



Food and Agriculture
Organization of the
United Nations

Priorities related to food value chains and the agri-food sector in the Nationally Determined Contributions (NDCs)





Priorities related to food value chains and the agri-food sector in the Nationally Determined Contributions (NDCs)

by

Emilie Wieben

FAO's Climate and Environment Division (CBC)

Food and Agriculture Organization of the United Nations (FAO)
Rome, 2019

Required citation:

Wieben, E. 2019. *Priorities related to food value chains and the agri-food sector in the Nationally Determined Contributions (NDCs)*. Rome, FAO.

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

The views expressed in this information product are those of the author(s) and do not necessarily reflect the views or policies of FAO.

© FAO, 2019



Some rights reserved. This work is made available under the Creative Commons Attribution-NonCommercial-ShareAlike 3.0 IGO licence (CC BY-NC-SA 3.0 IGO; <https://creativecommons.org/licenses/by-nc-sa/3.0/igo/legalcode>).

Under the terms of this licence, this work may be copied, redistributed and adapted for non-commercial purposes, provided that the work is appropriately cited. In any use of this work, there should be no suggestion that FAO endorses any specific organization, products or services. The use of the FAO logo is not permitted. If the work is adapted, then it must be licensed under the same or equivalent Creative Commons licence. If a translation of this work is created, it must include the following disclaimer along with the required citation: "This translation was not created by the Food and Agriculture Organization of the United Nations (FAO). FAO is not responsible for the content or accuracy of this translation. The original [Language] edition shall be the authoritative edition."

Disputes arising under the licence that cannot be settled amicably will be resolved by mediation and arbitration as described in Article 8 of the licence except as otherwise provided herein. The applicable mediation rules will be the mediation rules of the World Intellectual Property Organization <http://www.wipo.int/amc/en/mediation/rules> and any arbitration will be conducted in accordance with the Arbitration Rules of the United Nations Commission on International Trade Law (UNCITRAL).

Third-party materials. Users wishing to reuse material from this work that is attributed to a third party, such as tables, figures or images, are responsible for determining whether permission is needed for that reuse and for obtaining permission from the copyright holder. The risk of claims resulting from infringement of any third-party-owned component in the work rests solely with the user.

Sales, rights and licensing. FAO information products are available on the FAO website (www.fao.org/publications) and can be purchased through publications-sales@fao.org. Requests for commercial use should be submitted via: www.fao.org/contact-us/licence-request. Queries regarding rights and licensing should be submitted to: copyright@fao.org.

Cover photographs: (left side) ©FAO/Chris Steele-Perkins/Magnum Ph; (right side) ©FAO/Tamiru Legesse

Contents

Acknowledgements	iv
Acronyms and abbreviations	v
Executive summary	vi
1. Introduction	1
2. Methodology	3
3. Scope and overview of food value chain priorities in the NDCs	4
4. Geographical scope	6
5. National circumstances, risks and vulnerabilities	8
6. Mitigation coverage	10
7. Adaptation coverage	13
8. Technology needs for food value chains	16
9. Conclusion	18
References	18

Acknowledgements

The author is very grateful for the valuable input and guidance provided on this analysis by Martial Bernoux, Krystal Crumpler, Maryline Darmaun, Elizabeth Laval, Mirella Salvatore and Julia Wolf (CBC). Special thanks also goes to Andrew Morrow for his work on screening the NDCs as well as for the support provided by FAO's Strategic Programme 4, especially Divine Njie and Jorge Fonseca (SP4). The author would also like to thank Rebecka Ramstedt (CBC) for her communications-related support and the graphic designer Claudia Tonini for her work.



Acronyms and abbreviations

COP 21	21st Conference of the Parties
FAO	Food and Agriculture Organization of the United Nations
GHG	Greenhouse Gas
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
LDC	Least Developed Country
NDC	Nationally Determined Contribution
SIDS	Small Island Developing States
UNFCCC	United Nations Framework Convention on Climate Change



Executive summary

This paper presents a global assessment on how food value chains and the agri-food sector have been considered in the Nationally Determined Contributions (NDCs). Building on FAO's global study of the agriculture sectors in the NDCs, the analysis provides an overview of where value chain interventions and references have been included and outlines their specific context. In particular, it takes a closer look at the socio-economic activities that link the agri-food sector with livelihoods, in the context of national climate change mitigation and adaptation priorities.

The analysis highlights that countries through their NDCs have emphasized the importance of improving value chain infrastