EU) Member States and Partner Countries.

Contact: nrf@agrinatura-eu.eu

Information about this report

Title:	**Impact of COVID-19 pandemic on diet and nutrition outcomes: a systematic literature review**
Short description:	This research aims to generate evidence-informed recommendations for interventions and policies to mitigate the negative effect of the COVID-19 pandemic on diet and nutrition, particularly of children under-5 and women of child-bearing age in low- and middle- income countries. It is based on a systematic literature review complemented by two case studies in Ethiopia and Guatemala.
Requested by:	DG INTPA F3
Date of request:	15/05/2020
Date of delivery:	06/04/2021
Date of approval:	07/05/2021
Internal NRF Reference number:	D2.4.1

NRF Experts involvement	Name	Position
Principal Investigators	Fiorella Nastaran Picchioni	WP2 Research Assistant – COVID-19
	Dominique Roberfroid	Team Leader – KE1
	Luis Goulao	WP2 Leader
NRF Research team	Ravinder Kumar	Deputy Team Leader – KE2
	Arlene Alpha	WP1 Leader
	Amélie Wood	WP1 Research Assistant
	Michelle Holdsworth	WP3 Leader
	Melanie Broin	WP3 Research Assistant
	Carl Lachat	WP4 Leader
Project Manager	Dimitrios Petalios	NRF Project Manager - KE3
Subcontractors:	n.a.	n.a.

List of acronyms

COVID-19	Coronavirus Disease 2019
C4N	Capacity for Nutrition
CPI	Consumer Price Index
CSI	Coping Strategy Index
DHS	Demographic and Health Surveys
DQ	Diet Quality
DG INTPA F3	European Commission Directorate General for International Partnerships, Unit F3
ELCSA	*Escala Latinoamericana y Caribena de Seguridad Alimentaria*
ENSANUT	Mexican National Health and Nutrition Survey
EU	European Union
FAC	Food Accessibility
FAF	Food Affordability
FAO	Food and Agriculture Organisation of the UN
FAV	Food Availability
FCS	Food Consumption Score
FIES	Food Insecurity Experience Scale
FPMA	FAO Food Price Monitoring and Analysis
IPC AFI	Integrated Phase Classification Acute Food Insecurity
JRC	Joint Research Centre
GNC	Global Nutrition Cluster
HDDS	Household Diversity Score
HFIAS	Household Food Insecurity Access Scale
H-FIES	Household Food Insecurity Experience Scale
HNS	Health and Nutrition Services
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
LMICS	Low- and middle-income countries
MAD	Minimum Acceptable Diet
MDD-W	Minimum Dietary Diversity for Women
NIPN	National Information Platform for Nutrition
OPM	Oxford Policy Management
PSNP	Productive Safety Net Program
RCT	Randomised Controlled Trials
RMNCH	Reproductive, maternal, new-born and child health
SD	Standard Deviation
SDG	Sustainable Development Goals
SUN	Scaling Up Nutrition
UN	United Nations
UN OCHA	Office for the Coordination of Humanitarian Affairs
UNSCN	United Nations System Standing Committee on Nutrition
UPSNP	Urban Productive Safety Net Program
WASH	Water, Sanitation and Hygiene
WFP	World Food Programme

Content

List of figures and tables

Executive summary

The current global pandemic of Coronavirus (COVID-19), and measures adopted to reduce its spread, threaten the nutritional status of populations, particularly the most vulnerable. Children under-5 and women of reproductive age in low- and middle-income countries (LMICs) are expected to be particularly affected by a fall in access to nutrient rich foods such as fruit, vegetables and animal source foods and by the potential disruption of health and nutrition-related programmes and interventions, reducing their access to care. Hence, the need to prepare and/or strengthen appropriate interventions to mitigate the impact of the pandemic on nutritional outcomes. To this end, it is crucial to better understand how the pandemic impacts diet and nutritional outcomes and to document the existence and effectiveness of mitigating interventions. In this report we carried out a systematic review of both peer-reviewed and grey literature, including 35 primary studies, complemented by two specific case studies in Ethiopia and Guatemala.

Impact on diet and nutrition outcomes

Nutritional status. We did not retrieve any studies on the link between COVID-19 pandemic on nutritional outcomes (i.e. collecting nutritional status indicators such as BMI, child wasting and stunting).

Dietary diversity. The pandemic has had an adverse impact on diets of the surveyed population, especially in its early stages. In some examples, dietary diversity improved at a later stage. Studies suggest that there has been a shift away from relatively more expensive food groups (e.g. animal source foods, vegetables) to cheaper but less nutritious ones (staples), raising concerns about the long-term effects of COVID-19 on the nutritional quality of diets and related nutritional outcomes.

Food Security. The reviewed studies suggested that levels of food insecurity (measured via the Food Insecurity Experience Scale (FIES), Household Food Insecurity Access Scale (HFIAS) and non-standard food insecurity questions) during the pandemic were high, but the depth and duration varied across and within countries. For example, food insecurity levels were higher among informal sector workers in urban areas, young adults, female-headed and poorer households.

Food Accessibility. Since the start of the pandemic, food access has been affected negatively and has hit poorer households to a larger degree. The studies that reported access to different food items showed that the changes were product-specific, suggesting a heterogeneous impact across different food value chains. In a few countries, physical access to food ceased to be an issue once movement restrictions were relaxed.

Food Availability. The reviewed studies suggested that shorter value chains were better placed to adapt to the pandemic and movement restriction measures. However, poorer farmers living in areas with a lack of adequate storage facilities and infrastructure were adversely affected by delays to market due to the restriction measures.

Food Affordability. Most of the studies reported a widespread decrease of income due to loss of income-generating opportunities and formal employment. Income reduction represented an important channel of impact between the pandemic (and the restriction measures) and food and nutrition security in LMICs. The effect of the pandemic on food access through food prices was more heterogeneous. For example, on the one hand, Nigeria has experienced one of the highest inflation rates in food prices in the past three years. On the other hand, in Ethiopia, the proportion of the population reporting high food prices as a main obstacle to purchase food gradually decreased between May and October 2020.

Disruption to health and nutrition services. Disruptions of several maternal-child services delivered by health centres occurred due to the pandemic. Some reasons behind changes in health centre activities included, firstly, the need to provide outreach and training on COVID-19-related procedures and, secondly, movement restrictions that had made access to certain health services more arduous. Concomitantly, in some areas, a reduction in demand for routine services was observed due to fears of COVID-19 infections further to attending health care facilities.

Factors interacting with the impact of the pandemic

While evidence gathered since the outbreak indicates detrimental effects of COVID-19 on different aspects of people's food security, the intensity, duration and forms are different within and between LMICs. Several interacting factors can be identified to provide an interpretation of these variations between and within countries. Firstly, the link between containment measures and food insecurity was highly apparent in the studies. The pandemic situation is evolving rapidly and heterogeneously and there have been different government responses to curb the virus and mitigate the effect of containment measures. The timing and stringency of containment measures are variable.

Secondly, the variations of COVID-19 impacts between and within countries can be further associated with the food value chains considered. The few studies available on food value chain assessments suggest that shorter value chains and traditional smallholder farms were relatively more resilient in the face of COVID-19, as they depended on local inputs (local indigenous seeds, compost, and family and community labour exchange) as opposed to commercial or semi-commercial farms, which were hit harder. However, there were very few studies that linked the impacts of COVID-19 to agricultural processes and the dynamics through which rural households' incomes and food insecurity were affected. Therefore, although food systems analysis is recognised as an important and meaningful framework to conduct food security analysis, studies tended to focus either on food production/supply or on aspects related to food consumption and diets.

Finally, different food systems' actors and groups experienced and suffered from the pandemic in different ways. Studies in Ethiopia illustrated that poorer and female-headed households were among those with the lowest levels of indicators of dietary diversity and food security. Still in Ethiopia, the impact of the pandemic was particularly adverse on informal workers and young adults who relied on daily wages. Given the informal nature of large sections of the food system in LMICs (where women represent a high proportion of workers in food processing and marketing), assessing the financial losses by informal actors and defining targeted policies is considered a top priority to build more resilient food systems.

Effective interventions: lessons from the case studies

During the first wave of COVID-19, the governments in Guatemala and Ethiopia (the two case studies) were prompt in implementing both policies to mitigate the detrimental effects of the COVID-19 pandemic and associated containment measures. Such policies were multi-sectoral and encompassed social protection initiatives, agricultural incentives, market policies, food aid and cash transfers. Substantial support and resources were also provided by international donors directly to governments and ministries.

At its onset, the pandemic was expected to cause widespread disruptions of health services and food systems in LMICs, with consequences on maternal and child nutrition and mortality. The contextual analysis from the case studies indicated that while disruptions occurred, and in many cases were severe, a nuanced picture also existed. For example, the historical April-to-August peak of acute undernutrition in children under-5 attributed to the annual "hunger season" in Guatemala, was not observed in 2020, reflecting the additional support given to poor households under the framework of the measures implemented to cope with the negative impact of COVID-19 on nutrition. Early indications suggested that disruptions on Ethiopian food value chains were relatively contained and that specific production systems were largely resilient (i.e., dairy and vegetables). Despite the difficulties in assessing the specific impacts of policies at this stage, the resilience of the Ethiopian food system during the pandemic could be partly attributed to the swift agricultural subsidies put in place by the government at the beginning of the outbreak.

An important finding is related to existing and well-functioning social protection programmes and public distribution of food that have appeared to buffer the adverse effects on food security. For example, one of the responses of the Ethiopian government to the outbreak has been to extend the long-lasting Productive Safety Net Programme (PSNP) and its more recent urban counterpart (UPSNP) to more beneficiaries, including disadvantaged households. It has been demonstrated that these programmes sustain incomes and food demand and prevent the aggravation of food insecurity among vulnerable populations (reduction by 9.3% percentage points of the likelihood of becoming food insecure).

These findings highlight the potential of having social protection programmes in place prior to the onset of shocks in order to protect the food security of poor households. They also highlight that pandemic restriction measures put in place to curb infections and alleviate the pressure on health systems should be coupled with holistic and context-specific employment, income and business support.

These are preliminary findings. Proposing strong evidence-informed policy recommendations is difficult at this stage. The COVID-19 pandemic has posed significant obstacles to collecting high-quality information, particularly on maternal and child nutritional outcomes, and we retrieved no studies on such outcomes. A thorough appraisal of various policy responses is also lacking. We acknowledge that such appraisal is difficult for complex interventions in a time of crisis. However, we advocate for improved data collection to identify vulnerable groups and measure how interventions are successful in protecting them.

Introduction

The current global pandemic of Coronavirus (COVID-19), and measures adopted to reduce its spread, threaten the nutritional status of populations, particularly the most vulnerable. The World Food Programme (WFP) has estimated that the COVID-19 pandemic will see more than a quarter of a billion people suffering acute hunger by the end of 2020, which represents a doubling of current figures (1,2).

UN Nutrition (formerly UNSCN) recognizes the impacts of the COVID-19 pandemic on food environments, threatening increased levels of malnutrition (3). Disturbance of food environments may ensue from changes to both external and personal dimensions of food environments (Figure 1). 'External' dimensions include food availability and quality, prices, vendors, markets and regulations, while 'personal' dimensions include geographical access, affordability, convenience and desirability (3,4).

Figure 1. Guiding Framework of the Impact of COVID-19 pandemic on food environments
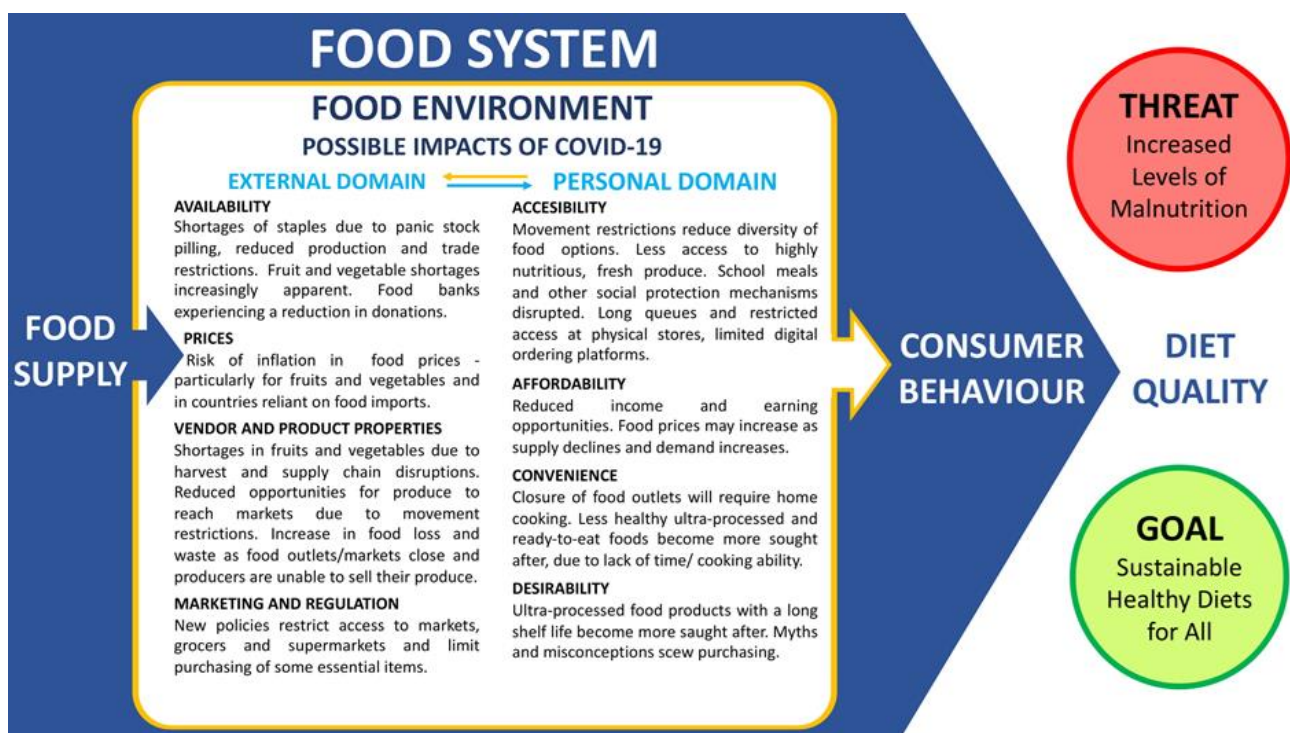
Source: adapted from Turner (4) by UNSCN (now called UN Nutrition) (3).

Children under-5 years and women are expected to be particularly affected by a fall in access to nutrient rich foods – such as fruit, vegetables and animal source foods – and by potential disruptions of health and nutrition-related programmes and interventions, reducing their access to care (5). It was estimated that even fairly short lockdown measures, combined with severe mobility restrictions and comparatively moderate food system disruptions, could result in a 14.3% increase in the prevalence of moderate or severe wasting among children under-5 years across 118 LMICs (6). Reduced coverage of essential maternal and child health interventions could result in an increase of 9.8–44.7% in under-5 child deaths per month, and an 8.3–38.6% increase in maternal deaths per month, across 118 LMICs (5). Poorer nutritional status may in turn expose individuals to more severe COVID-19 infections and increase pressure on already vulnerable health systems (6).

Hence the need to prepare and/or strengthen appropriate interventions to mitigate the effect of the pandemic on nutritional outcomes. A response to the COVID-19 pandemic may include support for functional and resilient food systems, sustainable healthy diets and access to health services for all, and particularly the most vulnerable, i.e. children under-5 years and women (7).

Such interventions can be identified on the basis of impact pathways and have already been listed by a number of international agencies (e.g. UNSCN (3), FAO (8), IFAD (9), the Global Nutrition Report(10)). For example, actions on external food environment domains can range from monitoring food prices, diet diversity, food security and malnutrition indicators, to adopting subsidies and taxes that promote the purchase and consumption of nutritious foods based on dietary guidelines (11). Actions on personal food environment domains can encompass improving accessibility and affordability of foods by social protection programmes, or the promotion of sustainable healthy diets.

However, evidence is lacking at two crucial levels. Firstly, most of the predictions of the impact of the COVID-19 pandemic on diet quality and the nutritional status of populations are based on macro or micro-level simulations (5,6,12,13). The actual impact of the COVID-19 pandemic is still to be quantified. Such information is crucial to identify factors that aggravate or mitigate the impact of the COVID-19 pandemic (e.g. geography, characteristics of the food environment, individuals with comorbidities), and to target appropriately early interventions. Secondly, the recommendations for action mentioned above are also generic and theoretical. It remains to be seen how such interventions are implemented in various contexts, and how effective they would be in mitigating the impact of the pandemic on the nutritional status of populations, particularly the most vulnerable. Documenting and disseminating these lessons and emerging evidence will be key to implementing the most appropriate and effective interventions in the face of this pandemic.

In this context, the European Commission Directorate General for International Partnerships, Unit F3 (INTPA F3) commissioned the NRF to carry out a study to:

1. Analyse the impact of the COVID-19 pandemic (and measures adopted to reduce its spread) on diet and nutrition, based on a systematic literature review and an in-depth situation analysis in a restricted sample of countries (see section 0).
2. Document the adaptation of nutrition-related programmes or the implementation of interventions specifically developed to mitigate the impact of the COVID-19 pandemic on diet quality and nutrition in the restricted sample of countries.

The final aim of this research is to generate evidence-informed recommendations for interventions and policies to mitigate the negative effect of the COVID-19 pandemic on diet and nutrition, particularly of children under-5 years and women/girls of childbearing age.

Methods

Literature Review

A systematic literature review was carried out to identify documented effects of COVID-19 on diet quality and nutritional status of children under-5 and women of child-bearing age in LMICs. All the research steps were described as recommended in the PRISMA statement[1]. The review protocol was drafted in June 2020, discussed with INTPA F3, the Joint Research Centre (JRC) and Capacity for Nutrition (C4N) representatives, and finalised in August 2020. Given the rapidly evolving landscape of COVID-19 evidence, the protocol was considered a living and adaptable document. Therefore, registering the protocol was not appropriate.

Eligibility criteria of studies are presented in Table 1. A list of nutrition and nutrition-related indicators was pre-set for each type of evidence sought. These indicators were in line with those presented in the Guiding Framework of Impact of the COVID-19 pandemic on food environments presented in Figure 1 (3,4), to which we added the dimension of food insecurity. The main outcomes were nutritional status, diet quality and food security indicators. Data on other, more distal, indicators (e.g. consumer behaviours, food availability and affordability) was also collected. Only studies with a design allowing inferences to be made on the impact of COVID-19 on nutrition, diet quality and food security were included (see Table 1).

We searched four databases (MEDLINE (Pubmed), EMBASE, Scopus and Web of Science) for peer-reviewed studies published up to 20th August 2020. Search strings can be viewed in Annex 1. MeSH terms were not used as their sensitivity was deemed to be low, given that the literature on COVID-19 pandemic is recent. We also searched studies in the grey literature by screening a pre-set list of institutions for efficiency purposes. The institutions and websites were selected based on their activities in monitoring the evidence-based impacts of COVID-19 on nutrition and food security, publishing sound evidence-based analysis or conducting web-screening and gathering evidence on this subject (see

Table 2).

Because of the rapidly accumulating new evidence, we performed two updates of the review (mid-November 2020 and early January 2021). For pragmatic reasons and due to time limitations, updates on the peer-reviewed literature were performed on two of the databases (Scopus and MEDLINE (Pubmed)), which cover the bulk of the natural science and social science articles published in academic outlets. Similarly, the updates of the grey literature were performed for: 1) Ethiopia and Guatemala, the two case study countries that provide further insights on policies and interventions in response to the COVID-19 outbreak; 2) reports included in the 1st search for which updates where expected.

References were imported into Mendeley (© 2020 Mendeley) where duplicates were detected and eliminated. Screening of search outputs was carried out in Rayyan[2] to eliminate irrelevant material based on title and abstract. All remaining reports and studies identified as potentially eligible were assessed on full-text.

Studies excluded at this stage are presented in Annex 3, with reasons for exclusion. The quality appraisal of included studies was based on the grids for observational studies proposed by the Joanna Briggs Institute[3]. These grids serve to appraise a number of items (e.g. appropriate sampling) in a systematic manner with no aim of yielding an overall quality score. Data extraction included: 1) information about study reference(s) and author(s); 2) verification of study eligibility; 3) study characteristics; 4) study methods; 5) participants;

---

[1] http://www.prisma-statement.org/PRISMAStatement/

[2] https://rayyan.qcri.org/welcome

[3] https://joannabriggs.org/critical-appraisal-tools

6) interventions; 7) outcomes measures and results. Study selection, quality appraisal, and data extraction were carried out by one researcher (FP).

A second researcher (DR) independently checked a sub-sample of publications with any doubtful inclusion/exclusion and the final decision being made by consensus. No meta-analysis was undertaken because of the wide variety of study designs and heterogeneity of outcomes reported.

Table 1. Inclusion & exclusion criteria for evidence retrieval

Indicators	Inclusion	Exclusion
Setting	LMIC	High income countries
Population	Children under-5 years and women/girls of childbearing age	
Indicators		
Outcome 1: Nutritional status	• Higher wasting rate in children under-5 • Higher Low Birth Weight rate • Higher Rate of (micronutrient) deficiencies • Higher/lower BMI	Studies reporting on obesity or co-morbidities (diabetes; hypoglycaemia; hypertension; eating disorders; gastrointestinal Syndrome; Metabolic Syndrome) as risk factors for COVID-19 infection
Outcome 2: diet quality	• Lower Minimum Dietary Diversity for Women (MDD-W) • Lower Minimum Acceptable Diet for children 6-12 (MAD) • Higher Household dietary Diversity Score (HDDS) • Reported changes in quantity and types of food consumed	
Outcome 3: food security	• Household Food Insecurity Experience Scale (H-FIES) • Household Food Insecurity Access Scale (HFIAS) • Coping Strategy Index (CSI)	
Consumer behaviours	• Source of foods (self-consumption, market, non-timber forest products, etc.), type of markets (open market, supermarket, etc.)	
Food availability	• Reduced production • Changes in trade flows • Disruptions in transportation of food	
Food affordability	• Reduced household income • Higher market prices	
Food accessibility	• Restricted access to markets • Market closures	
Disruption in health and nutrition services	• Lower vaccination coverage • Lower coverage of micronutrient supplements during pregnancy • Less treatment of acute malnutrition	
Study design (For outcomes 1-3)	• Longitudinal studies • Interrupted time series/before-after design/repeated cross-sectional surveys/ trend studies • Single cross-sectional survey with questions relating to outcomes before and after the pandemic	• Projection/predictive/modelling studies • Ecological studies • Individual case studies/series • Opinions • Editorial • No data-based analysis
Restrictions	• Language: none • Type of studies (quantitative/qualitative): none	

Table 2. Grey Literature: institutions and initiatives included in the purposive search

Name of Institution/Initiative	Website
ACAPS	https://www.acaps.org/countries
Big Data tool on food chains under COVID-19 pandemic	https://datalab.review.fao.org/
Country policy responses - ILO	https://www.ilo.org/global/topics/coronavirus/regional-country/country-responses/lang--en/index.htm#ET
COVID-19 and the food and agriculture sector - OECD	https://www.oecd.org/coronavirus/policy-responses/covid-19-and-the-food-and-agriculture-sector-issues-and-policy-responses-a23f764b/
COVID-19 and the Risks to the Nutritional outcomes of Children and Women in Eastern and Southern Africa	https://reliefweb.int/sites/reliefweb.int/files/resources/ESAR%20Joint%20Nutrition%20Partners%20Call%20to%20Action%2022%20JULY%202020.pdf
COVID-19 Food Price Monitor – IFPRI	http://tools.foodsecurityportal.org/COVID-19-food-price-monitoring
COVID-19 policy response portal - IFPRI	https://www.ifpri.org/project/covid-19-policy-response-cpr-portal
COVID-19 policy response tracker - IGC	https://www.theigc.org/covid-19/tracker/
Data to inform the COVID-19 response - UNICEF	https://data.unicef.org/topic/covid-19-and-children/
FAO Food Outlook (predicting global shortage of protein intake)	http://www.fao.org/3/ca9509en/CA9509EN.pdf
FAO Food Price Monitoring and Analysis (FPMA) tool	https://fpma.apps.fao.org/giews/food-prices/tool/public/#/dataset/domestic
FAO's Big Data tool on food chains under COVID-19 pandemic	https://datalab.review.fao.org/
FEWS NET COVID-19 and Food Security	https://fews.net/covid-19-pandemic-impacts-food-security
Food And Agriculture Policy Decision Analysis Tool - FAO	http://www.fao.org/in-action/fapda/tool/#main.html
Food Price Monitoring and Analysis - FAO	http://www.fao.org/giews/food-prices/home/en/
Food Security Portal	http://www.foodsecurityportal.org/COVID-19
Global Nutrition Cluster (GNC) support dashboard	https://app.powerbi.com/view?r=eyJrIjoiY2I5YmJmMDItZmJjMi00NDk4LTgyNmItMzViZGE2ZTM5OTVhIiwidCI6IjJjYjA1YzYyLTQ5ZGItNDFjMi05Zjg5LWI1ZjQ3MjQzNzg5NiJ9
IFPRI Resources and Analyses of COVID-19 Impact	https://www.ifpri.org/covid-19
IFPRI: Food Export Restrictions during the COVID-19 crisis	https://public.tableau.com/profile/laborde6680#!/vizhome/ExportRestrictionsTracker/FoodExportRestrictionsTracker
Impact of COVID-19 on SMEs in the food system - SUN	https://scalingupnutrition.org/news/impacts-of-covid-19-on-smes-in-the-food-system/
Innovation for Poverty Action	http://www.poverty-action.org/
Integrated Food Security Phase Classification portal	http://www.ipcinfo.org/
LSE Blog Series on COVID-19 in African Countries (including policy analysis)	https://blogs.lse.ac.uk/africaatlse/category/shifting-spaces/
LSMS-Supported High-Frequency Phone Surveys on COVID-19	https://www.worldbank.org/en/programs/lsms/brief/lsms-launches-high-frequency-phone-surveys-on-covid-19
Office for the Coordination of Humanitarian Affairs (UN OCHA)	https://fts.unocha.org/appeals/952/flows
Oxford Tracker of Government Response	https://www.bsg.ox.ac.uk/research/research-projects/coronavirus-government-response-tracker
Policy response to COVID-19 - IMF	https://www.imf.org/en/Topics/imf-and-covid19/Policy-Responses-to-COVID-19
Safeguarding Africa's food systems through and beyond the crisis – McKinsey	https://www.mckinsey.com/featured-insights/middle-east-and-africa/safeguarding-africas-food-systems-through-and-beyond-the-crisis#
Scaling Up Nutrition	https://scalingupnutrition.org/covid19/
Sistema de Información Nacional de Seguridad Alimentaria y Nutricional de Guatemala.	www.siinsan.gob.gt
The impact of COVID-19 on African Civil Society - INCLUDE	https://includeplatform.net/publications/the-impact-of-covid-19-on-african-civil-society-organisations-challenges-responses-and-opportunities/
The Market Monitor – WFP	https://www.wfp.org/publications/market-monitor
WFP Dashboard COVID-19	https://dataviz.vam.wfp.org/Dashboards/Hunger-Snapshots-Countries
WFP HungerMap LIVE: Hunger and COVID-19 Weekly Snapshot	https://www.hungermap.wfp.org
WHO African Region COVID-19 Dashboard	https://who.maps.arcgis.com/apps/opsdashboard/index.html#/0c9b3a8b68d0437a8cf28581e9c063a9
World Bank	https://www.worldbank.org/en/programs/lsms/brief/lsms-launches-high-frequency-phone-surveys-on-covid-19

Country case studies

Country selection

The selection of countries was made in collaboration with INTPA F3 and C4N. The following criteria were used to select countries:

- Expression of interest from the EU Delegation in being an EU Nutrition Priority Country
- Access to existing data and publication is granted:
    - Existence of a National Information Platform for Nutrition (NIPN)
    - Availability of data and scientific publications
    - Ongoing data collection by EUDs nutrition or nutrition-related programmes
- Nutrition-specific or nutrition-sensitive programmes were maintained, adapted or developed in response to the COVID-19 pandemic

Evidence retrieval

Firstly, the systematic literature review described above provided the groundwork for the case studies. In the case of Guatemala, AGRICOLA (AGRICultural OnLine Access) was also screened. Initiatives based on collecting and gathering data (such as data dashboards) were included.

Secondly, to ensure that the most relevant reports or information sources were included, Google and RSS feeds searches were conducted, integrating a systematic review search strategy (search strings are reported in the full case study reports). Other sources of information were assessed, using snowball methods. Governmental official websites were also searched. The quality of policy-related information retrieved from the web was assessed by checking their veracity against three renown reliable sources: IFPRI COVID-19 Policy Response Portal (14), Our World in Data (15), and the Oxford COVID-19 Government Response Tracker (16).

Finally, an early draft of the report was shared with selected stakeholders and experts based in the case study countries who have specialised knowledge on food and nutrition security and agriculture (the list of stakeholders' institutions contacted is presented in full case study reports). Consulted stakeholders were requested to complement information on data sources and interventions to mitigate the effect of the COVID-19 pandemic. This process helped assess the validity of the retrieved information and of the analysis presented in this report.

Results of the literature review

Three searches – end of August and mid-November 2020, mid-January 2021 – for both the peer-reviewed and grey literature were conducted. The first search yielded 1079 and 139 peer-reviewed and grey literature citations respectively, of which 16 (2 peer-reviewed and 14 grey literature studies) were included. The second search yielded 308 peer-reviewed and 48 grey literature papers and reports, of which 11 (5 peer-reviewed and 6 grey literature studies) were retained. The last search in January 2021, yielded 508 peer-reviewed papers and 29 grey literature citations, of which 10 (5 each for both types of studies) were included. Therefore, 35 primary studies were included, of which 10 were peer-reviewed and 25 were studies and reports retrieved from grey literature sources.

The overall selection process is presented in the PRISMA flow chart (Figure 2). Excluded studies are presented in Annex 3, with reasons for exclusion. The chart includes 12 report series conducted by the World Bank under the High-Frequency Phone Surveys on COVID-19 in Nigeria and Ethiopia (six reports respectively) (17,18).

Figure 2. PRISMA flowchart
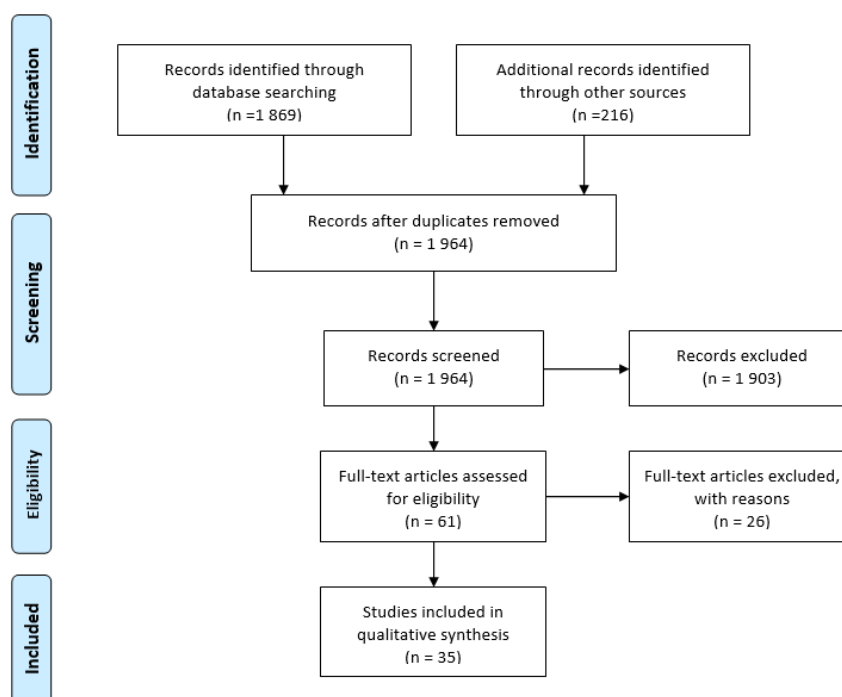
We summarize in Table 3 the number of studies found based on the selected outcome indicators.

Table 3. Number of studies based on selected outcome indicators

Indicators	Number of studies	Citations
Nutritional Indicators	0	
Diet quality (DQ) indicators: MDD-W; MAD; Household dietary Diversity Score (HDDS); Food Consumption Score (FCS) and other non-standardized measures	7	(19–25)
Food Security: Food Insecurity Experience Scale (FIES), Household Food Insecurity Access Scale (HFIAS), direct questions on food insecurity perceptions	11[4]	(17–21,25–30)
Food availability (FAV): changes in agricultural operations; changes in trade flows; disruptions of food transportation.	7	(17,31–36)
Food accessibility (FAC): restricted access to markets	5	(17,18,32,37,38)
Food affordability (FAF): income decline and food price increase	22	(17–27,29,30,32,34,37–42)
Disruption in health and nutrition services (HNS)	4	(17,18,27,35,40)

Table 4 summarises the main information of the search results, including outcomes measured and study design. We did not find any study designed to explicitly monitor food and nutrition of children under-5 years old and women of childbearing age. In terms of geographical coverage, the selected papers included Bangladesh (two studies) (30,38), Ivory Coast (one study) (40), Ethiopia (15 papers) (17,19–22,26,27,31,36), India (three papers) (23,32,41), Kenya (one paper) (25), Mexico (one paper) (28), Nepal (two papers) (33,37), Nigeria (seven papers) (18,29), Senegal (one paper) (37), South Africa (one paper) (42), Uganda (one paper) (25), Vanuatu (one paper) (34), and Zambia (one paper) (35). The 15 studies on Ethiopia include 6 rounds of the World Bank high-frequency phone survey conducted between May-October 2020. The 7 studies on Nigeria include 6 rounds of the World Bank high-frequency phone survey conducted between May-November 2020. Each of these 2 batches was referenced in the table as a unique entry for space reasons.

The majority of the studies were longitudinal (7 studies) and cross-sectional (13 studies) phone surveys. The remaining studies were: interrupted time series (1 study); phone exploratory qualitative assessment (2 studies); and repeated cross-sectional (3 studies). Data extraction tables and quality appraisal can be found in a separate document.

---

[4] The studies we report in this table include the 6 rounds of the World Bank high-frequency phone survey conducted in Nigeria and Ethiopia that are referenced once for space reasons.

Table 4. Summary table of included studies

*DQ: Diet quality, FAV: Food Availability, FAF: Food Affordability, FAC: Food Accessibility, FS: Food Security, HNS: Disruption in health and nutrition services, NU: Nutrition

Geographic area and citation	Sample and unit of analysis	Nationally representative	Survey round(s) and month	Study Design	Indicators*	Peer Review (P) or Grey Literature (G)
Bangladesh (30)	2424 Mothers/female carers[1]	No	1 Round: May to June 2020 (compared to baseline 2017-2019)	Interrupted time-series	FS; FAF	P
Bangladesh (38)	1876 households	No	1 Round: 7-15 September 2020	Cross-sectional face-to-face and online survey[2]	DQ, FS, FAC, FAF	P
Cote D'Ivoire (40)	666 Households	No[3]	1 Round – April 2020	Cross-sectional telephone survey	FAF; HNS	G
Ethiopia (17)	3,249 Households [4]	Yes	6 Rounds (May – October 2020)[5]	Longitudinal Phone Survey	FS; FAF; FAC; HNS	G
Ethiopia (21)	600 Households	No[6]	Rounds 1 May 2020	Longitudinal Phone Survey[7]	DQ; FS; FAV; FAF	G
Ethiopia (20)	589 Households	No	Round 2 June 2020	Longitudinal Phone Survey	DQ; FS; FAV; FAF	G
Ethiopia (19)	584 Households	No	Round 3 July 2020	Longitudinal Phone Survey	DQ; FS; FAV; FAF	G
Ethiopia (24)	577 Households	No	Round 4 August 2020	Longitudinal Phone Survey	DQ	G
Ethiopia (26)	2,471 young people[8]	No	1 Round: June-July 2020 (compared with 2016 data)	Longitudinal Phone Survey	FS; FAF	G
Ethiopia (31)	100 value chain actors[9]	No	1 Round: April-May 2020	Cross-sectional Phone Survey on qualitative aspects	FAV	G
Ethiopia (22)	1,188 Households[10]	No[11]	1 Round: June 2020	Cross-sectional phone survey	DQ[12], FAF	G
Ethiopia (36)	235 value chain actors [13]	No	2 Rounds: May 2020 (compared with Jan/Feb 2020 data)	Repeated cross-sectional phone survey	FAV; FAF	G
Ethiopia (27)	436 Households[14]	No	1 Round: July 2020	Cross-sectional phone survey	FA; FAF	G
India (23)[15]	448 Adult men and women[16]	No	1 Round: May 2020	Cross-sectional phone survey	DQ; FAF	P
India (32)	1515 farming households[17]	No	1 Round (early-April and mid-May 2020)	Cross-sectional phone survey	FS; FAV; FAC	P
Kenya and Uganda (25)	Kenya: 313 & Uganda: 129	No[18]	1 Round: April 2020	Cross-sectional Online Survey	DQ; FS, FAF	P

[1] All participants were mothers or female guardians of children enrolled in the Benefits and risks of iron interventions in children (BRISC) trial—a randomised controlled trial of preventive iron supplementation or placebo given to infants aged 8 months (ACTRN12617000660381) with a primary outcome of child cognitive development after 3 months of intervention. The BRISC trial was set in Rupganj upazila (county) of Narayanganj district, a rural area about 35 km northeast of Dhaka, which covers about 235 km² and comprises about 82000 households.

[2] Face-to-face survey was conducted in areas where contagion rates were low (green and yellow zones) while online surveys were conducted in areas with high contation rates (red zones). Data from 1164 (62 %) participants were collected randomly via face-to-face interviews, and data from 712 (38 %) participants were collected using online platforms.

[3] The study was conducted in 30 districts of Abidjan.

[4] By the time this study was finalised, the World Bank High-frequency Phone Survey in Ethiopia had conducted 6 survey rounds (early May-October 2020). Each round included a different sample sizes: Round1: 3,249; Round 2: 3,107; Round 3: 3,058; Round 4: 2,878; Round 5: 2,770; Round 6: 2,704.

[5] Round1: 2020-04-22/2020-05-13; Round2: 2020-05-14/2020-06-03; Round3: 2020-06-04/2020-06-26; Round4: 2020-07-27/2020-08-14; Round5: 2020-08-24/2020-09-17; Round6: 2020-09-21/2020-10-14. Survey Methodology document can be found at the following link: http://documents1.worldbank.org/curated/en/107141590729601148/pdf/Survey-Methodology-Document.pdf

[6] The study was conducted in Addis Ababa.

[7] Longitudinal reports conducted by IFPRI in Addis Ababa (13,10, 11, 35) were part of the same study.

[8] This includes 1,687 Younger Cohort respondents, aged 19, and 784 Older Cohort respondents, aged 25 years old.

[9] 100 Commercial and small dairy farmers dairy processors, traders, development agents, urban retailers, and consumers in rural and urban Ethiopia.

[10] Respondents were all beneficiaries of the fourth phase of Ethiopia's Productive Safety Net Program (PSNP4) and who also participate in the USAID-funded Strengthening PSNP4 Institutions and Resilience (SPIR) project.

[11] The study setting was rural Ethiopia: North Wollo and Wag Himra zones in Amhara, and primarily in East and West Hararghe zones in Oromia.

[12] The study includes one question asked about the variations of children's egg and fresh dairy consumption.

[13] Farmers include smallholders and investors (depending on the amount of land they were renting in) and they resided in the four major vegetable producing districts in East Shewa zone in the Oromia region (Adami Tulu, Bora, Dugda, and Lume). Urban wholesalers operated in Addis Ababa and urban retailers were located in five sub-cities in Addis Ababa.

[14] The population sample includes urban poor households and "special segment" population (i.e. particularly vulnerable groups such as day labourers). The study was conducted in 10 selected cities in Ethiopia: Addis Ababa, Mekelle, Dire Dawa, Adama, Gambela, Bahir Dar, Jigjiga, Bulehora, Logia, and Semera. Participants were part of the Urban Productive Safety Net Project (UPSNP), households who own a small-scale business (SSB), and refugees/IDPs/returnees.

[15] The study was conducted in Jharkhand, Assam, Andhra Pradesh, and Karnataka.

[16] All respondents were farmers and producing vegetables.

[17] 1275 farmers in Haryana State and 240 farmers in Odisha State participated in the survey.

[18] The questionnaire was sent to random respondents in Kenya and Uganda using social media (WhatsApp, Facebook, Telegram, and Twitter), and via email.

Table 4. Summary table of included studies (continued)

*DQ: Diet quality, FAV: Food Availability, FAF: Food Affordability, FAC: Food Accessibility, FS: Food Security, HNS: Disruption in health and nutrition services, NU: Nutrition

Geographic area and citation	Sample and unit of analysis	Nationally representative	Survey round(s) and month	Study Design	Indicators*	Peer Review (P) or Grey Literature (G)
Mexico (28)	833 Adult men and women[19]	Yes[20]	3 Rounds: April – June 2020	Cross-sectional Phone Survey[21]	FS	P
Nepal and Senegal (37)[22]	Adult male and female Nepal: 656 Senegal: 503	No	1 Round: June to mid-July 2020	Cross-sectional phone survey	FAF, FAC	G
Nepal (33)	25 key informants[23]	No	2 Rounds (Mid-April and Mid-October 2020)	Repeated key informant interviews and literature review	FAV	P
Nigeria (18)	1,950 Households[24]	Yes	6 Rounds: May-November 2020[25]	Longitudinal Phone Survey	FS; FAC; FAF; FAV; HNS	G
Nigeria (29)	Households and adult individuals Baseline sample: 4976 COVID-19 sample: 1950	Yes	2 rounds: May, June 2020 + Baseline Jul/Aug 2018	Panel Data	FS, FAF	G
South Africa (42)	30 Adult males and females[26]	No	1 round: month not mentioned (likely to be March or April)	Exploratory qualitative study (via phone)	FAF	P
Vanuatu(34)	31 Adult males and females[27]	No	1 round: April 2020	Cross sectional telephone rapid appraisal	FAV; FAF	P
Zambia(35)	40 self-employed women[28]	No	1 Round: March – July 2020	Cross-sectional telephone semi-structured interviews	FAV; HNS	P

---

[19] The study was included in 3 survey rounds with different sample sizes: Round1: 833; Round2: 850; Round3: 1,674.

[20] The monthly surveys were collected based on a one-stage probabilistic sample of mobile telephone numbers which were randomly selected from the publicly available National Dialing Plan.

[21] ENCOVID-19 was a monthly telephone cross-sectional survey, representative at a national level of individuals 18 years and older who have a mobile phone.

[22] Farmers in rural Nepal (Dang district of Province 5) and rural Senegal (across the country).

[23] Online Panel discussion and phone surveys were conducted between mid-April 2020 and mid- October 2020 among 10 government officers and 15 civil society and NGO officials working at different administrative levels.

[24] By the time this study was finalised, the World Bank High-frequency Phone Survey in Nigeria had conducted 6 survey rounds (May-November 2020). Each round included a different sample sizes: Round1: 1,950; Round 2: 1,820; Round 3: 1,737; Round 4: 1,691; Round 5: 1,656; Round 6: 1,640.

[25] Full methodological details were reported here: https://microdata.worldbank.org/index.php/catalog/3712.

[26] All individuals were residents of the Informal settlement in the city of Tshwane and they were beneficiaries of relief supplies from humanitarian organisations.

[27] 22 men and 9 women (all >18 years old) who have a position of leadership in the community were interviewed in 23 coastal sites.

[28] All respondents were self-employed women and resided in the district of Ndola in Zambia.

Nutritional indicators

No study reporting on nutritional status (e.g. BMI, child wasting and stunting) was found.

Diet quality indicators

Seven studies contained information on dietary quality using a variety of indicators (19–25), including: Household Dietary Diversity Score[1] (HDDS), Food Consumption Score[2] (FCS), food consumption and self-assessed diets variations since the start of the pandemic. No study reported on MMD-W and MAD. The reviewed studies illustrate that the pandemic had disrupted the diets of the surveyed population, especially in the early stages of the pandemic. In some examples, aggregate dietary diversity indicators deteriorated at early stages of the pandemic and recovered as the crisis matured (19–21,24). However, all studies suggest that there had been a shift from more nutritious food groups (e.g., vegetables, animal source foods) to cheaper ones (staples) raising concerns about the long-term effects of COVID-19 on healthy and diverse diets (19,20,22–25,43). One of the studies showed that female farmers were more adversely affected by dietary losses compared to their male counterparts (23).

Household Dietary Diversity Score – HDDS

In Ethiopia, diet quality measured in Addis Ababa by IFPRI was based on HDDS, collected across four survey rounds (May-August 2020), (19–21,24). The data indicated that HDDS dropped from 9.3 in January/February 2020 (pre-COVID-19 baseline) to 8.5 in May and June 2020 and 8.1 in July 2020. HDDS then increases to 9.4 points in August 2020 (**Erreur ! Source du renvoi introuvable.**). While the aggregate HDDS was stable in the May-July period, the disaggregated HDDS figures (Table 5) show that there was a steep decrease with regards to meat and poultry consumption, compensated by increases of other food groups. The authors suggested that the drop in animal source foods was likely to be related to early rumours of COVID-19 spread through food and the Orthodox fasting season (24).This was further corroborated by the increase of HDDS to 9.4 points in the subsequent survey round conducted in August after the fasting period (24).

Figure 3. Household Dietary Diversity Score among households in Addis Ababa in 2020
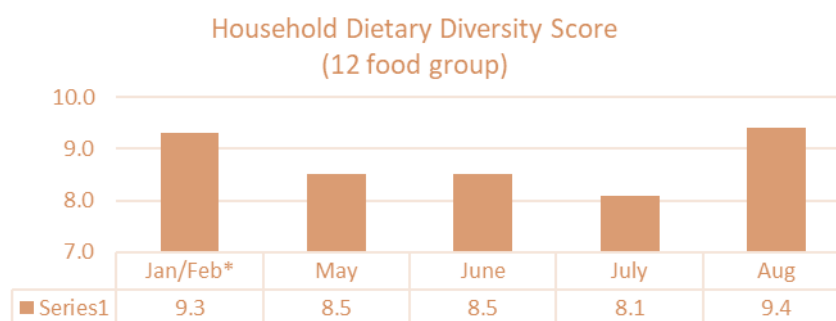
Household Dietary Diversity Score (12 food group)

	Jan/Feb*	May	June	July	Aug
■ Series1	9.3	8.5	8.5	8.1	9.4

Source: own reproduction using data published by International Food Research Institute(19–21,24). Observations = 600 households in Jan/Feb and May rounds; 589 in June; 584 in July; 577 in August. Note: HDDS = Household Dietary Diversity Score. The recall period is last 7 days.

---

[1] The Household dietary diversity Score (HDDS) is a qualitative measure of food consumption that reflects household access to a variety of foods. Household dietary diversity can be described as the number of food groups (for a maximum of 12 food groups) consumed by a household over a given reference period (i.e. 7 days). It was an important indicator of food security for many reasons. A more diversified household diet was correlated with caloric and protein adequacy, percentage of protein from animal sources, and household income (132).

[2] The Food Consumption Score (FCS) is an index that aggregates household-level data on the diversity and frequency of food groups consumed over the previous seven days. Each food group was weighted according to its relative nutritional value. For instance, food groups containing nutritionally dense foods, such as animal products, are given greater weight than those containing less nutritionally dense foods, such as tubers. Based on this score, a household's food consumption can be further classified into one of three categories: poor, borderline, or acceptable. The food consumption score was a proxy indicator of household caloric availability (133).

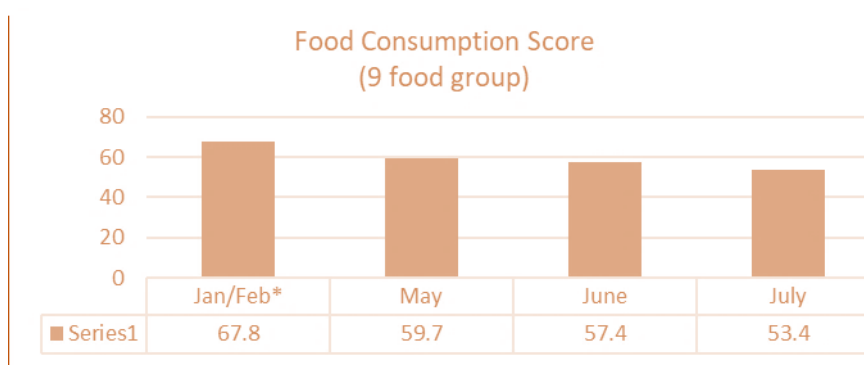*Table 5. Household Dietary Diversity Score: food group breakdown (Addis Ababa)*

HDDS food group	Jan/Feb survey	May phone survey	June phone survey	July phone survey
	%			
Cereals	100	100	100	100
Roots or tuber	79	67	78	88
Vegetables	100	99	99	99
Fruits	81	60	59	61
Meat or poultry	65	54	34	13
Eggs	52	54	43	24
Fish and seafood	3	2	3	1
Nuts or pulses	99	98	100	99
Dairy	56	45	45	30
Oil or fats	99	98	98	99
Sugar/honey	98	85	95	93
Miscellaneous food	100	93	97	99
Household dietary diversity score	**9.3**	**8.5**	**8.5**	**8.1**

Source: own reproduction using data published by International Food Research Institute (19–21,24). All months refer to 2020. Observations = 600 households in Jan/Feb and May rounds; 589 in June; 584 in July; 577 in August. Note: HDDS = Household Dietary Diversity Score. The recall period is last 7 days.

Food Consumption Score – FCS

In Addis Ababa (Ethiopia), IFPRI collected a Food Consumption Score (FCS) [3] over three survey rounds (May-July 2020) (19–21,24). The mean FCS was lower in the three phone surveys in May, June and July 2020 than in the in-person survey conducted in January-February 2020 (**Erreur ! Source du renvoi introuvable.**). Compared to pre-pandemic, baseline households were consuming fruit and animal source foods less frequently during the pandemic (Table 6). The decrease in vegetable consumption was marginal and the consumption of pulses dropped at the beginning of the pandemic, but returned to pre-pandemic levels in later survey rounds. The consumption frequency of animal source foods in July was lower than in other rounds, most likely because the July survey took place during an Orthodox fasting period.

Figure 4. Household Food Consumption Score in Addis Ababa.

	Jan/Feb*	May	June	July
■ Series1	67.8	59.7	57.4	53.4

Food Consumption Score (9 food group)

Source: own reproduction using data published by International Food Research Institute (19–21,24). All months refer to 2020. Observations = 600 households in Jan & Feb and May, 589 households in June and 584 households in July. Note: FCS = Food Consumption Score. The recall period is 7 days.

---

[3] Longitudinal phone survey; May-August 2020; sample size: Approx. 600 households; urban dwellers.

Table 6. Household Food Consumption Score food group breakdown (Addis Ababa)

FCS food group	FCS weight	Jan/Feb survey	May phone survey	June phone survey	July phone survey
Main staples	2	7.0	7.0	7.0	7.0
Pulses	3	5.5	4.8	5.4	5.6
Vegetables	1	7.0	6.7	6.8	6.7
Fruits	1	3.7	1.7	1.6	1.7
Meat, eggs, fish	4	2.8	2.6	1.8	0.8
Dairy products	4	2.2	1.6	1.6	1.2
Sugar	0.5	6.8	5.5	6.2	6.2
Oil /butter	0.5	6.7	6.8	6.8	6.8
Condiments	0	7.0	6.1	6.1	6.6
Food Consumption Score	**n/a**	**67.8**	**59.7**	**57.4**	**53.4**

Source: own reproduction using data published by International Food Research Institute(19–21,24). All months refer to 2020. Observations = 600 households in Jan & Feb and May, 589 households in June and 584 households in July. Note: FCS = Food Consumption Score. The recall period is 7 days.

Hirvonen et al. (24)[4] looked further into the average daily per capita kilocalorie consumption, by food groups in Addis Ababa (Table 7). As part of an existing study (44) authors had collected food intake baseline data for a randomised control trial (RCT) in August-September 2019 (577 households). They then collected food intake information via phone surveys in August 2020 from the same population. Using a cumulative distribution function (CDF) they compared per capita kilocalories consumed between September 2019 and August 2020. Authors found an increase in staple calories consumed, while per capita calorie consumption from legumes and nuts and vegetables had declined. They also found a small but statistically significant increase of per capita consumption of fruit. These results suggest that among the food groups that provide the largest shares of calories, there had been a shift from some relatively expensive foods (e.g., vegetables, legumes and nuts) to cheaper but less nutritious ones (staple foods).

Table 7. Mean weekly per capita consumption in kcal, per food group – Addis Ababa

Food group	September, 2019	August, 2020	Difference	Difference in % terms
Staples	1,025.9	1,263.6	237.7***	23%
Legumes and nuts	160.5	130.4	-30.1***	-19%
Vegetables	114.7	85.3	-29.4***	-26%
Fruits	33.2	39.8	6.6**	20%
Meat and eggs	51.0	54.4	3.4	7%
Dairy products	33.1	37.9	4.8	15%
All other foods	410.0	387.1	-22.9*	-6%
Total	**1,828.4**	**1,998.5**	**170.1*****	**9%**

*Source: own reproduction using data published by International Food Research Institute (24). All months refer to 2020. Observations = 577 in both rounds. Difference in means between the groups tested with a t-test (null hypothesis: difference in means =0). Statistical significance denoted with *p<0.10, **p<0.05, ***p<0.01.*

---

[4] Longitudinal phone survey; August 2020; sample size: 577 households; urban dwellers in Addis Ababa.

Other indicators

Children's dairy and egg consumption

In rural Ethiopia (regions of Oromia and Amhara) changes in children's dairy and egg consumption was assessed in June 2020[5] (22). When asked to compare whether the consumption of these products had changed between February and June 2020, 70% and 68% of parents reported that consumption of eggs and dairy had decreased respectively (drop in quantity consumed and regional breakdown were not provided).

Diet composition

In India[6], a study showed 62% of surveyed farm households experienced changes in their diets as a result of COVID-19 (survey conducted in May 2020, six weeks into the national lockdown and in the early stages of various states' relief packages)[7] (23). A majority of respondents reported the ability to maintain their staple food consumption, although 17% of households did report a fall in ability to procure staple foods. The largest falls in consumption were in fruit and animal source foods other than dairy, for around half of households. Pulse, dairy and vegetable consumption fell in 20–30% of households. Vegetables were the only food group where consumption reportedly increased, but only among 12% of respondents. The major reason for increases in vegetable intakes was eating the farm's own production, while reasons reported for reductions in vegetable consumption were mostly due to reduced physical access and affordability[8]. Women farmers were significantly more likely than men to report a stronger reduction in consumption of vegetables, fruit, and dairy products. Additionally, 8% of farmers reported that they were eating less food since the pandemic (of which 5% men and 16% women) and 12% were purchasing cheaper foods (6% men and 30% women).

In Kenya and Uganda[9], a study conducted in April 2020 (25) reported that 40% of respondents in Kenya and 55% of respondents in Uganda had changed their diets involuntarily since the outbreak of COVID-19. All respondents in both countries reported that the consumption of nutritious food had dropped since the pandemic (Table 8). For example, the regular consumption of fruit decreased by about 30% (in absolute terms) compared to the pre-COVID-19 period.

Table 8. Frequency of consumed food groups pre- and post-COVID-19 crisis, Kenya and Uganda

Food groups	Kenya (313 respondents)		Uganda (129 respondents)	
	Before (%)	After (%)	Before (%)	After (%)
Fruits	58	22	59	30
Vegetables	77	65	65	45
Fish and Seas Food	22	10	30	15
Meat	41	15	50	22
Poultry	39	20	41	25

Source: own reproduction using data published by Kansiime at al. 2020 (25)*; Frequency was defined as consuming a food group more than 10 times per month. Observations: =442; Self-Assessed online questionnaire collected in April 2020.*

---

[5] Cross-sectional phone survey; June 2020; sample size: 1188 households; rural households in North Wollo and Wag Himra zones in Amhara, and primarily in East and West Hararghe zones in Oromia (Ethiopia)

[6] Repeated cross Sectional online survey; March-April 2020; 448 vegetable farmers; locations: states of Jharkhand, Assam, Andhra Pradesh; Karnataka.

[7] The paper reports that the question was asked in binary terms as: "Has your household diet changed as a result of COVID-19?" Therefore, it was unclear if the effects of COVID-19 are intended from when the first cases were registered in India (Jan 2020) or since lockdown measures took place (24th March 2020).

[8] The paper suggests that even if vegetable farmers produce a variety of vegetables, their own production was not able to meet their consumption needs. The median number of vegetables produced was 3, the mean 4, and 30% of households produced five or more types of vegetable. The remaining vegetable required for their diets was purchased. In particular, the paper suggests that in some states (Jharkhand) the average land size was less than 1 ha and with rather limited diversity of vegetables produced.

[9] Cross-sectional study; online survey; April 2020; sample size: Kenya 313 respondents, Uganda 129 respondents; respondents represented a generally well-educated population; 60% of which were men. No rural urban classification was provided.

Food security indicators

Eleven[10] studies contained information on food security using a variety of indicators (17–21,25–30), including: Food Insecurity Experience Scale (FIES)[11], Household Food Insecurity Access Scale (HFIAS)[12] and self-assessed food insecurity questions. The reviewed studies suggested that levels of food insecurity during the pandemic were high, but the depth and duration varies across and within countries.

Food Insecurity Experience Scale – FIES

In Nigeria[13], the nationally representative household high-frequency phone survey was conducted by the World Bank over six rounds from May to November 2020 to monitor the socioeconomic impact of the COVID-19 pandemic and other shocks (18). Food security was measured via the FIES and data was collected in two rounds only (June and August 2020). Pre-pandemic FIES levels are also available (July/August 2018). Table 9 reports the results and indicate that both moderate and severe food insecurity were more prevalent during the early stages of the pandemic than during the pre-COVID-19 period (18). For example, the share of households experiencing moderate or severe food insecurity in Nigeria was 51.1% in July/August 2018, which increased to 76.8% in June 2020 and remained high at 68% in August 2020. The food security situation in the settings examined remained precarious, even after lockdown restrictions were loosened in early July 2020[14].

Table 9. Food insecurity Experience Scale (FIES) in Nigeria

	July/August 2018	June 2020	August 2020
	% Households		
Moderate and Severe Food Insecurity	51.1	76.8	68.4
Severe Food Insecurity	13.8	30.4	31.7

Sources: own reproduction using data published by World Bank High Frequency Phone Survey in Nigeria (18). Observations: July/Aug 2018: 4,976 households; June 2020: 1820 households; August 2020: 1789 households. FIES recall period used: 30 days.

A study that uses the same dataset as the previous study (29) looks closer at three FIES sub-questions between the pre-COVID-19 baseline and during the pandemic (round 2, June 2020). Table 10 provides the summary of three FIES sub-questions for the pre-pandemic period and the early stages of the outbreak.

Table 10. Pre and Post COVID-19 Food insecurity in Nigeria

	July/August 2018	June 2020
	% Households	
Skipping Meals in the past 30 days	26	73
Running out of food in the past 30 days	25	57
Going without eating for a whole day in the past 30 days	5	24

Sources: own reproduction using data published by Amare et al. 2020 (29). Overview of selected Food Insecurity Experiences Scale sub-questions. Observations: July/Aug 2018: 4,976 households; June 2020: 1820 households. FIES sub-questions recall period used: 30 days.

---

[10] The studies we report in this table include the 6 rounds of the World Bank high-frequency phone survey conducted in Nigeria and Ethiopia that are referenced once, for space reasons.

[11] The Food Insecurity Experience Scale (FIES) is an experience-based food insecurity indicator. The FIES module can be administered with either a 1-month or 12-month recall period and consists of eight standard questions capturing a range of food insecurity severity, with yes/no responses. While developed primarily to measure the individual experience of food insecurity, the scale can also be modified for use at the household level, in which case the questionnaire can be administered to an individual who responds on behalf of the household (134).

[12] The Household Food Insecurity Access Scale (HFIAS), was an experience-based food insecurity indicator similar to FIES and developed by the USAID FANTA initiative (135).

[13] Nationally representative longitudinal phone survey; 6 Rounds: May-November 2020; Sample size: Round1: 1,950; Round 2: 1,820; Round 3: 1,737; Round 4: 1,691; Round 5: 1,656; Round 6: 1,640.

[14] Information extracted from the Policy Stringency Index, available at:
https://ourworldindata.org/coronavirus/country/nigeria?country=~NGA#government-stringency-index

Food security in Ethiopia was assessed via the FIES[15], gathered through two rounds of the nationally representative World Bank high frequency telephone surveys (17). Nearly half of the interviewed households (about 47% in June and 46% in July) had experienced moderate or severe food insecurity (**Erreur ! Source du renvoi introuvable.**). The prevalence rates were constant in both rural and urban areas during the two rounds and the percentage of mild food insecure households is higher (by 4% points) in rural areas. This raises a number of concerns, as food insecurity is generally more severe in rural areas compared to urban contexts. This anomaly could be due to selection bias caused by the phone-survey methods. Although the World Bank methodology attempts to limit selection bias as far as possible, it is plausible that phone surveys are less likely to capture poorer households. While these numbers are dramatic, we are not able to compare these figures with the pre-pandemic period as data were unavailable. Table 11 illustrates the prevalence of the Food Insecurity Experience Scale by wealth quintile, and highlights, unsurprisingly, that food insecurity is more severe among the poorest households compared to the richest quartile.

Figure 5. Household Food Insecurity Experience Scale in Ethiopia
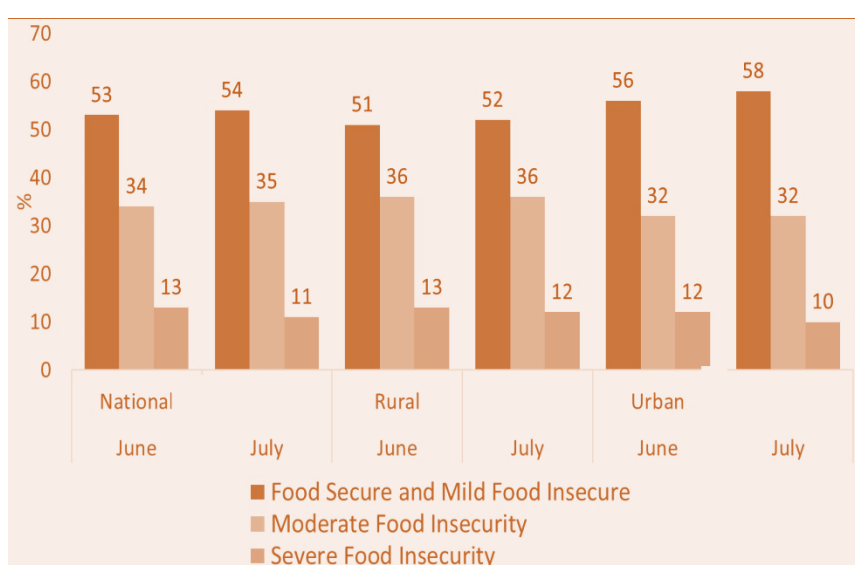
Source: Own reproduction from data by World Bank High-frequency Phone surveys in Ethiopia (25). All month refers to 2020. Observation: June: 3,107; July: 3,058. FIES recall period used: 30 days.

Table 11. Prevalence of Household Food Insecurity by wealth quartile in Ethiopia (%)

	June 2020				July 2020			
	Moderate & severe	MoE	Severe	MoE	Moderate & severe	MoE	Severe	MoE
Q1 (poorest)	61.4	13.4	19.2	9.5	58.4	13.5	19.7	10.5
Q2	47.2	11.1	12.4	6.5	44.7	11.3	10.4	6.4
Q3	51.8	10.0	13.2	7.1	54.1	10.0	13.0	7.0
Q4 (richest)	31.1	7.7	6.8	3.7	28.7	7.4	4.0	2.8

Source: Own reproduction from data by World Bank High-frequency Phone surveys in Ethiopia (25). All months refer to 2020. Observation: June 2020: 3,107; July 2020: 3,058. FIES recall period used: 30 days. Note: Prevalence by population, MoE=margin of error.

---

[15] Longitudinal Phone Survey; 6 Rounds: May-October 2020; Sample size: Round1: 3,249; Round 2: 3,107; Round 3: 3,058; Round 4: 2,878; Round 5: 2,770; Round 6: 2,704; nationally representative.

In Addis Ababa, the study by IFPRI[16] (19–21) reported a slight improvement of FIES between May-July 2020. **Erreur ! Source du renvoi introuvable.**5 reports the FIES between May and July 2020. Approximately 20% of the population was food secure, and 80% suffered some level of food insecurity. In May and June about 6% of survey households were severely food insecure, while in July this fell to 3%. This marginal improvement in food security in July is not shared equally: authors observe that in July, FIES levels were higher among female-headed and poorer households (19–21).

Figure 6. Household Food Insecurity Experience Scale in Addis Ababa
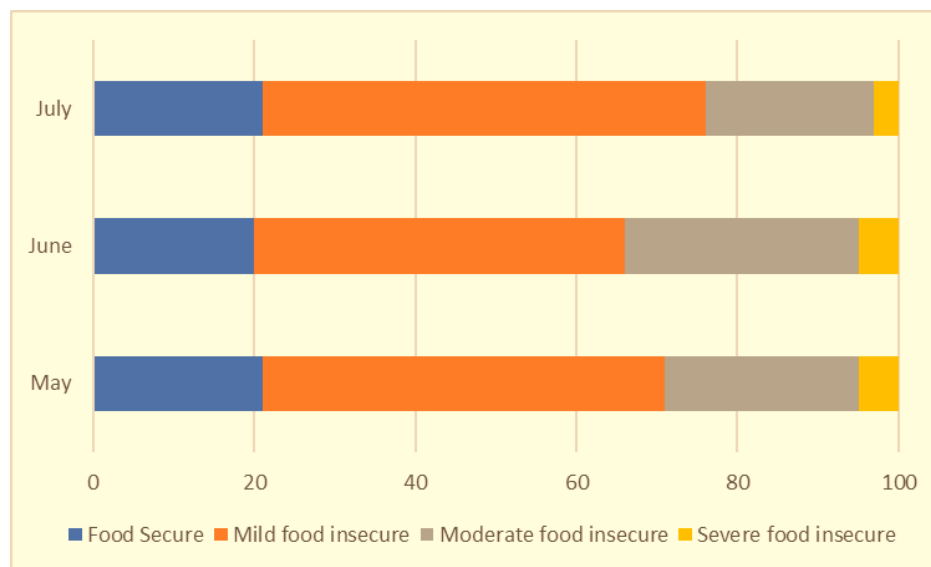
Source: own reproduction using IFPRI data on Addis Ababa COVID-19 phone surveys (19–21). Observations = 600 May 2020; 589 in June; 584 in July. FIES recall period used: 30 days.

Table 12 illustrates self-assessed pre-COVID-19 and post-COVID-19 food insecurity situations (measured with FIES)[17] in Kenya and Uganda (25). The upper part of the table shows the results for three food security levels: compared to a normal period, the findings revealed that the number of food-insecure households increased from 50% to 88% in Kenya and from 43% to 87% in Uganda. Severe food insecurity rose by 20 % and 7% in Kenya and Uganda respectively. The lower half of the table presents the results for the eight questions that constitute the FIES. The results show that food insecurity worsened during the period of the pandemic compared to a normal period. For instance, during the COVID-19 period in Kenya, more than half of the respondents were worried about insufficient food, unable to eat healthy and nutritious food, ate reduced portions of food, and consumed limited food varieties. Similarly, the number of respondents in Uganda who reduced the amount of food eaten, were unable to eat healthy and nutritious food, consumed less diverse diets, or were worried about not having enough food to eat increased significantly by about 30%, 35%, 45%, and 50% respectively during COVID-19, relative to a normal period. A conspicuous difference between the results for the two countries relates to the most severe FIES items on feeling hungry and not eating and going a whole day without eating. The share of respondents who experienced these two food insecurity situations was higher in Kenya than in Uganda and with statistically significant differences between COVID-19 and normal periods only in the case of Kenya. Authors link poorer food insecurity levels in Kenya to the country's dependency on food imports that make the country more vulnerable to food market fluctuations. Overall, the evidence presented in Table 13 was indicative of a deteriorating food security situation among respondents who, before the COVID-19 outbreak, were food secure on average.

---

[16] Longitudinal phone survey; May-August 2020; Sample size: May 2020: 600households; June 2020: 589 households; July 2020: 584 households; August 2020: 577 households; urban dwellers in Addis Ababa.
[17] Cross-sectional study; online survey; April 2020; Sample size: Kenya 313 respondents, Uganda 129 respondents; respondents represented a generally well educated; 60% of which were men. No rural urban classification was provided.

Table 12. Food Insecurity Experience Scale pre- and post-COVID-19 in Kenya and Uganda (%)

Food security indicator	Kenya (n=313)		Uganda (n=129)		Full sample (n=442)	
	Post-COVID[†]	Pre-COVID	Post-COVID[†]	Pre-COVID	Post-COVID[†]	Pre-COVID
Food insecure	88***	50	87***	43	87***	48
Moderately or severely food insecure	55***	18	40***	10	50***	16
Severely food insecure	26***	6	9***	2	21***	5
1. Worried about not having enough food	74***	29	63***	14	71***	25
2. Unable to eat healthy/nutritious food	56***	23	51***	16	55***	21
3. Ate only few kinds of foods	72***	3	74***	29	72***	30
4. Skipped a meal	42***	19	27***	12	38***	17
5. Ate less amount of food	56***	24	48***	19	54***	23
6. Ran out of food	38***	18	16***	8	31***	15
7. Felt hungry but did not eat	37***	19	19	12	32***	17
8. Went without eating for a whole day	22***	14	9	8	19***	12

Source: reproduction using Kansime et al. (25) Notes: *** denotes that the mean difference between COVID-19 and normal periods was significant at the 1% level. [†]: questions are asked as self-assessment pre- and post-COVID-19 in April 2020. 1 to 8 represent FIES underlying questions.

In Mexico[18], Gaitan-Rossi et al. (28) measured how food insecurity changed across three cross-sectional ENCOVID-19 waves (i.e. April, May and June 2020). The state of food insecurity of up to 1,164 households was measured with the eight-item adult version of the *Escala Latinoamericana y Caribena de Seguridad Alimentaria* (ELCSA) developed on the basis of the FIES[19]. Data on ELCSA are also available for Mexican National Health and Nutrition Survey (ENSANUT) 2018, to which ENCOVID-19 surveys are compared (Table 13). In 2018, 44.8% of households were food secure, but this proportion dropped to 38.9% in April 2020, 33.2% in May 2020 and 30.6% in June 2020. Mild food insecurity reached its highest level in May (41.7%) and moderate food insecurity in June 2020 (19%). Severe food insecurity in June 2020 was not statistically different from the 2018 prevalence, probably due to low statistical power. The authors reported a *clear dose–response gradient* between socio-economic status (SES) and the severity of food insecurity. Even though mild food insecurity was present at every SES level, moderate and severe food insecurity increased among lower socio-economic groups.

Table 13. Household Food Insecurity: pre- and post-COVID19 comparison* in Mexico

	ENSANUT 2018			ENCOVID-19 April			ENCOVID-19 May			ENCOVID-19 June		
	Prop	CI		Prop	CI		Prop	CI		Prop	CI	
Food security	44.7	43.9	45.6	38.9	35.6	42.2	33.2	29.6	36.7	30.6	28.0	33.2
Mild FI**	31.0	30.4	31.7	33.6	30.3	36.9	41.7	37.7	45.7	39.2	36.4	42.0
Moderate FI	14.9	14.4	15.4	17.2	14.5	19.8	13.3	10.3	16.3	18.6	16.4	20.9
Severe FI	9.3	8.9	9.7	10.3	8.2	12.4	11.7	8.8	14.6	11.5	9.6	13.4

Source: reproduction using Gaitan-Rossi et al. (28). Notes: *The Prevalence comparisons are between the Mexican National Health and Nutrition Survey (ENSANUT) 2018 and the three ENCOVID-19 surveys from April, May and June 2020. **FI: Food Insecurity. Observations: ENSANUT 2018: 44,509; April 2020: 833; May 2020: 850; June 2020: 1,674.

---

[18] Telephone cross-sectional survey; Baseline 2018 compared with April-June 2020; Sample size: ENSANUT 2018: 44,509; April 2020: 833; May 2020: 850; June 2020: 1,674 ; The monthly surveys were collected based on a one-stage probabilistic sample of mobile telephone numbers which are randomly selected from the publicly available National Dialing Plan.

[19] Authors explain that ELCSA has been extensively validated for Mexico and was widely used in the country to measure multidimensional poverty (28).

Household Food Insecurity Access Scale – HFIAS[20]

In Ethiopia[21], a study was conducted among young individuals (19-25 years old) between June-July 2020 (26). All were participants of a cohort study in 2016; 17% of respondents reported running out of food at least once since the start of the outbreak. The authors' assumption is that food insecurity before the pandemic was a risk factor. Individuals most at risk of food shortages during the pandemic were those already considered food insecure in the previous survey round in 2016. Such "long-term food insecurity" was more prevalent in urban areas, where 27% of those who were previously food insecure in 2016 also ran out of food during the virus outbreak. Of those who were classed as food secure in 2016, 15% reported running out of food during the pandemic. Authors further explain that alongside food shortages due to the pandemic, some respondents would also have experienced crop damage caused by locust swarms in the north and east of the country (45).

In rural Bangladesh[22], HFIAS was assessed before and after the pandemic (30). Before the pandemic, 5.6% and 2.7% of families experienced moderate and severe food insecurity, respectively. This increased to 36.5% and 15.3% during the lockdown. The number of families experiencing any level of food insecurity increased by 51.7% (Table 14).

Table 14. Household Food Insecurity Access Scale: pre-and post-COVID-19 in rural Bangladesh

	Baseline (July 2017-February 2019)	During Lockdown (May-June 2020)
	% Respondents	
Food Secure	80,7	30,6
Mild Food Insecure	11,0	17,6
Moderate Food Insecure	5,6	36,5
Severe Food Insecure	2,7	15,3
Sample	2420	2417

Source: own reproduction using data from Hamadani et al. (30). Sample size: Baseline: 2420; May-June 2020: 2417 Households. Primary respondents: mothers/female carers. HFIAS recall period: 30 days.

Food insecurity perceptions during the pandemic and evidence from qualitative studies

In Ethiopia, a report by the Oxford Policy Management (OPM)[23] on urban vulnerable households (27)[24] showed that, for population strata whose survival depends on daily generated income, restrictions and lockdowns led to food insecurity: the percentage of households who consumed an average of three meals a day reduced from 87.6% before COVID-19 to 62.2% at the time of the interview.

---

[20] The Household Food Insecurity Access Scale (HFIAS), was an experience-based food insecurity indicator similar to FIES and developed by the USAID FANTA initiative (135).

[21] Longitudinal Phone Survey; June-July 2020; Sample size: 2,471 individuals ; youth 19 to 25 years old.

[22] Interrupted time-series; May to June 2020 (compared to baseline 2017-2019); Sample size: Baseline: 2420; May-June 2020: 2417 Households. Primary respondents: mothers/female carers.

[23] Cross-sectional; July 2020; Sample Size: 436 households in 10 urban areas of Ethiopia; urban poor households and "special segment" population (i.e. particularly vulnerable groups such as day labourers).

[24] The 10 selected cities in Ethiopia include: Addis Ababa, Mekelle, Dire Dawa, Adama, Gambela, Bahir Dar, Jigjiga, Bulehora, Logia, and Semera. The study was conducted among 436 households part of Urban Productive Safety Net Project (UPSNP), households who own a small-scale business (SSB), and refugees/IDPs/returnees. The study had planned to conduct monthly interviews between July-December 2020.

Food accessibility indicators

We extracted information on food access from five studies (17,18,32,37,38). Similarly to the previous indicators, food access was not measured in a uniform manner between studies. Another challenge was the fact that food access is an umbrella concept that needs to be further disaggregated to explore the mechanisms that shape it: physical food access; financial access or food affordability; as defined in this report. When available, further explanations about financial access due to a fall in income or food price increases are reported in the food affordability section. Overall, the reviewed studies indicated food access was affected negatively since the start of the pandemic and hit poorer households to a larger degree. The studies that reported access to different food items show that the changes were product specific, suggesting heterogeneous impacts across different food value chains. We observed that in Ethiopia there was a recovery a few months after the beginning of the pandemic.

In Nigeria[25], in the World Bank High-Frequency Phone Survey (18), access to food was measured by looking at the percentage of households that needed to purchase basic food stuffs (rice, beans, cassava, yams and sorghum) but could not purchase them (2nd and 4th column of Table 15). The report points out that, since the easing of lockdown measures (in early July 2020), the difficulties faced by Nigerian households to access staple foods were alleviated, but constraints remained for many households. The share of households that needed but were unable to access staple foods decreased between April/May and July 2020 for four of the five major staple foods. The largest improvement was for cassava. However, the share of households unable to access some staple foods remained high in July 2020: 62% of households who needed yam were unable to access it, while 37% of households who needed rice were unable to purchase it. Lack of money and an increase in prices were the predominant reasons why households were unable to purchase these staples (reported in the next section).

Table 15. Access to staple foods in Nigeria

	R1 (April/May)		Round 3 (July)						
	Needed to buy (% of HHs)	Could not buy (% HH that needed to buy)	Needed to buy (% of HHs)	Could not buy (% HH that needed to buy)					
				All HHs	Q1	Q2	Q3	Q4	Q5
Rice	61.5	40.9	79.5	36.6	53.6	51.7	39.8	35.9	22.0
Beans	59.7	35.4	77.6	25.8	36.4	32.6	29.9	27.0	14.9
Cassava	48.2	33.8	64.1	17.6	30.4	24.8	13.9	17.0	12.1
Yams	49.4	59.0	56.0	61.7	74.4	69.7	57.7	60.7	57.0
Sorghum	39.4	30.9	44.4	24.3	26.9	28.0	18.0	28.0	21.8

*Sources: Own reproduction from data by World Bank High-frequency Phone surveys in Nigeria (18). *rice, beans, cassava, yams and sorghum. Observations: April/May 2020: 1,950; July 2020: 1,737. Recall data: past 7 days. All months refer to 2020.*

In rural Senegal[26], the survey conducted in June and mid-July 2020 (37) revealed that 80% of respondents self-reported that they had reduced access to food since the pandemic (albeit the size of decrease and mechanisms behind the reduction were not described).

---

[25] Longitudinal Phone Survey; 6 Rounds: May-November 2020; Sample size: Round1: 1,950; Round 2: 1,820; Round 3: 1,737; Round 4: 1,691; Round 5: 1,656; Round 6: 1,640; nationally representative.

[26] Cross-sectional phone survey; June mid-July 2020; 503 households; rural households

In Ethiopia[27], physical access to food was assessed by asking respondents of a nationally representative World Bank high frequency telephone survey whether their household had been able to purchase enough of some important food items during the seven days preceding the interview (17). Food items included teff, wheat, maize and edible oil. From May to August 2020, most households were able to buy the items they needed (Figure 7. Proportion of households with access to food staples in Ethiopia

Of the five monitored items, teff was the most difficult to buy: one third of households reported that they were unable to buy enough. All other staple food items maintained their baseline profiles, although access to maize gradually declined between May and September and started to recover in October 2020.

Figure 7. Proportion of households with access to food staples in Ethiopia
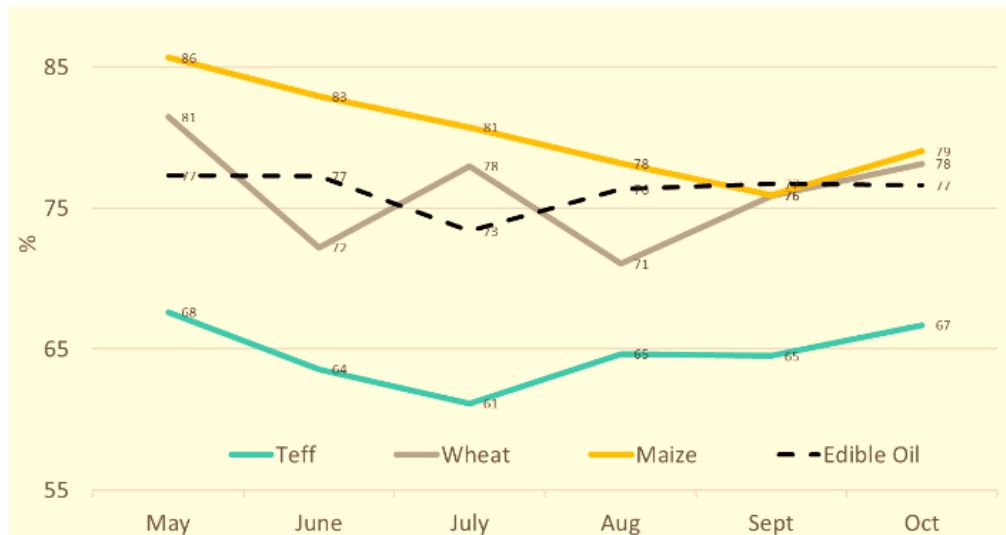
Source: Own reproduction from data by World Bank High-frequency Phone surveys in Ethiopia (17). All months refer to 2020. Observations: May: 3,249; June: 3,107; July: 3,058; August: 2,878; September: 2,770; October: 2,704. Recall period: past 7 days.

In Bangladesh[28], Kundu et al. (38) indicate that 45.3% and 61.0% of interviewed households in September 2020 reported that they did not access the same quantity or type of food as they did prior to COVID-19, respectively. In India[29], the study conducted by Ceballos et al. (32) reported the perceived access to food by farmers in the states of Haryana and Odisha[30]. In Haryana, farmers did not face difficulties accessing different kinds of food in the market before the COVID-19 pandemic. However, in the period after the lockdown 25% of farmers reported that they were either unable to access food due to market unavailability or because of price increases (the breakdown was not provided). In Odisha, one of the poorest states of India, before the lockdown almost 90% of the population was unable to access sufficient diversity of foods because of market unavailability or high prices. During the lockdown there was a slight decrease of the food insecurity situation. The authors suggest that key factors that may have insulated farmers in Odisha from further food insecurity could include shorter value chains, as a number of fruits and vegetables are grown locally and homestead gardens are popular in Odisha state. Finally, another key factor was a well-functioning public distribution system of food. However, given the pre-existing high levels of insufficient access to diverse foods could also mean that there was little room further deterioration.

---

[27] Longitudinal Phone Survey; 6 Rounds: May-October 2020; Sample size: Round1: 3,249; Round 2: 3,107; Round 3: 3,058; Round 4: 2,878; Round 5: 2,770; Round 6: 2,704; nationally representative.

[28] Cross-sectional face-to-face and online survey; September 2020; sample size: 1876 households; random selection, no particular group targeted.

[29] Cross-sectional phone survey; early-April and mid-May 2020; sample size 1275 farmers in Haryana State and 240 farmers in Odisha State; farmers.

[30] The survey conducted in Mid-April and mid-May 2020 included questions on affordability of food in the month prior to the interview (during the lockdown) and the month before the start of lockdown.

Food availability indicators

In total seven studies reported food availability indicators (17,31–36). Because standardised indicators were not used, the analysis is reported in two sub-sections. The first section summarizes the evidence found on the impacts of the pandemic and lockdown on food value chains and agricultural operations (4 studies: 31–33,36); the second sub-section reports the results from surveys that asked consumers about availability of food in markets (3 studies: 17,34,35). The studies on the impacts of COVID-19 and the lockdown on value chains and farming operations provide a small snapshot of the status of a few value chains: dairy products and vegetables in Ethiopia; wheat and pulses in India; and a more generic overview of Nepal's food system. These studies suggested that shorter value chains were better placed to survive the pandemic and movement restriction measures. However, poorer farmers living in areas with lack of adequate storage facilities and infrastructures were adversely affected by the marketing delays posed by restriction measures. Studies that asked consumers about availability of food in the market gave heterogeneous results: in Ethiopia, food unavailability was contained in the initial stages of the pandemic, while in other contexts (such as female market workers in Zambia or isolated areas like Vanuatu) food availability was compromised due to the pandemic (please see below for reasons).

Food value chains and agricultural operations

In Ethiopia, two studies conducted by IFPRI offered an overview of the production systems of two food value chains in Addis Ababa: dairy[31] (31) and vegetables[32] (36). Tesfaye et al.'s study on the disruption on the dairy market in April-May 2020 reported that initial rumours/panic of transmission of COVID-19 through raw milk negatively affected distributors, collectors and rural farmers in the dairy sector (31). As a result, more milk was processed, butter supply rose, and butter prices fell sharply in rural areas. Some dairy producing households reported incidences of wasted milk while others indicated increases of own dairy consumption (no percentages are provided in the report). However, despite these initial adverse effects, markets stabilised and all farmers taking part in the study reported that overall production had not fallen since the start of the COVID-19 crisis.

In Addis Ababa, Hirvonen et al. (36) looked at variations and disruption of marketing opportunities in the vegetable sector (tomatoes, onion, green pepper and cabbage) compared to before the pandemic (January-February 2020 pre-pandemic baseline, May 2020 post-pandemic period). They found heterogeneous price changes for different vegetables with relatively larger changes seen at the farm level. Authors believed that farm gate price increases (that were found for tomatoes and onions but not for cabbage and green peppers) were due to disruptions of established trade linkages due to movement restrictions and border closures. The reductions in both international trade and domestic trade between regions (Oromia and the Amhara region) seem to have increased the reliance of Addis Ababa on vegetables produced in the Central Rift Valley. This had led to winners and losers among local vegetable farmers due to pandemic-related trade disruptions. They further note that the main effects on the value chain (transport and distribution) were felt during the early stages of the pandemic with relatively small impacts on marketing margins.

In the two Indian states of Haryana and Odisha[33], 41% and 80% of farmers, respectively, reported in April and mid-May 2020 having to spend more financial resources on their harvest than usual due to the lockdown (32). In both states, most farmers (61% Haryana and 74% Odisha) could not sell their harvest immediately upon harvest, but thanks to better storage facilities in Haryana, the loss was limited. In Odisha, losses were more pronounced, with 74% of farmers having to sell with a delay because of travel restrictions.

---

[31] Cross-sectional phone survey; April-May 2020; Sample size: 100 Commercial and small dairy farmers dairy processors, traders, development agents, urban retailers, and consumers in rural and urban Ethiopia.
[32] Repeated cross-sectional phone survey; March and April 2020; Sample size 235 individuals; Sample includes smallholders farmers and investors in rural areas and urban wholesalers and retailers.
[33] Cross-sectional phone survey; early-April and mid-May 2020; Sample size 1275 farmers in Haryana State and 240 farmers in Odisha State ; farmers.

Finally, in Nepal[34] (33) lockdown measures were reported to have adversely impacted food availability through production, as well as trade/distribution, as the supply chains of inputs and farm products were disrupted. The study also suggested that traditional smallholder farms were somewhat more resilient in the face of COVID-19 as they depended on local inputs (local indigenous seeds, compost, and family and community labour exchange) as opposed to commercial or semi-commercial farms, which were harder hit. Larger commercial businesses produce mainly perishable goods. Producers of these commodities faced greater problems in the pandemic due to the lack of resilient supply networks to reach local markets and the inability of the Government in helping in the marketing of the products. Lower resiliency of commercial farming was also caused by their growing dependence on inputs (mainly seeds and fertilizer) from distant markets located in foreign countries (i.e. India).

Consumer's food availability

In Ethiopia, the World Bank high-frequency phone interviews (17)[35], assessed food availability during the pandemic. Households were asked to indicate the main reason they were not able to purchase a basic basket of items that included: edible oil, teff, maize, wheat and medicines. Overall, food unavailability affected a small proportion of respondents. At the beginning of the COVID-19 crisis, 10% of respondents in rural areas reported that the main obstacle to buying basic items was due to closure of local markets. However, in urban areas, about the same proportion of respondents reported that shops running out of stocks was the main obstacle. Over time, once local markets were allowed to operate, shops' barriers to replenishing stocks became the main problem among 10% of the population in rural areas and almost 8% in urban areas.

Figure 8. Inability to Purchase Items due to market availability in Ethiopia
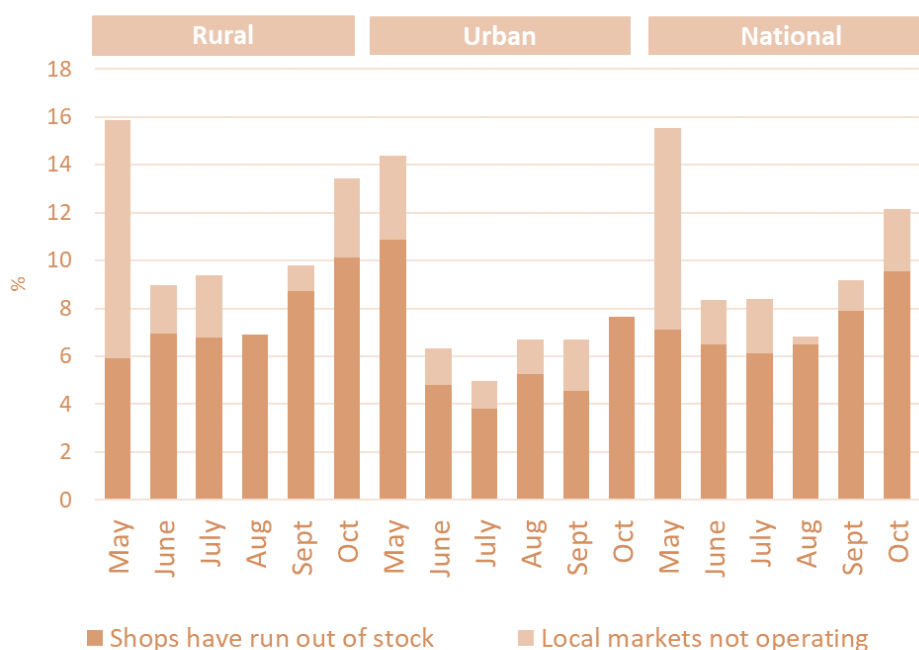
Source: Own reproduction from data by World Bank High-frequency Phone surveys in Ethiopia (17). All months refer to 2020. Observations: May: 3,249; June: 3,107; July: 3,058; August: 2,878; September: 2,770; October: 2,704. Data refer to % of Households.

---

[34] Repeated key informant interviews and literature review Mid-April and Mid-October 2020; Sample size: 25 key informants; authors conducted a literature review and a series of panel discussion and key informant interviews with 10 government officers and 15 civil society and NGO officials working at different administrative levels.

[35] Longitudinal Phone Survey; 6 Rounds: May-October 2020; ; Sample size: Round1: 3,249; Round 2: 3,107; Round 3: 3,058; Round 4: 2,878; Round 5: 2,770; Round 6: 2,704; nationally representative.

In Zambia[36], a similar approach was adopted (35). The study revealed that all self-employed women taking part to the study expressed concerns about inadequate food supplies as a result of closing down of markets to limit the virus spread. This measure also impacted on their ability to generate income and food insecurity as all respondents relied on daily earnings in order to purchase food for daily needs. Finally, an assessment of food availability in April 2020 in Vanuatu[37] (34) highlighted that these islands depended primarily on trade and exchanges from the mainland and neighbouring larger islands. Among the community leaders of the 23 fishing villages that were interviewed, nine managed to provide food thanks to gardens and markets. The worse affected communities in terms of food shortage were from outer-island sites. The main causes of food availability included: inter-island travel restrictions due to COVID-19 that were compromising otherwise sufficient stocks, and disruption due to drought and Tropical Cyclone Harold, which hit the islands in early April 2020. Vulnerable households, such as widowed families, were particularly badly affected (34).

Food affordability indicators

We selected reduced household income and variations of market food prices to evaluate food affordability. Reductions of income as a result of the outbreak of COVID-19 were reported in 22 studies (17–27,29,30,32,34,37–42). One study, conducted in the states of Haryana and Odisha (India)[38] directly asked farmers about affordability (32)[39]. Almost all farmers in Haryana reported never facing a situation in which they either could not afford enough food or a balanced diet, either during the months before or after lockdown. In Odisha, the baseline for food unaffordability was very high before the lockdown: almost 90% of households could not afford sufficient quantity and variety of foods. The percentage decreased slightly after the lockdown was imposed. The authors suggested that established public procurement schemes with fixed food prices may have played a role in protecting wheat farmers in Haryana from a fall in prices. In turn, this could have mitigated their ability to afford food. In Odisha, high levels of inability to afford sufficient quantity and variety of food before the outbreak, could have left little room for further decreases in food affordability after the outbreak of the pandemic.

Reduced income

There is much consensus among the studies that the major direct effect of COVID-19 and the measures put in place by local and national authorities has been through its impact on employment and, in turn, on income. In Nigeria, 79% of households that took part in nationally representative World Bank high-frequency phone surveys in May, reported that their incomes had decreased compared to mid-March 2020; and in August 67% of households reported that their incomes were lower than a year before (18). Similarly, 73% of Kenyan and 66% of Ugandan farmers asserted that the pandemic had affected their regular source of income due to reduction or closure of business activities and cessation of remittances (25). Other studies in African countries that reported income loss due to the pandemic and government restriction measures include Senegal (37) and South Africa (42). In Bangladesh, 96% of the women surveyed by phone (n>2400) (30) reported a reduction in paid work for their family, with the median monthly family income falling from USD 212 at baseline to USD 59 during lockdown. A similar finding was illustrated (38) among a survey of 1876 households in Bangladesh, where 71.8 % of respondents reported that their income decreased due to COVID-19. Other studies in South East Asia indicated income losses in the first half of the year: farm income reportedly dropped for 90% of vegetable farmers in India (23); a loss of income was reported among 85% of rural Nepalese households interviewed in June and mid-July 2020 (37). Several of the reviewed studies highlighted that the figures are usually higher for informal workers and younger adults in urban areas (26,27,42) and remote areas (34).

---

[36] Cross-sectional telephone semi-structured interviews; March-July 2020; Sample size: 40; self-employed women and resided in the district of Ndola in Zambia.

[37] Cross sectional telephone rapid appraisal; April 2020; 31 key informants; Key informants were in a leadership position.

[38] Cross-sectional phone survey; early-April and mid-May 2020; sample size 1275 farmers in Haryana State and 240 farmers in Odisha State; farmers.

[39] The survey included questions on self-assessed food affordability in the month prior to the interview (during the lockdown) and the month before the start of lockdown. Data was collected in April 2020.

Thanks to the relatively larger body of literature on Ethiopia, we are able to illustrate some nuances of the impact of the pandemic on income. The nationally representative World Bank survey (17) revealed that 51% of households interviewed in May reported income loss since the outbreak in mid-March. **Erreur ! Source du renvoi introuvable.** illustrates the share of households that reported a fall in regular income as the main barrier to purchase food[40] between May-October 2020. As the pandemic crisis matured, a fall in income became the main reason behind issues of food affordability. By October2020, more than 80% of households reported that a fall in income was the main factor impacting on their ability to purchase basic items.

Figure 9. Income decrease reported as the main barrier to food purchase in Ethiopia
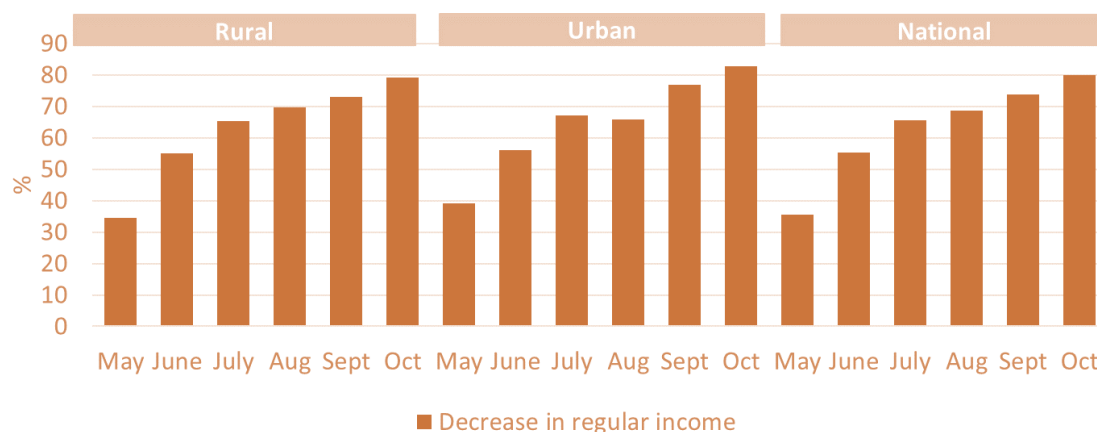
Source: own reproduction using data from World Bank High-frequency phone survey in Ethiopia (17). Data refer to % of households. Questions are asked on a 4 weeks recall basis, expect May when questions refer to mid-March 2020. All months refer to 2020. Observations: May: 3,249; June: 3,107; July: 3,058; August: 2,878; September: 2,770; October: 2,704.

The IFPRI study on the effects of COVID-19 pandemic on households' livelihoods in Addis Ababa (19–21), provides a detailed snapshot of the largest urban centre in Ethiopia. During data collection 37% of households reported a severe loss of income in May, which increased to 44% (June) and fell back to 39% (July). The percentage of households that were affected by some income loss followed a similar pattern. The percentage of households that experienced income loss initially increases and then seems to come down, as above (Table 16). Taken together, these figures illustrate that over half of the interviewed households (58% minimum to 67% maximum) had a reduced income during May-July 2020.

Table 16. Changes in total income between May and July 2020 in Addis Ababa (Ethiopia)

	May 2020	June 2020	July 2020
	% Households		
Experiencing Severe Income loss	37	44	39
Experiencing Some Income loss	21	28	25

Source: own reproduction using data from IFPRI COVID-19 studies (19–21). Observations = 600 May 2020; 589 in June; 584 in July. Recall: past 30 days. Data refer to % of households.

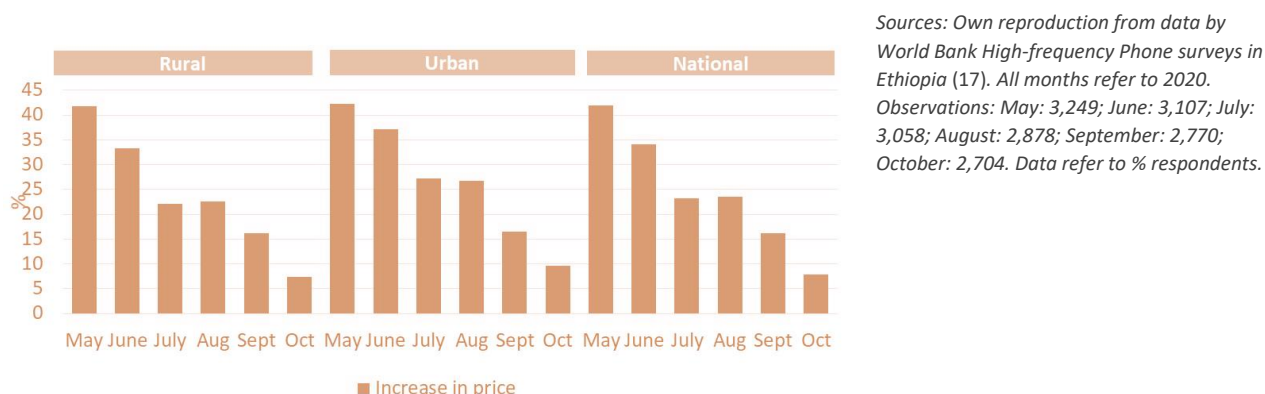[40] Food purchase refers to: teff, yams, maize and wheat.

The study conducted in rural Ethiopia (Oromia and Amhara regions) in May 2020, (22), reported that 79% of households had seen their incomes decrease compared to February 2020. Authors indicated that there were other external shocks to take into account: crop incomes decreased due to low rainfall and pest infestations from fall armyworm and desert locusts (45) and some farmers experienced losses from livestock income (11% of respondents reported that they sold livestock due to emergency income needs). These factors fed into the possible impact of COVID-19 on income losses[41].

Food prices

The review of the impacts of the COVID-19 pandemic on food prices suggests a nuanced situation. Several documents reported increases in food prices: in Nigeria (29)[42] a 24% increase of the food consumer price index (CPI) was reported, which is corroborated by the fact that in October 2020 the food CPI hit a three year high. Between April/May to July 2020, 90% of households in Nigeria reported that they were facing increased food prices, compared to 85% in mid-March to April/May 2020, and 19% between January 2017 and January 2018 (18). In the biggest city of Ivory Coast (Abidjan), 61 % of respondents reported significant increases in food prices since the outbreak of the pandemic (40). In Bangladesh (38), 94% of the 1876 households that took part in the study reported that they faced food price increases due to COVID-19.

Other studies suggested a more heterogeneous and variable food price situation, where prices can fluctuate over the course of several weeks. For example in Ethiopia, the World Bank Phone surveys (17) revealed that an increase in food prices was the main reason for households' inability to purchase food items at the start of the pandemic. However, this gradually decreased and by October 2020 high food prices were mentioned by fewer than 10% of respondents (mainly in urban areas) (**Erreur ! Source du renvoi introuvable.**9). In Addis Ababa (24) the monetary value of household food consumption among urban households was assessed (in Birr, in August 2020)[43]. The results suggest that food expenditure did not drop during the pandemic. On average, the value of food consumption increased by 2% between the September 2019 and August 2020 surveys. The main increases were observed for staple foods, while consumption of pulses, nuts and vegetables decreased.How COVID-19 pandemic affected food prices is poorly described in these studies. More context specific analysis is provided in the case studies.

Figure 10. Increased food prices reported as the main obstacle to purchasing food items in Ethiopia.

Sources: Own reproduction from data by World Bank High-frequency Phone surveys in Ethiopia (17)*. All months refer to 2020. Observations: May: 3,249; June: 3,107; July: 3,058; August: 2,878; September: 2,770; October: 2,704. Data refer to % respondents.*

---

[41] The same study asked respondents how long the household could meet its food needs with current resources. 30% of households in Oromia and 10% of households in Amhara reported that they had resources to meet food needs for less than one week; about 20% of respondents in Oromia and Amhara reported they had resources for 7-14 days; 20% of households in Oromia and about 40% in Amhara could meet their food need for 15-30 days with current resources. 25% of respondents in Oromia and 30% in the Amhara regions could afford food for more than a month.

[42] The Food Consumer Price Index (CPI) employed in the study was collected and constructed by the Nigeria Bureau of Statistics (NBS), which measures the average change in prices, over time, that consumers pay for a basket of food items. Food CPI measures changes in the retail prices of food items and was the principal indicator of changes in retail food prices. It was used to measure consumer inflation in Nigeria's economy. The paper used food CPI for May 2019 and May 2020, corresponding to both the survey rounds we use in this study.

[43] 577 households were part of the two rounds.

Indicators of disruption in health and nutrition services

Five studies reported information on access to health and nutrition services (17,18,27,35,40).

In Nigeria, two of the reports produced by the World Bank[44] reported indices on access to medicines and disruption of health services (18). In May, 26% of households reported being unable to access medical treatment when needed in the previous 7 days. In July, 64% of respondents with children under-5 years needed immunization, which 13.4% of respondents could not access. The main constraints these households faced in getting their children vaccinated were a lack of available medical personnel (44% of such households) and movement restrictions imposed by the lockdown measures (24% of such households), indicating a direct link with the COVID-19 pandemic. Harris et al. (27) results in Ethiopia corroborated that health managers and healthcare providers observed a decrease in the number of people seeking health services from health facilities since the outset of the COVID-19 pandemic. Perceived risk of exposure to coronavirus was the main reason affecting health-seeking behaviour.

Additionally, access to health and nutrition services was documented in three other contexts. In Abidjan district[45] (40) analyses revealed that sick people did not routinely use health services, with no differences found between female and male headed households. 36% of households reported having a sick person in their household in the previous 30 days (Table 17). About one in four households with sick members did not use health services in April 2020. In a study in Zambia[46], all respondents reported that the main challenge they faced in accessing health services was linked to a poor transport network during lockdown (35).

Table 17. Household frequency of accessing health services in Abidjan (Ivory Coast) during COVID-19.

	% of households with 1 sick individual in the past 30 days:	Of which the sick person used health services	% of households having a child under 5 who was sick in the past 30 days:	Of which the child used health services
Men-Headed Households	35.4%	25%	12.9%	8.7%
Women-Headed Households	36%	21.1%	11.2%	5%
All	35.6%	24%	12.5%	7.8%

Sources: Own reproduction from data by WFP (40). Observation: April 2020; 666 households; respondents residing in 30 districts of Abidjan.

Finally, in Ethiopia[47] access to health services since the COVID-19 outbreak was investigated during the various rounds of the World Bank high frequency telephone survey (17). Respondents were asked whether their household needed any medical treatment in the past four weeks (with the exception of May, for which the timing of question refers to the period since the outbreak). In rural areas, the percentage of households needing medical help doubled from May to September (15% and 29% respectively). In the same period, this proportion increased among urban households from 21% to 32%. The survey did not specify the reason for medical treatment. Respondents who needed medical treatment were also asked to confirm if they accessed medical treatment; 80-90% of households that needed to visit health services were able to access them, albeit rural households appeared to face more difficulties compared to their urban counterparts.

---

[44] Longitudinal Phone Survey; 6 Rounds: May-November 2020; Sample size: Round1: 1,950; Round 2: 1,820; Round 3: 1,737; Round 4: 1,691; Round 5: 1,656; Round 6: 1,640; nationally representative.

[45] Cross-sectional telephone survey; April 2020; 666 Households; urban dwellers in 30 districts of Abidjan.

[46] Cross-sectional telephone semi-structured interviews; March-July 2020; sample size: 40; self-employed women and residing in the district of Ndola in Zambia.

[47] Longitudinal Phone Survey; 6 Rounds: May-October 2020; sample size: Round1: 3,249; Round 2: 3,107; Round 3: 3,058; Round 4: 2,878; Round 5: 2,770; Round 6: 2,704; nationally representative.

The studies included did not describe in detail how health centre operations were affected by the pandemic. Two recent unpublished studies in Ethiopia[48] (main results presented during a webinar) reported that the main reasons behind changes in health centre activities included: a) the need to provide outreach and training on COVID-19 and on Water, Sanitation and Hygiene (WASH), crowding out time for other more time-intensive services (i.e. family planning); b) movement restrictions that made it more difficult to access certain services. The authors also point out that a number of mitigation strategies adopted by health centre workers helped maintain non-emergency health and nutrition-related services. For example, during door-to-door COVID-19 awareness campaigns and infection prevention, health centre workers may have performed rapid malnutrition checks. Although details of approaches used by health centre workers were not provided, the authors suggested that these might have been particularly important in the light of drops in demand for routine services due to fears of COVID-19 infections during health centre visits, or due to the perception that health centres were only delivering emergency services.

Figure 11. Access to healthcare services in Ethiopia
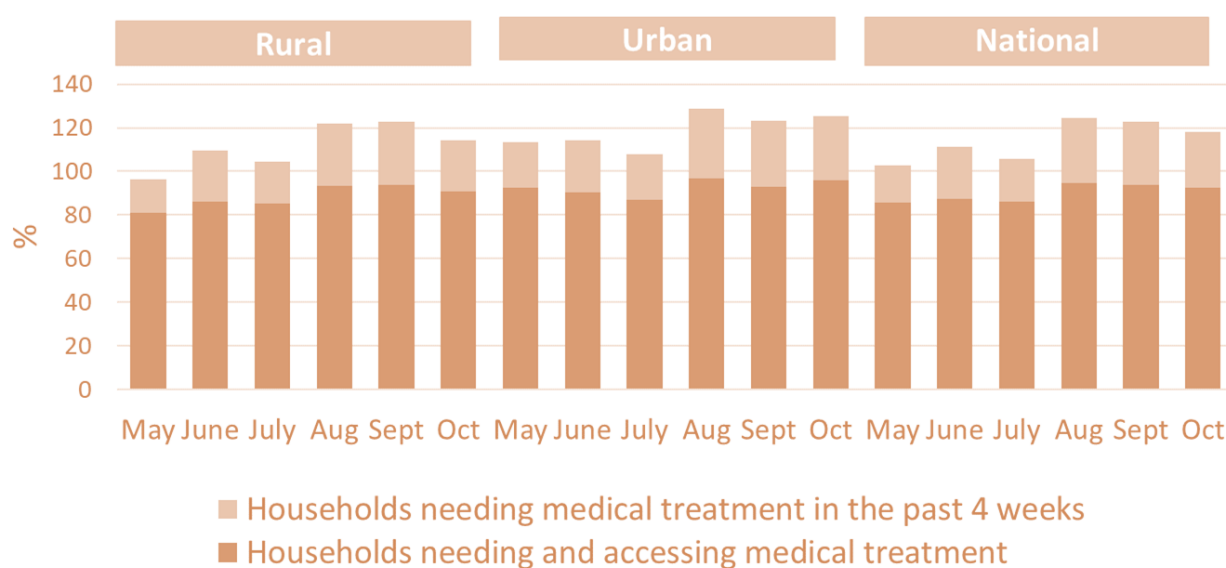
Source: own reproduction from data by World Bank High-frequency Phone surveys in Ethiopia (17). All months refer to 2020. In May, the timing of the question refers to the period since the outbreak. Data refer to % of households. Observations: May: 3,249; June: 3,107; July: 3,058; Aug: 2,878; Sept: 2,770; Oct: 2,704.

---

[48] At the time of concluding this report, these studies were unpublished. They were conducted by Tufts University and Cornell University and were presented during the Feed the Future webinar "Key health, nutrition and agricultural services in the face of COVID-19 in Ethiopia: Lessons Learned", 3rd February 2021.

Summary of the case study reports

We only present the main findings and discussion points herein. The full case studies are available as separate documents.

Ethiopia

The latest available data on the nutritional status of children under 5 in Ethiopia (2019), reported that 37% of children were stunted (below -2 SD), and 12% were severely stunted (below -3 SD) (46). Stunting among children was greater in rural areas (41%) than in urban areas (26%). However, stunting prevalence in Ethiopia has been declining steadily since the early 1990s (i.e. 1992 under-5 stunting levels was 66.9%) (47). The Mini Demographic and Health Survey conducted in 2019 reports that overall, 7% of children in Ethiopia are wasted (below -2 SD) and 1% are severely wasted (below -3 SD) (46). Similarly to prevalence of stunting, wasting levels had gradually improved in recent decades and declined from 12% in 2005 (46). According to the UNICEF 2017 annual report there is an overall increment of prevalence of overweight among children from 1.7 to 3.6% in Ethiopia in recent years (48). Finally, the Demographic and Health Surveys (DHS) data from 2016 reported that 24% percent of women of reproductive age in Ethiopia are anaemic. Anaemia is a public health problem in Ethiopia and despite its prevalence among women aged 15-49 declining from 27% in 2005 to 17% in 2011, there was an increase by 8% points in in 2016 (49).

Government Containment Measures

Ethiopia had its first case of COVID-19 on 13th March 2020. At the time of writing the report (27th March 2021) there were 198,794 cumulative confirmed cases, with a cumulative incidence of 1,729 confirmed cases per million people (15). The results gathered in this study indicate that Ethiopia was among the African countries that managed the pandemic and economic crisis with rapid and context-specific measures. Due to a lack of intensive care facilities across the continent, Ethiopia implemented restrictive measures (closures of schools and religious institutions) before widespread transmission was detected, allowing time for health systems to prepare (50). Concomitantly, the government had minimal stay-at-home measures and travel bans among regions (14). Government communication about the measures that can be taken to reduce the risk of contracting the virus was effective (17,50). This is reflected by the highly widespread adoption of handwashing and physical distancing by the population (50). By the end of 2020, Ethiopia was among the six African countries performing the bulk of COVID-19 testing in the continent (51). Containment measures were coupled with a range of mitigation strategies, including communication campaigns on handwashing and social distancing, agricultural input distributions, food aid, employment support measures and expansion of social safety net programmes (more details can be found in the separate document of the case study). However, the country has recently been facing a second wave of cases. Despite new and more transmissible variants of the virus, restriction measures have not been implemented to the same degree as they had early on in the pandemic[49]. Additionally, there is some evidence indicating adherence fatigue in relation to mask wearing and social distancing (51).

Impact of the COVID-19 pandemic on diet and nutrition outcomes

As documented in other countries, COVID-19 pandemic restrictions had adverse implications on food and nutrition security through a range of impact pathways (50,52,53). On the production side, movement restrictions impacted agricultural labour movement, limited farm input supplies and disrupted transport and markets (54). On the demand side, movement restrictions and drop in demand for numerous goods and services may have negatively impacted income generation activities and food security for poorer households.

---

[49] The Stringency Indicator for March 2021 is 38. During the peak of the first wave (Spring-Summer 2020) the stringency level of the Ethiopian Government measures was 80 (16).

The analysis of available data since the COVID-19 outbreak illustrated the worsening of dietary diversity indicators, especially at the early stages of the pandemic. For example, the HDDS, collected in Addis Ababa, decreased at the beginning of the pandemic, but later returned to pre-pandemic levels. However, further analysis showed that aggregate HDDS remained stable due to increased calorie-dense food consumption at the expense of more nutritious foods (24). In rural Ethiopia (Oromo and Amhara regions), parents had reported a significant reduction of animal source foods among children since the outbreak of COVID-19 (22). Such reductions in the consumption of nutritious foods raises serious concerns for the Ethiopian population given that dietary diversity, an important proxy of diet quality, was reported to be low already before the pandemic (12). The FIES, collected in the nationally representative phone surveys conducted by the World Bank (17), indicated that in June and July 2020 almost half of the population suffered some level of food insecurity. These are alarming figures and they remain comparable with food insecurity estimates computed before the pandemic (55). Therefore, the link with the COVID-19 pandemic cannot be established unambiguously. Surprisingly, figures between rural and urban areas were similar, despite significantly higher levels of food insecurity among rural populations in previous nationally representative surveys (56). The report also found that urban populations, especially those reliant on daily income and informal employment, were affected differently from rural populations. Among the sub-groups that had reported to be most severely affected by the pandemic, there are female-headed households and young individuals between 19 to 25 years old living in urban areas. The main channel of impact on food and nutrition outcomes has been through the impact of COVID-19 restriction measures on employment, income and associated purchasing power. In October 2020, more than 80% of households reported that income decrease was the main factor impacting their ability to purchase such items (17). Together with the continuous depreciation of the Ethiopian currency and regional conflicts that are increasing food prices, income reduction can undermine food affordability and consequently food security in vulnerable populations. Finally, the pandemic has reduced the types of services and treatments on child and maternal nutrition provided by health centres[50]. However, a comprehensive assessment of the impacts of the pandemic and restriction measures on reproductive, maternal, new-born and child health (RMNCH) services and nutritional status of children under 5 years old is limited due to the lack of data.

From the production side, the evidence on food supply chains in Ethiopia is not yet complete and a comprehensive sectoral analysis of the national food system is yet to be produced. Early indications suggested disruptions were relatively contained and that specific production systems were largely resilient (31,36). Despite difficulties in assessing the specific impacts of policies at this stage, the resilience of the Ethiopian food system during the pandemic could be partly attributed to the swift agricultural policies put in place by the government at the beginning of the outbreak (e.g. distribution of fertilisers, pesticides and improved seeds; communication campaigns from extension services; public loans to cooperative unions to minimise supply shortage). However, the national agricultural COVID-19 response strategy initially prioritised crop production with a strong focus on cereals and cash crops (maize, wheat, rice, sorghum, sesame, soya beans, mung beans, onion, tomato, pepper, potatoes, and sweet potatoes). Crops were mainly selected for their ease and reliability of production and also their export or import substitution value. Crops with a high nutrition potential were not specifically prioritised (57). With regards to cooperatives, a report by Wageningen University exhibits scepticism about the effectiveness of promoting their role in food distribution and loans, as: a) the main obstacles in food distribution are transport limitations due to movement restriction; b) earlier research shows mixed results on the effectiveness of cooperatives in distributing loans and in microfinance (57).

---

[50] Information retrieved from unpublished studies. They were conducted by Tufts University and Cornell University and were presented during the Feed the Future webinar "Key health, nutrition and agricultural services in the face of COVID-19 in Ethiopia: Lessons Learned", 3rd February 2021.

Effective policy responses

To mitigate the effects of the COVID-19 pandemic, the government implemented nearly 100 policy responses, including social protection policies, health responses, farm and market policies. International partners were also active in supporting government measures. Probably the most important finding of the report relates to the effectiveness of social safety nets. There are promising indications that in Ethiopia, employment and income support interventions played a key role in reducing the adverse effects of COVID-19 on food security for the most vulnerable groups (58,59). Social protection programmes have been shown to sustain incomes and food demand and prevent the aggravation of food insecurity among beneficiaries of the Productive Safety Net Programme (PSNP) directed at disadvantaged households (58). By using macroeconomic simulations, the Joint Research Centre of the European Commission reaches similar conclusions: Ethiopian government measures (such as income support and business aid) can provide a buffer against the adverse effects of COVID-19 on food demand by supporting incomes, especially in urban areas (59).

Conclusion

In conclusion, the analysis of the impacts of COVID-19 on food and nutrition security in Ethiopia highlighted that pandemic restriction measures put in place to curb infections and alleviate the pressure on health systems should be coupled with holistic and context-specific employment, income and business support. Social safety nets can play a role in making sure that Ethiopia's progress in reducing malnutrition is not reversed due to the COVID-19 pandemic. However, social safety nets cannot be effective on their own and there is a need for broader systemic interventions and investments to support food and nutrition security (60).

Guatemala

Guatemala faces a major health challenge of addressing the double burden of malnutrition, with the coexistence of stunting, wasting and micronutrient deficiencies, and also overweight and obesity. Before the start of the pandemic, some 2.3 million people were food insecure nationwide (61) and more than half of the adult population were overweight or obese. With the advent of the COVID-19 pandemic, many organizations were concerned that food vulnerabilities could be exacerbated aggravating acute malnutrition and/or exacerbating obesogenic environments due to changes in diets towards less healthy foods.

Government Containment Measures

The first confirmed case of COVID-19 in Guatemala was reported on the 13th of March 2020. On the 20th of January 2021, the cumulative incidence accounted for 8,446 confirmed infections per million inhabitants, which corresponds to a total of 151,324 cases detected in the country. To face the COVID-19 pandemic, the Guatemalan government implemented a set of measures strongly depending on mobility restrictions in order to avoid widespread and sustained community transmission of SARS-CoV-2 and to defend the fragile national health system, the latter being particularly important in the national context. The stringency of the restrictions was high at the onset of the pandemic and was then relaxed at a magnitude that reflected the evolution of new daily cases in the country. This strategy and the adopted measures were similar to those ordered at the international level. It was reported to challenge food security and nutrition through a range of impact pathways (50,52,62,63).

Impact of the COVID-19 pandemic on diet and nutrition outcomes

This link between containment measures and food insecurity is also well apparent in Guatemala. Movement restrictions that prevented more than two thirds of the population from selling and buying food in informal markets led to a negative impact on incomes and affected food security and nutrition, particularly in poorer households living in rural areas. Food inflation and the price of the basic food basket peaked during the period when retail demand soared amidst the COVID-19 pandemic. Noticeably, for maize, the annual price peak was observed early and was sustained for a longer period when compared with historical data from previous years. For this staple food (and for rice), the Government authorised imports free of tariff quotas.

As the restrictive measures were lifted in October 2020, the percentage of households reporting difficulties in accessing markets due to government restrictions on movement and commerce and security concerns, steadily decreased, although still being up by 50% in January 2021. Lack of money became the most significant barrier to access markets and grocery stores in October 2020 and January 2021, which suggests an aggravation in income reductions and poverty levels of the population, despite the release of the level of stringency of contingency measures and support initiatives from government and international organisations. The observed decrease in people with insufficient food consumption (assessed according to the Food Consumption Score) from July 2020 to below pre-COVID-19 levels in January 2021 can be associated with the decline in the stringency index of containment measures and/or benefits from government and institutional food assistance. From May 2020 to January 2021 the percentage of households reporting negative coping strategies to face food insecurity also decreased, except for reliance on less expensive food such as staple foods, which remained adopted by over 80% of the households in January 2021. Discussing if this high percentage results from the COVID-19 pandemic is not possible and stands as a limitation of this report. The available data only allows comparisons between the period of strict mobility restrictions and the period immediately after these restrictions were released, due to the absence of data collected using identical methodologies pre-COVID-19. Although suggesting an alleviation in families' difficulties in obtaining food, this changing diet behaviour may be a risk for nutrition, since it has been reported that shifting towards cheap calorie-dense but nutritionally poor foods may result in reduced immunity and increased COVID-19 fatality (64,65). This shift may also favour overweight and obesity, thus contributing to the double burden of malnutrition and long-term diet-related non-communicable disease (66). However, without information about the nature of the less expensive food on which 80% of people state to rely, one cannot conclude that diets became healthier or unhealthier and we cannot associate diet changes with specific dimensions of malnutrition. In fact, marginal fluctuations below 3% were reported in the daily consumption of fruits, cooked or raw vegetables, legumes, fish and meat, and milk and dairy according to an online survey conducted in Guatemala on the self-perception of eating habits and lifestyle before and during the COVID-19 pandemic (personal communication, Astrid Sánchez, Sophia Martínez, Edna Nava, Mónica Silva and Karina Aguilar). Another evaluation made by the FAO on rural family farming households, reported that 86% of households had reduced meat consumption, and about half reported reduced milk and fruit consumption, replacing these foods by maize, beans and local herbs (67). The former results are probably biased towards a less vulnerable population, as the initial study targeted people with an electronic device or computer with internet access and access to social media, while the latter targeted rural households, suggesting a differential in impact of the pandemic in diets quality between socioeconomic levels. The lack of disaggregated data on the split urban/rural or low/high income additionally hampers a deeper discussion.

Effective policy responses

The COVID-19 pandemic and its economic consequences (68) were expected to cause widespread disruptions of health and food systems, with consequences on maternal and child nutrition and mortality (69)(6). To some extent, our analysis seems to challenge these assumptions for Guatemala.

For example, the consensus among international agencies and Non-Governmental Organizations working in the country on the worsening of undernutrition in children under-5 in relation to COVID-19 restrictions, may be a misinterpretation when looked at cumulative numbers in years 2017-2020. In 2020, a modification was implemented to the registry system, therefore a cause-effect relationship between acute undernutrition and the COVID-19 pandemic in Guatemala cannot be unambiguously established. Nonetheless, the historical April-to-August peak in acute undernutrition in children under-5 attributed to the annual "hunger season" in the region was not observed in 2020, again reflecting the additional support given to poor households under the framework of measures implemented to counter the negative impact of COVID-19 on nutrition. Other indicators improved when the containment measures were lowered, as mentioned above.

Nonetheless, publicly available data for the country suggests an aggravation of the acute food insecurity in the country, as demonstrated by the 7-8% increase of households classified in Phases 3 and 4 of the Integrated Phase Classification Acute Food Insecurity (IPC AFI). It should be noted that this finding may be related to the multisectoral and multidimensional aspect of the classification. The IPC analytical framework is a predictive model to explain and situate data within a larger conceptual framework, based on risk calculations that consider hazards and vulnerability; the latter understood in relation to exposure, susceptibility and resilience (70). In late 2020 and early 2021, the effect of the hurricanes helps explain these results. The concept provides an analysis that is broader than the current food security status and our results support the need to maintain social protection programmes in Guatemala.

Overall, the information reported here suggests that disruptions occurred, but at a less severe level than foreseen, which may be due to a mixed effect of the support policies implemented by the government during the outbreak and, particularly, a realignment of the initiatives deployed in the country by international organisations and donors, which targeted their actions to vulnerable populations with food insecurity risks aggravated by the pandemic. To cope with the adverse effects of the COVID-19 pandemic, nearly 200 government policy responses were registered, including social protection policies, farm policies, market policies, and reinforcement of malnutrition diagnosis and intervention policies, encompassing family agriculture support, food aid and cash transfers via multi-ministerial actions against malnutrition. In addition to the efforts of the Government of Guatemala in supporting the population in the light of restrictions implemented to contain the COVID-19 pandemic, many initiatives were deployed through international partnerships. A number of international donors and non-governmental initiatives operating in Guatemala reviewed and adjusted their programmes to support the government in implementing measures to face the COVID-19 pandemic and deployed new dedicated activities in support of the population. The scope of the activities was diversified and included data collection, situation analysis and data sharing, training, screening and assisting vulnerable households including children suffering with acute malnutrition, support for smallholders (cash transfers to target farming practices, supply of productive inputs and livelihood assessment, and public procurement of food), support for school feeding programmes, support for the population with provision of cash and food, production of nutrition educational and awareness materials, or breastfeeding and maternal nutrition counselling. Most importantly, many of these organisations supported the government's policies and efforts both in synergistic and complementary actions with the Ministry of Agriculture, Livestock and Food, the Ministry of Social Development, the Ministry of Education, the Ministry of Public Health and Social Assistance, as well as the National COVID-19 Response and Recovery Programme. Even though no formal evaluation of the implemented policies had been carried out in Guatemala, the example of Ethiopia shows that social protection programmes can prevent the aggravation of food insecurity in disadvantaged households (58).

Conclusion

Social protection policies and government welfare support are effective instruments for protecting the food security of poor households facing catastrophic shocks, as demonstrated in the case studies in Ethiopia and Guatemala. International organisations and donors can be instrumental in generating synergistic effects in benefit of the most vulnerable target populations when reshaping their national/regional programmes to share facilities and capabilities in support of government policies. The direct impact of the COVID-19 pandemic (and associated governmental measures) in persistent overweight and obesity outcomes would be difficult to discern without a structured voluntary self-reporting programme or directed longitudinal studies. Under the specific nutritional context of Guatemala, the incorporation of "double-duty" objectives in food and cash transfer programs that increase household income and access to food has been highlighted. This concern is needed to ensure that actions aimed at addressing child undernutrition do not simultaneously exacerbate the problem of unhealthy weight gain (71,72). During the COVID-19 pandemic, the support given to the Ministry of Agriculture, Livestock and Food, to the Ministry of Social Development, to the Ministry of Education, to the Ministry of Public Health and Social Assistance, as well as to the National COVID-19 Response and Recovery Programme was acknowledged as a game changer by stakeholders.

Discussion

To better understand how the pandemic impacts diet and nutrition outcomes and to document the existence and effectiveness of mitigating interventions, we carried out an extensive review of both peer-reviewed and grey literature, and two case studies in Ethiopia and Guatemala. Thirty-six primary studies were included.

Impact on diet and nutrition outcomes

By using a range of different measures, reviewed studies report repercussions on dietary intakes, especially at the early stages of the pandemic. In particular, there has been a shift from relatively more nutritious but expensive food groups (e.g., vegetables, legumes and nuts, animal source foods) to cheaper ones (staples) since the start of COVID-19. For example, in studies from India and Ethiopia, households reported an ability to protect their consumption of staple foods but often at the expenses of vegetables, pulses, fruits and animal source foods (19–24). Similar deteriorations were found in Kenya and Uganda (25). However, in all countries included in the literature review, the situation is still multifaceted and sometimes difficult to interpret. Although specific data on dietary intakes were reported, comprehensive longitudinal pre-pandemic data are needed to assess annual and seasonal dietary diversity fluctuations and compare these to variations observed since the outbreak of the pandemic. Some studies also reported factors unrelated to COVID-19 that could have modified dietary habits over the same period (e.g. Orthodox fasting in Ethiopia). While more complete evidence of the impacts of the pandemic on specific food value chains are yet to be published, the production and distribution of perishable and more nutritious foods are often more prone to disruptions during a crisis (73,74). Dietary diversity was among one of the major concerns before the outbreak of the pandemic (12). Therefore the current economic and heath crisis raises concerns about long term impacts on access to and affordability of nutrient-rich, healthy diets and their health implications (73–75).

Moreover, as a consequence of increasing consumption of cheaper and less nutrient-rich foods, in combination with lower levels of physical activities associated with lockdown measures, there are increasing concerns about the deepening of the triple burden of malnutrition (i.e. undernutrition; overweight and obesity; and micronutrient deficiencies) especially in light of rapid urbanization in LMICs (53,76). A number of studies have described the incidence of elevated consumption of ultra-processed foods, alcohol and lack of physical activity during lockdown (77,78). While these issues were not included in the primary outcomes of this report, we recognise the need to systematically assess the effects of COVID-19 on overweight and obesity, as a result of changes in consumers' behaviour, access to healthy diets and a general deterioration in healthy diets and diversity. The implications of unhealthy diets are discussed in the Guatemala case study. However, due to lack of available data it is difficult to evaluate the impacts and magnitude of the changes in food habits on overweight/obesity prevalence in that country.

The pandemic has so far had an unquestionably negative impact on food security in the countries included in this report, which has manifested itself at various degrees of intensity, duration and in different forms. The literature retrieved measured food insecurity via different methods and techniques. Studies in Nigeria, Mexico and Bangladesh showed a significant deterioration of food security pre- and post-COVID-19 periods, based on the existence of pre-pandemic data (18,28–30). The same trend was reported for Uganda and Kenya using self-assessed food insecurity surveys (25). The COVID-19 pandemic may have affected diets and food security through various pathways (see Figure 1). There is a large consensus among the literature that one of the major direct effects of COVID-19 on food and nutrition outcomes has been through its impact on employment, income and associated purchasing power. This is corroborated by the studies we assessed in the report (17–21,26,27,30,37,38,42) as well as by commentaries and reports produced by international organisations (1,79).

However, the link between a fall in income and changes in consumption behaviours and diet quality, although plausible, was not studied as such. For example, in poor households, a fall in income could lead to reductions of non-food essential expenditure (education, housing, health) to protect food (quality and quantity) intake. Other channels of impact, such as physical access and availability of food provided a heterogeneous picture and were assessed via binary (and often simplistic) questions (17,18,32,37,38).

Interacting factors

Several interacting factors can be identified to interpret variations between and within countries. The discussion is shaped around three areas: 1) timing, duration and stringency of national COVID-19 restriction measures and policies to mitigate their adverse impacts; 2) context specific food value chain responses to domestic and international containment measures; 3) differentiated impacts of restriction measures on different groups, along lines of gender, age and work conditions. We address these aspects individually. Firstly, the pandemic is a rapidly evolving phenomenon and there have been heterogeneous government responses to curb the virus and mitigate the adverse effects of lockdown. The timing and stringency of containment measures are variable. Countries that intervened promptly with a range of measures to contain the pandemic as well as mitigating its effect on people's livelihoods, were more likely to control both the pandemic and the economic crisis during the first wave of the outbreak. For example in Ethiopia (one of the case studies included in this report), restrictive measures were implemented before widespread transmission was detected, allowing time for the fragile health systems to prepare (50). Concomitantly, the government had minimal stay-at-home measures and travel bans among regions. In the second case study, Guatemala, the government also rapidly implemented stringent restrictions that were relaxed after a few months to reflect the evolution of new daily cases. The link between containment measures and food insecurity was highly apparent[51].

Secondly, differences in the impact of COVID-19 between and within countries can be further associated with the food value chains considered. The few studies on food value chain assessments suggested that shorter value chains and traditional smallholder farms were somewhat more resilient in the face of COVID-19, as they depended on local inputs (local indigenous seeds, compost, and family and community labour exchange) as opposed to commercial or semi-commercial farms, which were more severely hit (31,33,80). However, with the exception of one study in India (32), to our knowledge there were no other studies that linked the impacts of COVID-19 to agricultural processes and the dynamics through which rural households' incomes and food insecurity were affected. Therefore, although food systems analysis is recognised as an important and meaningful framework for conducting food security analysis, studies tended to focus separately either on food production or on aspects related to food consumption.

Finally, different food systems actors and groups have experienced and suffered from the pandemic in different ways. Studies in Ethiopia and India have illustrated that poorer and female headed households were among those with the lowest levels of dietary diversity and food insecurity indicators (17,19,20,23,43). For example, in Ethiopia and Zambia the impact of the pandemic has been particularly adverse on informal workers and young adults that relied on daily wages (26,27,35). Given the informal nature of large sections of the food system in LMICs (where women represent large sections of food processing and sales in wet markets), assessing the impacts on informal actors and defining targeted policies is considered a top priority for reconstructing towards more resilient food systems (53).

---

[51] Further analyses on Ethiopia and Guatemala are available in the Case Study Reports, presented as separate documents.

Effective mitigating interventions

The case studies in Guatemala and Ethiopia showed that governments were prompt in implementing policies to mitigate the negative effects of the COVID-19 pandemic and associated containment measures. In both Guatemala and Ethiopia, substantial support and resources were provided by international donors directly to the government and ministries. We can speculate that such concerted action was probably central to the effective implementation of programmes and policies.

The COVID-19 pandemic and its economic consequences were expected to cause widespread disruptions of health and food systems (69). In Guatemala and Ethiopia, disruptions occurred, but at a less severe level than foreseen. One of the most relevant findings in the report is related to existing and efficient social protection programmes and public distribution of food that appeared to buffer the adverse effects of food insecurity (32,58,59). In Ethiopia, the long-lasting PSNP, and the more recent UPSNP, represent the main income support and food distribution measures in place since the outbreak. For example, the evaluation of the PSNP programme during COVID-19 (58) shows that participation in PSNP reduced the likelihood of becoming food insecure by 9.3%[52]. This is promising, as recent simulations on government employment and income protection in Ethiopia have demonstrated these to be effective measures for protecting vulnerable populations with regards to food security during the pandemic (59).

The evaluation of the PSNP provides solid grounds to underline the importance of having established social protection programmes in place prior to the onset of shocks, in order to protect the food security of poor households. Social safety nets are complex to design and fiscal policies can face obstacles. Low-income countries in particular often lack fiscal leeway, which can lead to hesitation toward such programmes (58). The COVID-19 crisis has reignited interest in social protection policies and government welfare support as instruments for enhancing the capacity of the poor to resist catastrophic shocks.

However, social safety nets cannot be effective on their own and there is a need for broader food system interventions and investments to support food and nutrition security (60). These include, amongst others: i) investing in long-term climate adaptations to mitigate the risks of widespread hunger and starvation from adverse climate impacts on food production; ii) building resilience of health and food systems to withstand climate- and conflict-related shocks; iii) strengthening and ring-fencing maternal and child essential health and nutrition services so that they are not sacrificed for emergency measures; iv) enhancing nutrition programme coordination and implementation; iv) engaging effectively with young people and women to support both the immediate COVID-19 efforts and the long-term aim of building back better (81). An effective response to the COVID-19 pandemic should include support for functional and resilient food systems, sustainable healthy diets and access to health services for all, and particularly the most vulnerable, i.e. children under-5 years and women. Finally, this crisis can represent a window of opportunity for positive reforms to achieve the SDGs, including: enhancing shorter, sustainable and local food systems; investing in primary care, especially at the local level; and recognising the value of the role of informal workers in the food system (and other sectors).

---

[52] 60% of the 1,497 respondents reported that their incomes had fallen after the pandemic began and almost half reported that their ability to satisfy their food needs had worsened. The percentage of households reporting a food gap increased by 11.7% points. Estimations from the study show that participation in the PSNP offsets virtually all of adverse changes caused by COVID-19 on food insecurity. The likelihood of becoming food insecure increased by only 2.4 %points for PSNP households.

Challenges and limitations

These are preliminary findings. Proposing strong evidence-informed policy recommendations is difficult at this stage. This literature review and case studies faced a number of challenges to disentangle the impacts of COVID-19 on food and nutrition outcomes. On one hand, a large amount of information was published during the acute phase of the crisis when researchers were unable to operate in the field and obtain direct primary data meaning that the information made available to date has been less scientific or reliant on prediction modelling studies. On the other hand, it is promising that research findings are progressively emerging, providing more clarity on the implications of the pandemic on food and nutrition security. Heterogeneity in methods, indicators, study-designs and approaches also posed difficulties in reaching a consistent assessment of the situation. Moreover, only a limited set of studies included baseline pre-COVID-19 data (18,24,28,30). This limited availability of longitudinal pre-COVID-19 data on food and nutrition security has made it difficult to disentangle the secular variations of food and nutrition insecurity indicators from the effects of the pandemic or other localised seasonal shocks (i.e. desert locust infestation in Ethiopia).

COVID-19 has posed significant obstacles to collecting information on maternal and child nutritional outcomes (82). We retrieved no data on such outcomes. For measuring other indicators, such as diet diversity and food security, phone and online surveys have been extremely valuable in times of social distancing and movement restrictions. However, phone surveys may have led to a bias toward easily or quickly 'measurable' or quantifiable data/indicators. For example, we retrieved no data on standardised indices such as the Minimum Dietary Diversity for Women (MDD-W) to assess the disaggregated impacts of COVID-19 on different groups and on different food security pillars (i.e. food availability, access, utilisation and stability). Moreover, the extent of a potential selection bias against poorer and vulnerable strata who could not be reached via phone-surveys is unknown. The nutrition status of populations also needs to be monitored and remote anthropometric assessment be done (83), possibly complemented by COVID-19 safe in-person visits to minimise selection bias possibly related to phone surveys. A thorough appraisal of mitigating policies is also needed. We acknowledge that such appraisal is difficult for complex interventions in time of crisis. However, we advocate for improved data collection to identify vulnerable groups and measure how interventions are successful in protecting them. The evaluation of the PSNP in Ethiopia is a good example on how actual policy can generate good quality data on effectiveness and lead to recommendations (58).

References

1. FSIN Food Security Information Network. 2020 Global Report on Food Crises - Joint Analysis for Better Decision [Internet]. Rome; 2020 [cited 2020 Sep 9]. Available from: http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/133693/filename/133904.pdf

2. WFP. Risk of hunger pandemic as coronavirus set to almost double acute hunger by end of 2020 [Internet]. 2020 [cited 2020 Mar 18]. Available from: https://www.wfp.org/stories/risk-hunger-pandemic-coronavirus-set-almost-double-acute-hunger-end-2020

3. UNSCN. Food Environments in the COVID-19 Pandemic [Internet]. 2020 [cited 2021 Mar 18]. Available from: https://www.unscn.org/19?idnews=2040

4. Turner C, Aggarwal A, Walls H, Herforth A, Drewnowski A, Coates J, et al. Concepts and critical perspectives for food environment research: A global framework with implications for action in low- and middle-income countries. Vol. 18, Global Food Security. 2018. p. 93–101.

5. Roberton T, Carter ED, Chou VB, Stegmuller AR, Jackson BD, Tam Y, et al. Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study. Lancet Glob Heal. 2020 Jul 1;8(7):e901–8.

6. Headey D, Heidkamp R, Osendarp S, Ruel M, Scott N, Black R, et al. Impacts of COVID-19 on childhood malnutrition and nutrition-related mortality. Lancet. 2020;396(10250):519–21.

7. GAIN. Impact of COVID-19 on Food Systems: A Situation Report. 2020; Available from: https://www.gainhealth.org/resources/reports-and-publications/impact-covid-19-food-systems-situation-report

8. FAO. Coronavirus Food Supply Chain Under Strain: What to do? [Internet]. Food Systems Transformation. 2020 [cited 2021 Mar 23]. Available from: http://www.fao.org/3/ca8308en/ca8308en.pdf

9. IFAD. Shaping a holistic response to COVID-19: Protecting food systems and rural producers [Internet]. 2020 [cited 2021 Mar 23]. Available from: https://www.ifad.org/en/web/latest/blog/asset/41863743

10. The Global Nutrition Report's Independent Expert Group. Global Nutrition Report 2020 [Internet]. 2020. Available from: https://globalnutritionreport.org/reports/2020-global-nutrition-report/2020-global-nutrition-report-context-covid-19/

11. FAO. Food-based dietary guidelines [Internet]. 2020. Available from: http://www.fao.org/nutrition/education/food-dietary-guidelines/background/en/

12. Hirvonen K, Bai Y, Headey D, Masters WA. Affordability of the EAT–Lancet reference diet: a global analysis. Lancet Glob Heal [Internet]. 2020 Jan 1 [cited 2021 Mar 12];8(1):e59–66. Available from: www.thelancet.com/lancetgh

13. Osendarp S, Akuoku J, Bank W, Black R, Headey D, Ruel M, et al. The potential impacts of the COVID-19 crisis on maternal and child undernutrition in low and middle income countries Results 4 Development Lawrence Haddad Global Alliance for Improved Nutrition. 2020;1–15. Available from: https://www.researchsquare.com/article/rs-123716/v1

14. IFPRI. COVID-19 Policy Response (CPR) Portal [Internet]. 2020. Available from: https://www.ifpri.org/project/covid-19-policy-response-cpr-portal

15. Ritchie H, Ortiz-Ospina E, Beltekian D. Ethiopia: Coronavirus Pandemic Country Profile - Our World In Data [Internet]. 2020. Available from: https://ourworldindata.org/coronavirus/country/ethiopia?country=~ETH

16. Hale T, Webster S, Petherick A, Phillips T, Kira B. Oxford COVID-19 Government Response Tracker, Blavatnik School of Government. Data use policy: Creative Commons Attribution CC BY standard. [Internet]. 2020. Available from: https://covidtracker.bsg.ox.ac.uk/

17. World Bank. COVID-19 High Frequency Phone Survey of Households 2020 - Ethiopia Portal [Internet]. LSMS-Supported High-Frequency Phone Surveys on COVID-19. 2020 [cited 2020 Feb 6]. Available from: https://www.worldbank.org/en/programs/lsms/brief/lsms-launches-high-frequency-phone-surveys-on-covid-19#2

18. World Bank. COVID-19 High Frequency Phone Survey of Households 2020 - Nigeria Portal [Internet]. LSMS-Supported High-Frequency Phone Surveys on COVID-19. 2020. Available from: https://www.worldbank.org/en/programs/lsms/brief/lsms-launches-high-frequency-phone-surveys-on-covid-19#5

19. de Brauw A, Hirvonen K, Abate GT. Food and nutrition security in Addis Ababa, Ethiopia during COVID-19 pandemic: July 2020 report [Internet]. Washington, DC: International Food Policy Research Institute (IFPRI); 2020 [cited 2020 Aug 21]. (ESSP WORKING PAPER). Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133851

20. Abate GT, de Brauw A, Hirvonen K. Food and nutrition security in Addis Ababa, Ethiopia during COVID-19 pandemic: June 2020 report [Internet]. Washington, DC: International Food Policy Research Institute (IFPRI); 2020 [cited 2020 Aug 21]. (ESSP WORKING PAPER). Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133766

21. Hirvonen K, Abate GT, de Brauw A. Food and nutrition security in Addis Ababa, Ethiopia during COVID-19 pandemic: May 2020 report [Internet]. 2020 [cited 2020 Aug 21]. (ESSP WORKING PAPER). Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133731

22. Alderman H, Gilligan D, Hidrobo M, Leight J, Tafesse AS, Tambet H. Short-term evidence on wellbeing of rural Ethiopian households during the COVID-19 pandemic [Internet]. Spir Learning Brief. 2020 [cited 2020 Aug 21]. Available from: https://www.ifpri.org/publication/short-term-evidence-wellbeing-rural-ethiopian-households-during-covid-19-pandemic

23. Harris J, Depenbusch L, Pal AA, Nair RM, Ramasamy S. Food system disruption: initial livelihood and dietary effects of COVID-19 on vegetable producers in India. Food Secur. 2020;12(4):841–51.

24. Hirvonen K, De Brauw A, Abate GT. Food Consumption and Food Security during the COVID-19 Pandemic in Addis Ababa - [Internet]. Washington, DC: International Food Policy Research Institute (IFPRI).; 2020. (Discussion Paper). Report No.: 1964. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/134018

25. Kansiime MK, Tambo JA, Mugambi I, Bundi M, Kara A, Owuor C. COVID-19 implications on household income and food security in Kenya and Uganda: Findings from a rapid assessment. World Dev. 2021 Jan;137:105199.

26. Sanchez A, Cueto S, Penny M, Hidalgo A. COVID-19 Phone Survey Headlines Report Listening to Young Lives at Work in Ethiopia. 2020;(August):1–6.

27. Harris D, Teklu A, Medhin G, Mitiku I, Tadesse B, Demissie M. The effect of COVID-19 and government response measures on poor and vulnerable groups in urban areas in Ethiopia [Internet]. London, UK: Oxford Policy Management; 2020. Available from: https://www.opml.co.uk/files/Publications/A2241-maintains/gk-v00-final-bre-covid-19-urban-study-monthly-report-1-june-july-2020-copy-edited-final-with-correction-13-08-20.pdf?noredirect=1

28. Gaitán-Rossi P, Vilar-Compte M, Teruel G, Pérez-Escamilla R. Food insecurity measurement and prevalence estimates during the COVID-19 pandemic in a repeated cross-sectional survey in Mexico. Public Health Nutr. 2020 Oct;1–25.

29. Amare M, Abay KA, Tiberti L, Chamberlin J. Impacts of COVID-19 on food security panel data evidence from Nigeria [Internet]. Washington, DC: International Food Policy Research Institute (IFPRI); 2020 [cited 2020 Aug 21]. (IFPRI DISCUSSION PAPER). Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133866

30. Hamadani JD, Hasan MI, Baldi AJ, Hossain SJ, Shiraji S, Bhuiyan MSA, et al. Immediate impact of stay-at-home orders to control COVID-19 transmission on socioeconomic conditions, food insecurity, mental health, and intimate partner violence in Bangladeshi women and their families: an interrupted time series. Lancet Glob Heal. 2020 Nov;8(11):e1380–9.

31. Tesfaye A, Habte Y, Minten B. COVID-19 is shifting consumption and disrupting dairy value chains in Ethiopia. In: Swinnen J, McDermott J, editors. COVID-19 and global food security [Internet]. Washington, DC: International Food Policy Research Institue (IFPRI); 2020 [cited 2020 Aug 21]. p. 42–5. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133815

32. Ceballos F, Kannan S, Kramer B. Impacts of a national lockdown on smallholder farmers' income and food security: Empirical evidence from two states in India. World Dev. 2020;136.

33. Adhikari J, Timsina J, Khadka SR, Ghale Y, Ojha H. COVID-19 impacts on agriculture and food systems in Nepal: Implications for SDGs. Agric Syst. 2021;186.

34. Steenbergen DJ, Neihapi PT, Koran D, Sami A, Malverus V, Ephraim R, et al. COVID-19 restrictions amidst cyclones and volcanoes: A rapid assessment of early impacts on livelihoods and food security in coastal communities in Vanuatu. Mar policy. 2020 Sep;104199.

35. Nyashanu M, Deborah I, Karonga T, Rumbidzai C. The impact of COVID-19 lockdown in a developing country: narratives of self-employed women in Ndola, Zambia. Health Care Women Int. 2020 Oct;1–14.

36. Hirvonen K, Mohammed B, Minten B, Tamru S. Food marketing margins during the COVID-19 pandemic: Evidence from vegetables in Ethiopia [Internet]. Washington, DC: International Food Policy Research Institute (IFPRI); 2020 [cited 2020 Aug 21]. (IFPRI DISCUSSION PAPER). Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133931

37. Prapti B, Stephanie F, Wouterse, Smriti Saini, Muzna A, Rigler C. COVID-19 challenges to equity: Insights from rural Nepal and Senegal | IFPRI : International Food Policy Research Institute. Agrilinks [Internet]. 2020 [cited 2020 Aug 21]; Available from: https://www.ifpri.org/publication/covid-19-challenges-equity-insights-rural-nepal-and-senegal

38. Kundu S, Banna MH Al, Sayeed A, Sultana MS, Brazendale K, Harris J, et al. Determinants of household food security and dietary diversity during the COVID-19 pandemic in Bangladesh. Public Health Nutr. 2020 Dec;1–9.

39. Ministere du Plan et du Developpement and UNDP. Mesure de l'impact socio-economique du COVID-19 sur les conditions des menages en Cote d'Ivoire. 2020.

40. WFP. Enquête de référence de l'impact du covid-19 sur la situation de la sécurité alimentaire des ménages dans le district d'Abidjan [Internet]. 2020. Available from: https://cotedivoire.un.org/sites/default/files/2020-06/RAPPORT DE L%27IMPACT DE LA COVID19 SUR LA SECURITE ALIMENTAIRE DES MENAGES DANS LE DISTRICT D%27ABIDJAN_AVRIL 2020.pdf

41. Sukhwani V, Deshkar S, Shaw R. COVID-19 Lockdown, Food Systems and Urban-Rural Partnership: Case of Nagpur, India. Int J Environ Res Public Health [Internet]. 2020 Aug 7 [cited 2020 Aug 20];17(16):5710. Available from: http://www.ncbi.nlm.nih.gov/pubmed/32784648

42. Nyashanu M, Simbanegavi P, Gibson L. Exploring the impact of COVID-19 pandemic lockdown on informal settlements in Tshwane Gauteng Province, South Africa. Glob Public Health [Internet]. 2020; Available from: http://www.embase.com/search/results?subaction=viewrecord&id=L2005834431&from=export

43. Hirvonen K, De Brauw A, Abate GT. Food Consumption and Food Security during the COVID-19 Pandemic in Addis Ababa. Washington, DC: International Food Policy Research Institute (IFPRI); 2020.

44. Abate GT, Bayeh K, De Brauw A, Hirvonen K. Promoting fruit and vegetable intake in urban Ethiopia. An Experiment Using Video-Based Communication. 2019;(June):2014–7.

45. Integrated Food Security Phase Classification. IPC acute food insecurity analysis in Ethiopia: Belg pastoral and agropastoral areas analysis - September 2020. 2020.

46. Ethiopian Public Health Institute (EPHI) [Ethiopia] and ICF. Ethiopia Mini Demographic and Health Survey 2019: Key Indicators. Rockville, Maryland, USA: EPHI and ICF.; 2019.

47. Tasic H, Akseer N, Gebreyesus SH, Ataullahjan A, Brar S, Confreda E, et al. Drivers of stunting reduction in Ethiopia: a country case study. Am J Clin Nutr [Internet]. 2020 Sep 14 [cited 2021 Mar 24];112(Supplement_2):875S-893S. Available from: https://academic.oup.com/ajcn/article/112/Supplement_2/875S/5897228

48. Weldearegay HG, Gebrehiwot TG, Abrha MW, Mulugeta A. Overweight and Obesity among children under five in Ethiopia: Analysis from 2016 National Demographic Health Survey: A Case Control Study. 2019;1–15.

49. DHS. Ethiopia Demographic and Health Survey 2016. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF; 2016.

50. Josephson A, Kilic T, Michler JD. Socioeconomic Impacts of COVID-19 in Four African Countries [Internet]. 2020. Available from: https://openknowledge.worldbank.org/handle/10986/34733

51. Salyer SJ, Maeda J, Sembuche S, Kebede Y, Tshangela A, Moussif M, et al. The first and second waves of the COVID-19 pandemic in Africa: a cross-sectional study. Lancet [Internet]. 2021 Mar [cited 2021 Mar 29];0(0). Available from: https://linkinghub.elsevier.com/retrieve/pii/S0140673621006322

52. OECD. COVID-19 in Africa: Regional socio-economic implications and policy priorities [Internet]. Tackling coronavirus (Covid-19): contributing to a global effort. 2020. Available from: https://www.oecd.org/coronavirus/policy-responses/covid-19-in-latin-america-and-the-caribbean-regional-socio-economic-implications-and-policy-priorities-93a64fde

53. Béné C, Bakker D, Chavarro MJ, Even B, Melo J, Sonneveld A. Impacts of COVID-19 on People's Food Security : Foundations for a more Resilient Food System [Internet]. 2021. Available from: https://doi.org/10.2499/p15738coll2.134298

54. Ayanlade A, Radeny M. COVID-19 and food security in Sub-Saharan Africa: implications of lockdown during agricultural planting seasons [Internet]. Vol. 4, npj Science of Food. Nature Research; 2020 [cited 2021 Feb 10]. p. 1–6. Available from: https://doi.org/10.1038/s41538-020-00073-0

55. FAO, IFAD, UNICEF, WFP,WHO. The State of Food Security and Nutrition in the World. Transforming food systems for affordable healthy diets. Rome (Italy); Food and Agricultural Organisation; 2020.

56. Central Statistic Agency (Ethiopia) and World Bank. Ethiopia - Socioeconomic Survey/LSMS 2018-2019 [Internet]. Addis Ababa (Ethiopia):Central Statistic Agency; 2019. Available from: https://microdata.worldbank.org/index.php/catalog/3823

57. Dirks F, Berkum V. COVID-19 Food System: Rapid Country Assessment in Ethiopia [Internet]. 2020. Available from: https://www.wur.nl/en/Research-Results/Research-Institutes/centre-for-development-innovation/Our-Value-Propositions/Guiding-Sector-Transformation/The-effects-of-COVID-19-on-food-systems-rapid-assessments/Rapid-Country-Assessment-Ethiopia.htm

58. Abay K, Berhane G, Hoddinott J, Tafere K. COVID-19 and Food Security in Ethiopia: Do Social Protection Programs Protect? SSRN Electron J [Internet]. 2020;(November). Available from: https://openknowledge.worldbank.org/handle/10986/34794

59. Nechifor V, Boysen O, Ferrari E, Hailu K, Beshir M. COVID-19 : socioeconomic impacts and recovery in Ethiopia. EUR 30484 EN, Publications Office of the European Union, Luxembourg; 2020.

60. Ayele S, Zegeye EA, Nisbett N. Multi-Sectoral Nutrition Policy and Programme Design , Coordination and Implementation in Ethiopia [Internet]. 2020. Available from: https://opendocs.ids.ac.uk/opendocs/handle/20.500.12413/15200

61. World Food Programme. WFP Guatemala Country Brief June 2020 [Internet]. 2020. Available from: https://docs.wfp.org/api/documents/WFP-0000118287/download/

62. OECD. COVID-19 in Latin America and the Caribbean: Regional socio-economic implications and policy priorities [Internet]. Available from: https://www.oecd.org/coronavirus/policy-responses/covid-19-in-latin-america-and-the-caribbean-regional-socio-economic-implications-and-policy-priorities-93a64fde

63. United Nations. Policy Brief: The Impact of COVID-19 on Food Security and Nutrition. United Nations; 2020. p. #23.

64. Galmés S, Serra F, Palou A. Current state of evidence: Influence of nutritional and nutrigenetic factors on immunity in the COVID-19 pandemic framework. Nutrients. 2020 Sep;12(9):1–33.

65. Mertens E, Peñalvo JL. The Burden of Malnutrition and Fatal COVID-19: A Global Burden of Disease Analysis. Front Nutr. 2021 Jan;7.

66. Littlejohn P, Finlay BB. When a pandemic and an epidemic collide: COVID-19, gut microbiota, and the double burden of malnutrition. BMC Med. 2021 Dec;19(1):31.

67. FAO. Sistemas alimentarios y COVID-19 en Guatemala. Efectos, respuestas, políticas e implicaciones a largo plazo [Internet]. FAO: Roma. 2020. p. #18. Available from: https://doi.org/10.4060/cb1597es

68. Divala T, Burke RM, Ndeketa L, Corbett EL, MacPherson P. Africa faces difficult choices in responding to COVID-19 [Internet]. Vol. 395, The Lancet. Lancet Publishing Group; 2020 [cited 2021 Feb 19]. p. 1611. Available from: http://www.thelancet.com/article/S0140673620310564/fulltext

69. Fore HH, Dongyu Q, Beasley DM, Ghebreyesus TA. Child malnutrition and COVID-19: the time to act is now. Lancet [Internet]. 2020 Aug 22 [cited 2020 Sep 8];396(10250):517–8. Available from: https://www.who.int/news-room/commentaries/detail/breastfeeding-

70. Armstrong J, Oliveira L, Korpi-Salmela K, Lopez J. The Integrated Phase Classification approach as an example of comprehensive system approaches. In: Food Security Policy, Evaluation and Impact Assessment. Routledge; 2019. p. 206–18.

71. Leroy JL, Olney DK, Ruel MT. PROCOMIDA, a Food-Assisted Maternal and Child Health and Nutrition Program, Contributes to Postpartum Weight Retention in Guatemala: A Cluster-Randomized Controlled Intervention Trial. J Nutr. 2019 Dec;149(12):2219–27.

72. Leroy JL, Gadsden P, Rodríguez-Ramírez S, de Cossío TG. Cash and In-Kind Transfers in Poor Rural Communities in Mexico Increase Household Fruit, Vegetable, and Micronutrient Consumption but Also Lead to Excess Energy Consumption. J Nutr. 2010 Mar;140(3):612–7.

73. Block SA, Kiess L, Webb P, Kosen S, Moench-Pfanner R, Bloem MW, et al. Macro shocks and micro outcomes: Child nutrition during Indonesia's crisis. Econ Hum Biol [Internet]. 2004 [cited 2021 Mar 12];2(1):21–44. Available from: https://pubmed.ncbi.nlm.nih.gov/15463991/

74. Huber C, Finelli L, Stevens W. The Economic and Social Burden of the 2014 Ebola Outbreak in West Africa. In: Journal of Infectious Diseases [Internet]. Oxford University Press; 2018 [cited 2021 Mar 12]. p. S698–704. Available from: https://pubmed.ncbi.nlm.nih.gov/30321368/

75. Galiano A, Vera-Hernández M. Health Shocks, Household Consumption, and Child Nutrition [Internet]. 2008 [cited 2021 Mar 12]. Available from: http://www.dnp.gov.co/paginas_detalle.aspx?idp=760

76. Oni T, Micklesfield LK, Wadende P, Obonyo CO, Woodcock J, Mogo ERI, et al. Implications of COVID-19 control measures for diet and physical activity, and lessons for addressing other pandemics facing rapidly urbanising countries. Glob Health Action. 2020 Dec;13(1):1810415.

77. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. Nutrients. 2020;12(6).

78. Werneck AO, Silva DR, Malta DC, Gomes CS, Souza-Júnior PRB, Azevedo LO, et al. Associations of sedentary behaviours and incidence of unhealthy diet during the COVID-19 quarantine in Brazil. Public Health Nutr [Internet]. 2021 Feb 1 [cited 2021 Mar 16];24(3):422–6. Available from: https://www.cambridge.org/core.

79. FAO. Impact of COVID-19 on agriculture, food systems and rural livelihoods in Eastern Africa. 2020.

80. Béné C. Resilience of local food systems and links to food security – A review of some important concepts in the context of COVID-19 and other shocks. Food Secur [Internet]. 2020;12(4):805–22. Available from: https://www.scopus.com/inward/record.uri?eid=2-s2.0-85087809382&doi=10.1007%2Fs12571-020-01076-1&partnerID=40&md5=8cf702d53d1ffd0731708136caed3b97

81. Save the Children. Nutrition Critical; Why we must all act now to tackle child malnutrition [Internet]. 2020. Available from: https://resourcecentre.savethechildren.net/library/nutrition-critical-why-we-must-act-now-tackle-child-malnutrition

82. Sam-Agudu NA, Rabie H, Pipo MT, Byamungu LN, Masekela R, van der Zalm MM, et al. The Critical Need for Pooled Data on COVID-19 in African Children: An AFREhealth Call for Action through Multi-Country Research Collaboration. Clin Infect Dis [Internet]. 2021 Feb 13 [cited 2021 Feb 22]; Available from: http://www.ncbi.nlm.nih.gov/pubmed/33580256

83. Viana Bagni U, da Silva Ribeiro KD, Soares Bezerra D, Cavalcante de Barros D, de Magalhães Fittipaldi AL, Pimenta da Silva Araújo RG, et al. Anthropometric assessment in ambulatory nutrition amid the COVID-19 pandemic: Possibilities for the remote and in-person care. Clin Nutr ESPEN [Internet]. 2021 Feb 1 [cited 2021 Feb 21];41:186–92. Available from: http://clinicalnutritionespen.com/article/S2405457720311001/fulltext

84. DIAO X, MAHRT K. Assessing the impacts of COVID-19 on household incomes and poverty in Myanmar: A microsimulation approach - An analytical summary [in Burmese] [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://www.ifpri.org/publication/assessing-impacts-covid-19-household-incomes-and-poverty-myanmar-microsimulation-0

85. Diao X, Aung N, Lwin WY, Zone PP, Nyunt KM, Thurlow J. Assessing the impacts of COVID-19 on Myanmar's economy: A Social Accounting Matrix (SAM) multiplier approach [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133742

86. Muungano wa wana vijiji. Coronavirus situation tracker for Kenyan informal settlements [Internet]. 2020 [cited 2020 Sep 10]. Available from: www.muungano.net

87. World Bank. COVID-19 Impact Monitoring at HH level - Burkina Faso. 2020; Available from: http://documents1.worldbank.org/curated/en/425021598292810539/pdf/COVID-19-Impact-Monitoring-at-the-Household-Level.pdf

88. Arndt C, Davies R, Gabriel S, Harris L, Makrelov K, Robinson S, et al. Covid-19 lockdowns, income distribution, and food security: An analysis for South Africa. Glob Food Sec. 2020 Sep 1;26.

89. Baye K. COVID-19 prevention measures in Ethiopia: Current realities and prospects [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133729

90. Breisinger C, Latif AA, Raouf M, Wiebelt M. Economic impact of COVID-19 on tourism and remittances: Insights from Egypt. In: Swinnen J, McDermott J, editors. COVID-19 and global food security [Internet]. International Food Policy Research Institue (IFPRI); 2020 [cited 2020 Aug 21]. p. 56–9. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133827

91. Andam KS, Edeh H, Oboh V, Pauw K, Thurlow J. Estimating the economic costs of COVID-19 in Nigeria [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133846

92. Breisinger C, Raouf M, Wiebelt M, Kamaly A, Karara M. Impact of COVID-19 on the Egyptian economy: Economic sectors, jobs, and households [Internet]. International Food Policy Research Institute. 2020 [cited 2020 Aug 21]. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133764

93. Arndt C, Davies R, Sherwin G, Harris L, Makrelov K, Boipuso M, et al. Impact of Covid-19 on the South African economy: An initial analysis | IFPRI : International Food Policy Research Institute [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://www.ifpri.org/publication/impact-covid-19-south-african-economy-initial-analysis

94. NPC. Medium and long-term impacts of a moderate lockdown (social restrictions) in response to the COVID-19 pandemic in Malawi : A rapid cost-benefit analysis National Planning Commission with technical support from the Copenhagen Consensus Center. 2020;

95. Federal Ministry of Health. Nigeria Food and Nutrition Response Plan for COVID-19 pandemic [Internet]. 2020. Available from: https://www.humanitarianresponse.info/fr/operations/nigeria/document/nigeria-food-and-nutrition-response-plan-covid-19-pandemic

96. IPA. Análisis de la Encuesta RECOVR en Colombia - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/recovr-colombia-tracking-effects-covid-19-pandemic

97. IPA. Analyse de l'enquête RECOVR en Côte d'Ivoire - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/recovr-CI-tracking-effects-covid-19-pandemic

98. IPA. Ghana RECOVR Survey Analysis - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/recovr-ghana-tracking-effects-covid-19-pandemic

99. IPA. Análisis de la encuesta RECOVR en Mexico - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/recovr-mexico-tracking-effects-covid-19-pandemic

100. IPA. Rwanda Survey Analysis - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/sites/default/files/Rwanda-RECOVR-Survey-Analysis-July-2020.pdf

101. IPA. Sierra Leone RECOVR Survey Analysis - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/recovr-sierra-leone-tracking-effects-covid-19-pandemic

102. IPA. Philippines RECOVR Survey Analysis - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/recovr-philippines-tracking-effects-covid-19-pandemic

103. IPA. Uganda RECOVR Survey Analysis - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/covid-19-response-context-kamwenge-graduation-study-uganda

104. IPA. Zambia RECOVR Survey Analysis - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/recovr-study/recovr-zambia-tracking-effects-covid-19-pandemic

105. IPA. Analyse de l'enquête RECOVR au Burkina Faso - Round 1 [Internet]. 2020. Available from: https://www.poverty-action.org/sites/default/files/FRENCH_Burkina Faso RECOVR Survey Analysis.pdf

106. Baulch B, Botha R, Pauw K. Short-term impacts of COVID-19 on the Malawian economy: Initial results [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133788

107. Hirvonen K, Abate GT, de Brauw A. Survey suggests rising risk of food and nutrition insecurity in Addis Ababa, Ethiopia, as COVID-19 restrictions continue. In: Swinnen J, McDermott J, editors. COVID-19 and global food security [Internet]. International Food Policy Research Institue (IFPRI); 2020 [cited 2020 Aug 21]. p. 46–9. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133822

108. Amewu S, Asante S, Pauw K, Thurlow J. The economic costs of COVID-19 in Sub-Saharan Africa: Insights from a simulation exercise for Ghana [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133760

109. Oxfam. OXFAM MEDIA BRIEFING THE HUNGER VIRUS: HOW COVID-19 IS FUELLING HUNGER IN A HUNGRY WORLD. 2020; Available from: www.oxfam.org

110. United Nation. The Impact of COVID-19 on Food Security and Nutrition [Internet]. 2020 [cited 2020 Sep 8]. Available from: https://data.unicef.org/resources/jme-report-2020/

111. Headey DD, Cho A, Goudet S, Oketch JA, Oo TZ. The impacts of the COVID-19 crisis on maternal and child malnutrition in Myanmar: What to expect, and how to protect [Internet]. 2020 [cited 2020 Aug 21]. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133814

112. WFP (Region Bureau Nairobi). Impact of COVID-19 outbreak on livelihoods, food security and nutrition in East Africa. 2020.

113. Das S, Rasul MG, Hossain MS, Khan A-R, Alam MA, Ahmed T, et al. Acute food insecurity and short-term coping strategies of urban and rural households of Bangladesh during the lockdown period of COVID-19 pandemic of 2020: Report of a cross-sectional survey. BMJ Open. 2020;10(12).

114. Lain J, Perng J, Vishwanath T, Abul M, Azad K, Siwatu GO, et al. What the Crisis Means for Nigerians: Findings from the Nigeria COVID-19 National Longitudinal Phone Survey (NLPS) [Internet]. 2020 [cited 2020 Sep 10]. Available from: https://microdata.worldbank.org/index.php/catalog/3712/download/48362

115. Inegbedion HE. COVID-19 lockdown: implication for food security. J Agribus Dev Emerg Econ. 2020;

116. Shammi M, Robi MR, Tareq SM. COVID-19: socio-environmental challenges of Rohingya refugees in Bangladesh. J Environ Heal Sci Eng. 2020;

117. Rao N, Narain N, Chakraborty S, Bhanjdeo A, Pattnaik A. Destinations Matter: Social Policy and Migrant Workers in the Times of Covid. Eur J Dev Res. 2020 Oct;1–23.

118. Saxena A, Amin A, Mohan SB, Mohan P. Food Insecurity in Tribal High Migration Communities in Rajasthan, India. Food Nutr Bull. 2020 Nov;379572120967163.

119. Manfrinato CV, Marino A, Condé VF, Franco M do CP, Stedefeldt E, Tomita LY. High prevalence of food insecurity, the adverse impact of COVID-19 in Brazilian favela. Public Health Nutr. 2020 Dec;1–14.

120. Headey D, Ruel M. Economic Shocks and Child Wasting [Internet]. 2020 [cited 2020 Sep 8]. Report No.: 01941. Available from: https://ebrary.ifpri.org/digital/collection/p15738coll2/id/133786

121. Hossain ST. Impacts of COVID-19 on the agri-food sector: Food security policies of Asian productivity organization members. J Agric Sci - Sri Lanka. 2020;15(2):116–32.

122. Erokhin V, Gao T. Impacts of COVID-19 on Trade and Economic Aspects of Food Security: Evidence from 45 Developing Countries. Int J Environ Res Public Health [Internet]. 2020 [cited 2020 Aug 20];17(16):5775. Available from: https://www.mdpi.com/1660-4601/17/16/5775

123. Sama BK, Kaur P, Thind PS, Verma MK, Kaur M, Singh DD. Implications of COVID-19-induced nationwide lockdown on children's behaviour in Punjab, India. Child Care Health Dev. 2021;47(1):128–35.

124. Zimmerer KS, Carrasco M, de Haan S, Meza K, Jones AD, Tubbeh RM, et al. Indigenous Smallholder Struggles in Peru: Nutrition Security, Agrobiodiversity, and Food Sovereignty amid Transforming Global Systems and Climate Change. J Lat Am Geogr. 2020 Jul;19(3, SI):74–111.

125. Zimmerer KS, de Haan S. Informal food chains and agrobiodiversity need strengthening—not weakening—to address food security amidst the COVID-19 crisis in South America. Food Secur. 2020;12(4):891–4.

126. Adhikari A, Goregaonkar N, Narayanan R, Panicker N, Ramamoorthy N. Manufactured Maladies: Lives and Livelihoods of Migrant Workers During COVID-19 Lockdown in India. Indian J labour Econ Q J Indian Soc Labour Econ. 2020 Oct;1–29.

127. Lackey KA, Pace RM, Williams JE, Bode L, Donovan SM, Järvinen KM, et al. SARS-CoV-2 and human milk: What is the evidence? Maternal and Child Nutrition. Blackwell Publishing Ltd; 2020.

128. García L, Veneros J, Tineo D. Severe Acute Respiratory Syndrome (SARS-CoV-2): A national public health emergency and its impact on food security in Peru. Sci Agropecu. 2020;11(2):241–5.

129. Buonsenso D, Cinicola B, Raffaelli F, Sollena P, Iodice F. Social consequences of COVID-19 in a low resource setting in Sierra Leone, West Africa. Int J Infect Dis. 2020 Aug 1;97:23–6.

130. Jambor A, Czine P, Balogh P. The Impact of the Coronavirus on Agriculture: First Evidence Based on Global Newspapers. SUSTAINABILITY. 2020 Jun;12(11).

131. Meyer CJ, Hardy M, Witte M, Kagy G, Demeke E. The market-reach of pandemics: Evidence from female workers in Ethiopia's ready-made garment industry. World Dev. 2021 Jan;137:105179.

132. Swindale A, Bilinsky P. Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (Version 2) [Internet]. 2006 [cited 2020 Oct 25]. Available from: www.fantaproject.org

133. WFP. Meta data for the Food Consumption Score (FCS) indicator [Internet]. 2008 [cited 2020 Oct 25]. Available from: http://documents.wfp.org/stellent/groups/public/documents/manual_guide_proced/wfp197216.pdf

134. Ballard TJ, Kepple AW, Cafiero C. The Food Insecurity Experience Scale Development of a Global Standard for Monitoring Hunger Worldwide [Internet]. 2013 [cited 2020 Oct 28]. Available from: http://www.fao.org/economic/ess/ess-fs/voices/en/

135. Coates J, Swindale A, Bilinsky P. Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide: Version 3 [Internet]. 2007 [cited 2020 Nov 23]. Available from: www.fantaproject.org

Annexes

Annex 1 – Search Strings

Search 1 – August 2020

Run in PubMed on 20/08/2020

#1	COVID* OR 2019-nCoV OR2019nCoV OR 2019nCoV OR SARS-CoV* OR SARS-nCoV OR (SARS AND virus) OR Coronavirus* OR corona-virus* OR coronaviridae OR "Middle East respiratory syndrome" OR MERS-CoV	62 622
#2	Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calorie* OR micronutrient* OR malnutrition OR malnourished OR undernutrition OR denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obese* OR BMI	3 316 822
#3	Afghanistan[Title/Abstract] OR Burkina Faso[Title/Abstract] OR Burundi[Title/Abstract] OR "Central African Republic"[Title/Abstract] OR Chad[Title/Abstract] OR Congo[Title/Abstract] OR Eritrea[Title/Abstract] OR Ethiopia[Title/Abstract] OR Gambia[Title/Abstract] OR Guinea[Title/Abstract] OR Guinea-Bissau[Title/Abstract] OR Haiti[Title/Abstract] OR "North Korea"[Title/Abstract] OR Liberia[Title/Abstract] OR Madagascar[Title/Abstract] OR Malawi[Title/Abstract] OR Mali[Title/Abstract] OR Mozambique[Title/Abstract] OR Niger[Title/Abstract] OR Rwanda[Title/Abstract] OR "Sierra Leone"[Title/Abstract] OR Somalia[Title/Abstract] OR Sudan[Title/Abstract] OR Syrian[Title/Abstract] OR "Arab Republic"[Title/Abstract] OR Tajikistan[Title/Abstract] OR Togo[Title/Abstract] OR Uganda[Title/Abstract] OR Yemen[Title/Abstract] OR Algeria[Title/Abstract] OR Angola[Title/Abstract] OR Bangladesh[Title/Abstract] OR Benin[Title/Abstract] OR Bhutan[Title/Abstract] OR Bolivia[Title/Abstract] OR "Cabo Verde"[Title/Abstract] OR Cambodia[Title/Abstract] OR Cameroon[Title/Abstract] OR Comoros[Title/Abstract] OR Congo[Title/Abstract] OR "Côte d'Ivoire"[Title/Abstract] OR "Ivory Coast"[Title/Abstract] OR Djibouti[Title/Abstract] OR Egypt[Title/Abstract] OR "El Salvador"[Title/Abstract] OR Eswatini[Title/Abstract] OR Ghana[Title/Abstract] OR Honduras[Title/Abstract] OR India[Title/Abstract] OR Kenya[Title/Abstract] OR Kiribati[Title/Abstract] OR "Kyrgyz Republic"[Title/Abstract] OR Lao[Title/Abstract] OR Laos[Title/Abstract] OR Lesotho[Title/Abstract] OR Mauritania[Title/Abstract] OR Micronesia[Title/Abstract] OR Moldova[Title/Abstract] OR Mongolia[Title/Abstract] OR Morocco[Title/Abstract] OR Myanmar[Title/Abstract] OR Nepal[Title/Abstract] OR Nicaragua[Title/Abstract] OR Nigeria[Title/Abstract] OR Pakistan[Title/Abstract] OR "Papua New Guinea"[Title/Abstract] OR Philippines[Title/Abstract] OR "São Tomé AND Principe"[Title/Abstract] OR Senegal[Title/Abstract] OR "Solomon Islands"[Title/Abstract] OR "Sri Lanka"[Title/Abstract] OR Tanzania[Title/Abstract] OR Timor-Leste[Title/Abstract] OR Tunisia[Title/Abstract] OR Ukraine[Title/Abstract] OR Uzbekistan[Title/Abstract] OR Vanuatu[Title/Abstract] OR Vietnam[Title/Abstract] OR Gaza[Title/Abstract] OR Zambia[Title/Abstract] OR Zimbabwe Africa[Title/Abstract] OR South-East Asia[Title/Abstract] OR Caribbean[Title/Abstract] OR "West Indies"[Title/Abstract] OR "South America"[Title/Abstract] OR "Latin America"[Title/Abstract] OR "Central America"[Title/Abstract] OR "low-income"[Title/Abstract] OR "low- and-middle income"[Title/Abstract] OR "low-and-middle-income"[Title/Abstract] OR LMIC*[Title/Abstract] OR global OR "developing countries"[Title/Abstract]	1 247 604
#4[1]	#1 AND #2	3 227
#5	#3 AND #4	580
#6	Filters: in the last 1 year	
#7	#5 AND #6	466
#8[2]		

---

[1] May be interesting to overview for: 1. better understanding the physiological mechanisms between COVID-19 and nutrition; 2. retrieve editorials and comments with no elements of #3 in their titles.

[2] We could exclude editorial and comments, as our focus is on good quality evidence.

Run in Embase 24/08/2020

#1	COVID* OR "2019-nCoV" OR "2019nCoV" OR "SARS-CoV*" OR ("SARS" AND "virus") OR "Coronavirus*" OR "corona-virus*" OR coronaviridae OR "Middle East respiratory syndrome" OR "MERS-CoV"	70 531
#2	Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calori* OR micronutrient* OR malnutrition OR malnourished OR undernutrition OR denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obese* OR BMI	3 516 714
#3	Afghanistan OR Burkina Faso OR Burundi OR "Central African Republic" OR Chad OR Congo OR Eritrea OR Ethiopia OR Gambia OR Guinea OR Guinea-Bissau OR Haiti OR "North Korea" OR Liberia OR Madagascar OR Malawi OR Mali OR Mozambique OR Niger OR Rwanda OR "Sierra Leone" OR Somalia OR Sudan OR Syrian OR "Arab Republic" OR Tajikistan OR Togo OR Uganda OR Yemen OR Algeria OR Angola OR Bangladesh OR Benin OR Bhutan OR Bolivia OR "Cabo Verde" OR Cambodia OR Cameroon OR Comoros OR Congo OR "Ivoire" OR "Ivory Coast" OR Djibouti OR Egypt OR "El Salvador" OR Eswatini OR Ghana OR Honduras OR India OR Kenya OR Kiribati OR "Kyrgyz Republic" OR Lao OR Laos OR Lesotho OR Mauritania OR Micronesia OR Moldova OR Mongolia OR Morocco OR Myanmar OR Nepal OR Nicaragua OR Nigeria OR Pakistan OR "Papua New Guinea" OR Philippines OR "São Tomé and Principe" OR Senegal OR "Solomon Islands" OR "Sri Lanka" OR Tanzania OR Timor-Leste OR Tunisia OR Ukraine OR Uzbekistan OR Vanuatu OR Vietnam OR Gaza OR Zambia OR Zimbabwe OR Africa OR South-East Asia OR Caribbean OR "West Indies" or "South America" or "Latin America" or "Central America" OR "low-income" OR "low-and-middle income" OR "low-and-middle-income" OR LMIC* OR global OR "developing-countries"	949 336
#4[3]	#1 AND #2	4 389
#5	#3 AND #4	535
#6	Filters: [2019-2020]/py	
#7	#5 AND #6	437
#8	Filters: [embase]/lim	
#9	#7 AND #8	340

---

[3] May be interesting to overview for: 1. better understanding the physiological mechanisms between COVID-19 and nutrition; 2. retrieve editorials and comments with no elements of #3 in their titles.

Run in SCOPUS on 20/08/2020

#1	ALL= COVID* OR "2019-nCoV" OR "2019nCoV" OR "SARS-CoV*" OR ("SARS" AND "virus") OR "Coronavirus*" OR "corona-virus*" OR coronaviridae OR "Middle East respiratory syndrome" OR "MERS-CoV"	131,734
#2[4]	ALL=Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calori* OR micronutrient* OR malnutrition OR malnourished OR undernutrition OR denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obese* OR BMI	101,723
#3	TI-ABS=Afghanistan OR Burkina Faso OR Burundi OR "Central African Republic" OR Chad OR Congo OR Eritrea OR Ethiopia OR Gambia OR Guinea OR Guinea-Bissau OR Haiti OR "North Korea" OR Liberia OR Madagascar OR Malawi OR Mali OR Mozambique OR Niger OR Rwanda OR "Sierra Leone" OR Somalia OR Sudan OR Syrian	101,723
#4	TI-ABS= "Arab Republic" OR Tajikistan OR Togo OR Uganda OR Yemen OR Algeria OR Angola OR Bangladesh OR Benin OR Bhutan OR Bolivia OR "Cabo Verde" OR Cambodia OR Cameroon OR Comoros OR Congo OR "Ivoire" OR "Ivory Coast" OR Djibouti OR Egypt OR "El Salvador" OR Eswatini OR Ghana OR Honduras or India	101,723
#5	TI-ABS= Kenya OR Kiribati OR "Kyrgyz Republic" OR Lao OR Laos OR Lesotho OR Mauritania OR Micronesia OR Moldova OR Mongolia OR Morocco OR Myanmar OR Nepal OR Nicaragua OR Nigeria OR Pakistan OR "Papua New Guinea" OR Philippines OR "São Tomé and Principe" OR Senegal OR "Solomon Islands" OR "Sri Lanka"	101,723
#6	TI-ABS= Tanzania OR Timor-Leste OR Tunisia OR Ukraine OR Uzbekistan OR Vanuatu OR Vietnam OR Gaza OR Zambia OR Zimbabwe OR Africa OR South-East Asia OR Caribbean OR "West Indies" or "South America" or "Latin America" or "Central America" OR "low-income" OR "low- and-middle income" OR "low-and-middle-income" OR LMIC* OR global OR "developing-countries"	101,723
#7	#3 OR #4 OR #5 OR #6	1,089,281
#8[5]	#1 AND #2	23,631
#9	#8 AND #7	667
#10	(LIMIT-TO (PUBYEAR , 2020) OR LIMIT-TO (PUBYEAR , 2019)	
#11	#9 AND #10	293

---

[4] There is a bug with the whole query. But sharing it in two separate searches and combining them afterwards works well. It seems that SCOPUS does not like too long queries.

[5] May be interesting to overview for: 1. better understanding the physiological mechanisms between COVID-19 and nutrition; 2. retrieve editorials and comments with no elements of #3 in their titles.

Run in Web of Science on 20/08/2020

#1	ALL=(COVID* OR "2019-nCoV" OR "2019nCoV" OR "SARS-CoV*" OR ("SARS" AND "virus") OR "Coronavirus*" OR "corona-virus*" OR coronaviridae OR "Middle East respiratory syndrome" OR "MERS-CoV")	48,981
#2[6]	ALL=(Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calori* OR micronutrient* OR malnutrition OR malnourished OR undernutrition)	4,112,889
#3	ALL= (denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obese* OR BMI_	788,058
#4	TI =(Afghanistan OR Burkina Faso OR Burundi OR "Central African Republic" OR Chad OR Congo OR Eritrea OR Ethiopia OR Gambia OR Guinea OR Guinea-Bissau OR Haiti OR "North Korea" OR Liberia OR Madagascar OR Malawi OR Mali OR Mozambique OR Niger OR Rwanda OR "Sierra Leone" OR Somalia OR Sudan) OR AB=(Afghanistan OR Burkina Faso OR Burundi OR "Central African Republic" OR Chad OR Congo OR Eritrea OR Ethiopia OR Gambia OR Guinea OR Guinea-Bissau OR Haiti OR "North Korea" OR Liberia OR Madagascar OR Malawi OR Mali OR Mozambique OR Niger OR Rwanda OR "Sierra Leone" OR Somalia OR Sudan)	265,170
#5	TI=(Syrian OR "Arab Republic" OR Tajikistan OR Togo OR Uganda OR Yemen OR Algeria OR Angola OR Bangladesh OR Benin OR Bhutan OR Bolivia OR "Cabo Verde" OR Cambodia OR Cameroon OR Comoros OR Congo OR "Ivoire" OR "Ivory Coast" OR Djibouti OR Egypt OR "El Salvador" OR Eswatini) OR AB=(Syrian OR "Arab Republic" OR Tajikistan OR Togo OR Uganda OR Yemen OR Algeria OR Angola OR Bangladesh OR Benin OR Bhutan OR Bolivia OR "Cabo Verde" OR Cambodia OR Cameroon OR Comoros OR Congo OR "Ivoire" OR "Ivory Coast" OR Djibouti OR Egypt OR "El Salvador" OR Eswatini)	191,427
#6	TI=(Ghana OR Honduras OR India OR Kenya OR Kiribati OR "Kyrgyz Republic" OR Lao OR Laos OR Lesotho OR Mauritania OR Micronesia OR Moldova OR Mongolia OR Morocco OR Myanmar OR Nepal OR Nicaragua OR Nigeria OR Pakistan OR "Papua New Guinea" OR Philippines OR "São Tomé and Principe") OR AB=(Ghana OR Honduras OR India OR Kenya OR Kiribati OR "Kyrgyz Republic" OR Lao OR Laos OR Lesotho OR Mauritania OR Micronesia OR Moldova OR Mongolia OR Morocco OR Myanmar OR Nepal OR Nicaragua OR Nigeria OR Pakistan OR "Papua New Guinea" OR Philippines OR "São Tomé and Principe")	487,636
#7	TI=(Senegal OR "Solomon Islands" OR "Sri Lanka" OR Tanzania OR Timor-Leste OR Tunisia OR Ukraine OR Uzbekistan OR Vanuatu OR Vietnam OR Gaza OR Zambia OR Zimbabwe OR Africa OR South-East Asia OR Caribbean OR "West Indies" or "South America" or "Latin America" or "Central America") OR AB=(Senegal OR "Solomon Islands" OR "Sri Lanka" OR Tanzania OR Timor-Leste OR Tunisia OR Ukraine OR Uzbekistan OR Vanuatu OR Vietnam OR Gaza OR Zambia OR Zimbabwe OR Africa OR South-East Asia OR Caribbean OR "West Indies" or "South America" or "Latin America" or "Central America")	519,921
#8	TI=("low-income" OR "low- and-middle income" OR "low-and-middle-income" OR LMIC* OR global OR "developing-countries") OR AB=("low-income" OR "low- and-middle income" OR "low-and-middle-income" OR LMIC* OR global OR "developing-countries")	1,223,479
#9	#2 AND #3	4,687,351
#10[7]	#1 AND #9	2,796
#11	#4 OR #5 OR #6 OR #7 OR#8	2,439,739
#12	#10 AND #11	387
#13	Refined by: PUBLICATION YEARS: (2020 OR 2019)	
#14	#12 AND #13	271

---

[6] There is a bug with the whole query. But sharing it in two separate searches and combining them afterwards works well. It seems that SCOPUS does not like too long queries.

[7] May be interesting to overview for: 1. better understanding the physiological mechanisms between COVID-19 and nutrition; 2. retrieve editorials and comments with no elements of #3 in their titles.

Search 2 - November 2020

Scopus 08/11/2020

	Search string	
#1	COVID*	96,785
#2	Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calori* OR micronutrient* OR malnutrition OR malnourished OR undernutrition OR denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obes* OR BMI	4,362,302
#3	Afghanistan[Title/Abstract] OR Burkina Faso[Title/Abstract] OR Burundi[Title/Abstract] OR "Central African Republic"[Title/Abstract] OR Chad[Title/Abstract] OR Congo[Title/Abstract] OR Eritrea[Title/Abstract] OR Ethiopia[Title/Abstract] OR Gambia[Title/Abstract] OR Guinea[Title/Abstract] OR Guinea-Bissau[Title/Abstract] OR Haiti[Title/Abstract] OR "North Korea"[Title/Abstract] OR Liberia[Title/Abstract] OR Madagascar[Title/Abstract] OR Malawi[Title/Abstract] OR Mali[Title/Abstract] OR Mozambique[Title/Abstract] OR Niger[Title/Abstract] OR Rwanda[Title/Abstract] OR "Sierra Leone"[Title/Abstract] OR Somalia[Title/Abstract] OR Sudan[Title/Abstract] OR Syrian[Title/Abstract] OR "Arab Republic"[Title/Abstract] OR Tajikistan[Title/Abstract] OR Togo[Title/Abstract] OR Uganda[Title/Abstract] OR Yemen[Title/Abstract] OR Algeria[Title/Abstract] OR Angola[Title/Abstract] OR Bangladesh[Title/Abstract] OR Benin[Title/Abstract] OR Bhutan[Title/Abstract] OR Bolivia[Title/Abstract] OR "Cabo Verde"[Title/Abstract] OR Cambodia[Title/Abstract] OR Cameroon[Title/Abstract] OR Comoros[Title/Abstract] OR Congo[Title/Abstract] OR "Côte d'Ivoire"[Title/Abstract] OR "Ivory Coast"[Title/Abstract] OR Djibouti[Title/Abstract] OR Egypt[Title/Abstract] OR "El Salvador"[Title/Abstract] OR Eswatini[Title/Abstract] OR Ghana[Title/Abstract] OR Honduras[Title/Abstract] OR India[Title/Abstract] OR Kenya[Title/Abstract] OR Kiribati[Title/Abstract] OR "Kyrgyz Republic"[Title/Abstract] OR Lao[Title/Abstract] OR Laos[Title/Abstract] OR Lesotho[Title/Abstract] OR Mauritania[Title/Abstract] OR Micronesia[Title/Abstract] OR Moldova[Title/Abstract] OR Mongolia[Title/Abstract] OR Morocco[Title/Abstract] OR Myanmar[Title/Abstract] OR Nepal[Title/Abstract] OR Nicaragua[Title/Abstract] OR Nigeria[Title/Abstract] OR Pakistan[Title/Abstract] OR "Papua New Guinea"[Title/Abstract] OR Philippines[Title/Abstract] OR "São Tomé AND Principe"[Title/Abstract] OR Senegal[Title/Abstract] OR "Solomon Islands"[Title/Abstract] OR "Sri Lanka"[Title/Abstract] OR Tanzania[Title/Abstract] OR Timor-Leste[Title/Abstract] OR Tunisia[Title/Abstract] OR Ukraine[Title/Abstract] OR Uzbekistan[Title/Abstract] OR Vanuatu[Title/Abstract] OR Vietnam[Title/Abstract] OR Gaza[Title/Abstract] OR Zambia[Title/Abstract] OR Zimbabwe Africa[Title/Abstract] OR South-East Asia[Title/Abstract] OR Caribbean[Title/Abstract] OR "West Indies"[Title/Abstract] OR "South America"[Title/Abstract] OR "Latin America"[Title/Abstract] OR "Central America"[Title/Abstract] OR "low-income"[Title/Abstract] OR "low- and-middle income"[Title/Abstract] OR "low-and-middle-income"[Title/Abstract] OR LMIC*[Title/Abstract] OR "developing countries"[Title/Abstract]	1,071,136
#4	#1 AND #2	7,780
#5	#3 AND #4	548
#6	Filters: **2020/8/15 - 2020/11/6**	
#7	#5 AND #6	146

Medline 08/11/2020

	Search string	
#1	COVID*	61,869
#2	Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calori* OR micronutrient* OR malnutrition OR malnourished OR undernutrition OR denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obes* OR BMI	3,404,147
#3	Afghanistan[Title/Abstract] OR Burkina Faso[Title/Abstract] OR Burundi[Title/Abstract] OR "Central African Republic"[Title/Abstract] OR Chad[Title/Abstract] OR Congo[Title/Abstract] OR Eritrea[Title/Abstract] OR Ethiopia[Title/Abstract] OR Gambia[Title/Abstract] OR Guinea[Title/Abstract] OR Guinea-Bissau[Title/Abstract] OR Haiti[Title/Abstract] OR "North Korea"[Title/Abstract] OR Liberia[Title/Abstract] OR Madagascar[Title/Abstract] OR Malawi[Title/Abstract] OR Mali[Title/Abstract] OR Mozambique[Title/Abstract] OR Niger[Title/Abstract] OR Rwanda[Title/Abstract] OR "Sierra Leone"[Title/Abstract] OR Somalia[Title/Abstract] OR Sudan[Title/Abstract] OR Syrian[Title/Abstract] OR "Arab Republic"[Title/Abstract] OR Tajikistan[Title/Abstract] OR Togo[Title/Abstract] OR Uganda[Title/Abstract] OR Yemen[Title/Abstract] OR Algeria[Title/Abstract] OR Angola[Title/Abstract] OR Bangladesh[Title/Abstract] OR Benin[Title/Abstract] OR Bhutan[Title/Abstract] OR Bolivia[Title/Abstract] OR "Cabo Verde"[Title/Abstract] OR Cambodia[Title/Abstract] OR Cameroon[Title/Abstract] OR Comoros[Title/Abstract] OR Congo[Title/Abstract] OR "Côte d'Ivoire"[Title/Abstract] OR "Ivory Coast"[Title/Abstract] OR Djibouti[Title/Abstract] OR Egypt[Title/Abstract] OR "El Salvador"[Title/Abstract] OR Eswatini[Title/Abstract] OR Ghana[Title/Abstract] OR Honduras[Title/Abstract] OR India[Title/Abstract] OR Kenya[Title/Abstract] OR Kiribati[Title/Abstract] OR "Kyrgyz Republic"[Title/Abstract] OR Lao[Title/Abstract] OR Laos[Title/Abstract] OR Lesotho[Title/Abstract] OR Mauritania[Title/Abstract] OR Micronesia[Title/Abstract] OR Moldova[Title/Abstract] OR Mongolia[Title/Abstract] OR Morocco[Title/Abstract] OR Myanmar[Title/Abstract] OR Nepal[Title/Abstract] OR Nicaragua[Title/Abstract] OR Nigeria[Title/Abstract] OR Pakistan[Title/Abstract] OR "Papua New Guinea"[Title/Abstract] OR Philippines[Title/Abstract] OR "São Tomé AND Principe"[Title/Abstract] OR Senegal[Title/Abstract] OR "Solomon Islands"[Title/Abstract] OR "Sri Lanka"[Title/Abstract] OR Tanzania[Title/Abstract] OR Timor-Leste[Title/Abstract] OR Tunisia[Title/Abstract] OR Ukraine[Title/Abstract] OR Uzbekistan[Title/Abstract] OR Vanuatu[Title/Abstract] OR Vietnam[Title/Abstract] OR Gaza[Title/Abstract] OR Zambia[Title/Abstract] OR Zimbabwe Africa[Title/Abstract] OR South-East Asia[Title/Abstract] OR Caribbean[Title/Abstract] OR "West Indies"[Title/Abstract] OR "South America"[Title/Abstract] OR "Latin America"[Title/Abstract] OR "Central America"[Title/Abstract] OR "low-income"[Title/Abstract] OR "low- and-middle income"[Title/Abstract] OR "low-and-middle-income"[Title/Abstract] OR LMIC*[Title/Abstract] OR "developing countries"[Title/Abstract]	1,130,373
#4	#1 AND #2	6,367
#5	#3 AND #4	420
#6	Filters: **2020/8/15 - 2020/11/6**	
#7	#5 AND #6	151

Search 3 - January 2021

Scopus 06/01/2021

	Search string	
#1	COVID*	72,795
#2	Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calori* OR micronutrient* OR malnutrition OR malnourished OR undernutrition OR denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obes* OR BMI	4,362,302
#3	Afghanistan[Title/Abstract] OR Burkina Faso[Title/Abstract] OR Burundi[Title/Abstract] OR "Central African Republic"[Title/Abstract] OR Chad[Title/Abstract] OR Congo[Title/Abstract] OR Eritrea[Title/Abstract] OR Ethiopia[Title/Abstract] OR Gambia[Title/Abstract] OR Guinea[Title/Abstract] OR Guinea-Bissau[Title/Abstract] OR Haiti[Title/Abstract] OR "North Korea"[Title/Abstract] OR Liberia[Title/Abstract] OR Madagascar[Title/Abstract] OR Malawi[Title/Abstract] OR Mali[Title/Abstract] OR Mozambique[Title/Abstract] OR Niger[Title/Abstract] OR Rwanda[Title/Abstract] OR "Sierra Leone"[Title/Abstract] OR Somalia[Title/Abstract] OR Sudan[Title/Abstract] OR Syrian[Title/Abstract] OR "Arab Republic"[Title/Abstract] OR Tajikistan[Title/Abstract] OR Togo[Title/Abstract] OR Uganda[Title/Abstract] OR Yemen[Title/Abstract] OR Algeria[Title/Abstract] OR Angola[Title/Abstract] OR Bangladesh[Title/Abstract] OR Benin[Title/Abstract] OR Bhutan[Title/Abstract] OR Bolivia[Title/Abstract] OR "Cabo Verde"[Title/Abstract] OR Cambodia[Title/Abstract] OR Cameroon[Title/Abstract] OR Comoros[Title/Abstract] OR Congo[Title/Abstract] OR "Côte d'Ivoire"[Title/Abstract] OR "Ivory Coast"[Title/Abstract] OR Djibouti[Title/Abstract] OR Egypt[Title/Abstract] OR "El Salvador"[Title/Abstract] OR Eswatini[Title/Abstract] OR Ghana[Title/Abstract] OR Honduras[Title/Abstract] OR India[Title/Abstract] OR Kenya[Title/Abstract] OR Kiribati[Title/Abstract] OR "Kyrgyz Republic"[Title/Abstract] OR Lao[Title/Abstract] OR Laos[Title/Abstract] OR Lesotho[Title/Abstract] OR Mauritania[Title/Abstract] OR Micronesia[Title/Abstract] OR Moldova[Title/Abstract] OR Mongolia[Title/Abstract] OR Morocco[Title/Abstract] OR Myanmar[Title/Abstract] OR Nepal[Title/Abstract] OR Nicaragua[Title/Abstract] OR Nigeria[Title/Abstract] OR Pakistan[Title/Abstract] OR "Papua New Guinea"[Title/Abstract] OR Philippines[Title/Abstract] OR "São Tomé AND Principe"[Title/Abstract] OR Senegal[Title/Abstract] OR "Solomon Islands"[Title/Abstract] OR "Sri Lanka"[Title/Abstract] OR Tanzania[Title/Abstract] OR Timor-Leste[Title/Abstract] OR Tunisia[Title/Abstract] OR Ukraine[Title/Abstract] OR Uzbekistan[Title/Abstract] OR Vanuatu[Title/Abstract] OR Vietnam[Title/Abstract] OR Gaza[Title/Abstract] OR Zambia[Title/Abstract] OR Zimbabwe Africa[Title/Abstract] OR South-East Asia[Title/Abstract] OR Caribbean[Title/Abstract] OR "West Indies"[Title/Abstract] OR "South America"[Title/Abstract] OR "Latin America"[Title/Abstract] OR "Central America"[Title/Abstract] OR "low-income"[Title/Abstract] OR "low- and-middle income"[Title/Abstract] OR "low-and-middle-income"[Title/Abstract] OR LMIC*[Title/Abstract] OR "developing countries"[Title/Abstract]	1,130,373
#4	#1 AND #2	8,367
#5	#3 AND #4	388
#6	Filters: **2020/11/08 - 2021/01/06**	
#7	#5 AND #6	209

Medline 06/01/2021

	Search string	
	Search string	
#1	COVID*	79,900
#2	Nutri* OR diet* OR (food* NOT "Food and Drug Administration") OR feed* OR appetite OR calorie* OR micronutrient* OR malnutrition OR malnourished OR undernutrition OR denutrition OR undernourished OR ((wasting OR wasted) NOT wastewater) OR (stunted OR stunting) OR kwashiorkor OR underweight* OR "failure-to-thrive" OR "low-birth-weight" OR hunger OR hungry OR overweight* OR obes* OR BMI	3,441,665
#3	Afghanistan[Title/Abstract] OR Burkina Faso[Title/Abstract] OR Burundi[Title/Abstract] OR "Central African Republic"[Title/Abstract] OR Chad[Title/Abstract] OR Congo[Title/Abstract] OR Eritrea[Title/Abstract] OR Ethiopia[Title/Abstract] OR Gambia[Title/Abstract] OR Guinea[Title/Abstract] OR Guinea-Bissau[Title/Abstract] OR Haiti[Title/Abstract] OR "North Korea"[Title/Abstract] OR Liberia[Title/Abstract] OR Madagascar[Title/Abstract] OR Malawi[Title/Abstract] OR Mali[Title/Abstract] OR Mozambique[Title/Abstract] OR Niger[Title/Abstract] OR Rwanda[Title/Abstract] OR "Sierra Leone"[Title/Abstract] OR Somalia[Title/Abstract] OR Sudan[Title/Abstract] OR Syrian[Title/Abstract] OR "Arab Republic"[Title/Abstract] OR Tajikistan[Title/Abstract] OR Togo[Title/Abstract] OR Uganda[Title/Abstract] OR Yemen[Title/Abstract] OR Algeria[Title/Abstract] OR Angola[Title/Abstract] OR Bangladesh[Title/Abstract] OR Benin[Title/Abstract] OR Bhutan[Title/Abstract] OR Bolivia[Title/Abstract] OR "Cabo Verde"[Title/Abstract] OR Cambodia[Title/Abstract] OR Cameroon[Title/Abstract] OR Comoros[Title/Abstract] OR Congo[Title/Abstract] OR "Côte d'Ivoire"[Title/Abstract] OR "Ivory Coast"[Title/Abstract] OR Djibouti[Title/Abstract] OR Egypt[Title/Abstract] OR "El Salvador"[Title/Abstract] OR Eswatini[Title/Abstract] OR Ghana[Title/Abstract] OR Honduras[Title/Abstract] OR India[Title/Abstract] OR Kenya[Title/Abstract] OR Kiribati[Title/Abstract] OR "Kyrgyz Republic"[Title/Abstract] OR Lao[Title/Abstract] OR Laos[Title/Abstract] OR Lesotho[Title/Abstract] OR Mauritania[Title/Abstract] OR Micronesia[Title/Abstract] OR Moldova[Title/Abstract] OR Mongolia[Title/Abstract] OR Morocco[Title/Abstract] OR Myanmar[Title/Abstract] OR Nepal[Title/Abstract] OR Nicaragua[Title/Abstract] OR Nigeria[Title/Abstract] OR Pakistan[Title/Abstract] OR "Papua New Guinea"[Title/Abstract] OR Philippines[Title/Abstract] OR "São Tomé AND Principe"[Title/Abstract] OR Senegal[Title/Abstract] OR "Solomon Islands"[Title/Abstract] OR "Sri Lanka"[Title/Abstract] OR Tanzania[Title/Abstract] OR Timor-Leste[Title/Abstract] OR Tunisia[Title/Abstract] OR Ukraine[Title/Abstract] OR Uzbekistan[Title/Abstract] OR Vanuatu[Title/Abstract] OR Vietnam[Title/Abstract] OR Gaza[Title/Abstract] OR Zambia[Title/Abstract] OR Zimbabwe Africa[Title/Abstract] OR South-East Asia[Title/Abstract] OR Caribbean[Title/Abstract] OR "West Indies"[Title/Abstract] OR "South America"[Title/Abstract] OR "Latin America"[Title/Abstract] OR "Central America"[Title/Abstract] OR "low-income"[Title/Abstract] OR "low- and-middle income"[Title/Abstract] OR "low-and-middle-income"[Title/Abstract] OR LMIC*[Title/Abstract] OR "developing countries"[Title/Abstract]	1,147,019
#4	#1 AND #2	5,666
#5	#3 AND #4	534
#6	Filters: **2020/11/08 - 2021/01/06**	
#7	#5 AND #6	309

Annex 2 – List of full-text articles excluded, with reasons

List of excluded grey literature reports/papers (08 March 2021)

Title and reference	Reason for exclusion
2020 Global Report on Food crises (1)	Inappropriate study design: pre-COVID-19 pandemic estimates of the number of acutely food-insecure people in need of urgent action in 2020 (forecasts)
Assessing the Impacts of COVID-19 on Household Incomes and Poverty in Myanmar (84)	Inappropriate topic and methods (micro-simulation of impact of COVID on household income and poverty)
Assessing the Impacts of COVID-19 on Myanmar's Economy (85)	Inappropriate topic and methods (micro-simulation of impact of COVID on the economy)
Coronavirus situation tracker for Kenyan informal settlements (86)	Inappropriate population (informal settlement), unclear methods (Information was collected by community mobilizers living in informal Settlements. Mobilizers were asked to interview 5 people in their village and provide their responses using an online survey)
Covid-19 Impact Monitoring at the Household Level – Burkina Faso (Report N.1 August 2020) (87)	Only Baseline survey available (with no baseline data to assess changes)
Covid-19 Impact Monitoring at the Household Level - Malawi (Report N.1 July 2020) (World Bank 2020d)	Only Baseline survey available (and link broken in August and November when search was being conducted)
Covid-19 Impact Monitoring at the Household Level - Uganda (Report N.1 June 2020) (World Bank 2020b)	Only Baseline survey available (with no baseline data to assess changes)
Covid-19 lockdowns, income distribution, and food security: An analysis for South Africa (88)	Inappropriate topic and study design (simulation of impact of COVID on household labour income)
COVID-19 prevention measures in Ethiopia (89)	Inappropriate study design (evaluation report using historical data).
Economic impact of COVID-19 on tourism and remittances: Insights from Egypt (90)	Inappropriate topic and methods (simulation of impact of COVID on economic sectors)
Estimating the Economic Costs of COVID-19 in Nigeria (91)	Inappropriate topic and methods (micro-simulation of impact of COVID on the economy)
Impact of COVID-19 on Food Systems: A Situation Report (7)	Inappropriate study design (evaluation report). The authors emphasize that "The information reported here should be interpreted with caution, as it does rely heavily on personal experience and perceptions"
Impact of COVID-19 on the Egyptian economy: Economic sectors, jobs, and households (92)	Inappropriate topic and methods (micro-simulation of impact of COVID on the economy, jobs and households
Impact of Covid-19 on the South African economy (93)	Inappropriate topic and methods (simulation of impact of COVID on economy)
Medium and long-term impacts of a moderate lockdown (social restrictions) in response to the COVID-19 pandemic in Malawi: A rapid cost-benefit analysis (94)	Inappropriate topic and methods (simulation for forecast); data on maternal and child health are from Roberton et al 2020
Nigeria food and nutrition response plan for COVID-19 Pandemic (Ministry of Health 2020)	Inappropriate methods (report on GoN Food and nutrition response plan during COVID-19)
RECOVR survey in Colombia (96)	Results not published
RECOVR survey in Côte d'Ivoire (97)	Only Baseline survey available (with no baseline data to assess changes)
RECOVR survey in Ghana (98)	Only Baseline survey available (with no baseline data to assess changes)
RECOVR survey in Mexico (99)	Only Baseline survey available (with no baseline data to assess changes)
RECOVR survey in Rwanda (100)	Only Baseline survey available (with no baseline data to assess changes)
RECOVR survey in Sierra Leone (101)	Only Baseline survey available (with no baseline data to assess changes)
RECOVR survey in the Philippines (102)	Only Baseline survey available (with no baseline data to assess changes)
RECOVR survey in Uganda (103)	No results published yet
RECOVR survey in Zambia (104)	Only Baseline survey available (with no baseline data to assess changes)
RECOVR survey in Burkina Faso (105)	Only Baseline survey available (with no baseline data to assess changes)
Short-term Impacts of COVID-19 on the Malawian Economy: Initial Results (106)	Inappropriate topic and methods (micro-simulation of impact of COVID on the economy)
Survey suggests rising risk of food and nutrition insecurity in Addis Ababa, Ethiopia, as COVID-19 restrictions (107)	Uses same data IFPRI collected in Ethiopia and reported elsewhere (21). This report and subsequent round are included in the analysis.
The Economic Costs of COVID-19 in Sub-Saharan Africa (108)	Inappropriate topic and methods (micro-simulation of impact of COVID on the economy)
The Hunger Virus: how COVID-19 is fuelling hunger in a hungry world (109)	Inappropriate design (briefing paper; narrative review)
The Impact of COVID-19 on Food Security and Nutrition (110)	Inappropriate design (briefing paper; narrative review)
The impacts of the COVID-19 crisis on maternal and child malnutrition in Myanmar (111)	Inappropriate methods (micro-simulation of impact of COVID-19 economic crisis on maternal and child nutrition)
WFP Report: COVID-19 outbreak on livelihoods, food security and nutrition in East Africa (112)	Inappropriate study design (evaluation report using historical data).

List of excluded Peer Reviewed papers (08 March 2021)

Title and Reference	Reason for exclusion
Acute food insecurity and short-term coping strategies of urban and rural households of Bangladesh during the lockdown period of COVID-19 pandemic of 2020: report of a cross-sectional survey (113)	Inappropriate study design: study provides a snapshot of food insecurity during the pandemic. No pre-Covid data are available, and questions are not framed to compare pre-/post-COVID-19 changes
Child malnutrition and COVID-19: the time to act is now (69)	Inappropriate study design (this is a comment paper)
COVID-19 From the Ground Up: What the Crisis Means for Nigerians (114)	Wrong topic and inappropriate design: simulation of economic crisis
COVID-19 lockdown: implication for food security (115)	Inappropriate outcome: respondents' perception of the possible impact of the COVID-19 lockdown on farm labour, farmers' morale, transportation, security and farm coordination
COVID-19: socio-environmental challenges of Rohingya refugees in Bangladesh (116)	Inappropriate output (report on WASH facilities in refugee camps)
Destinations Matter: Social Policy and Migrant Workers in the Times of Covid (117)	Outcome indicators of interest not collected
Early estimates of the indirect effects of the COVID-19 pandemic on maternal and child mortality in low-income and middle-income countries: a modelling study (5)	Inappropriate methods (simulation of impact of COVID on maternal and child mortality)
Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. (77)	The study included high and low- middle income countries. However, the results presentation did not include regional or country breakdown.
Food Insecurity in Tribal High Migration Communities in Rajasthan, India (118)	Inappropriate study design (does not have pre/post COVID-19 changes of outcome indicators).
High prevalence of food insecurity, the adverse impact of COVID-19 in Brazilian favela (119)	Inappropriate study design: study provides a snapshot of food insecurity during the pandemic. No pre-Covid data are available, and questions are not framed to compare pre-/post-COVID-19 changes
Impacts of COVID-19 on Childhood Malnutrition and Nutrition-Related Mortality (120)	Inappropriate methods (simulation of impact of COVID on economic sectors)
Impacts of COVID-19 on the Agri-food Sector: Food Security Policies of Asian Productivity Organization Members (121)	Inappropriate design: publicly available information was synthesized, and insights from 19 individuals working in agriculture or agri-food-related areas
Impacts of COVID-19 on Trade and Economic Aspects of Food Security: Evidence from 45 Developing Countries + (122)	Inappropriate methods (Meta data from WFP Hunger map, covering vulnerable population in 45 countries who have reported poor or border line food security status)
Implications of COVID-19-induced nationwide lockdown on children's behaviour in Punjab, India (123)	The only indicator of interest (changes of children's diets) does not provide any additional content (how have diets changed? Are they richer or poorer?)
Indigenous Smallholder Struggles in Peru: Nutrition Security, Agrobiodiversity, and Food Sovereignty amid Transforming Global Systems and Climate Change (124)	Data collected before the outbreak of COVID-19. Data during the pandemic not available.
Informal food chains and agrobiodiversity need strengthening—not weakening—to address food security amidst the COVID-19 crisis in South America (125)	Commentary
Manufactured Maladies: Lives and Livelihoods of Migrant Workers During COVID-19 Lockdown in India (126)	Outcome indicators of interest not collected
SARS-CoV-2 and human milk: What is the evidence? (127)	No appropriate geographic coverage with regards to human milk tested for COVID-19 (China, Italy, Singapore)
Severe Acute Respiratory Syndrome (SARS-CoV-2): A national public health emergency and its impact on food security in Peru (128)	Inappropriate methods (using historical data to anticipate the impacts on the quantity and the need to distribute food for food security)
Social consequences of COVID-19 in a low resource setting in Sierra Leone, West Africa (129)	Inappropriate study design (small sample size, only qualitative questions, no data disaggregation provided)
The Impact of the Coronavirus on Agriculture: First Evidence Based on Global Newspapers (130)	Inappropriate design/methods: synthesis of most read English-based newspaper articles
The market-reach of pandemic: Evidence from female workers in Ethiopia's ready-made garment industry (131)	Inappropriate study design (does not have pre/post COVID-19 changes of outcome indicators)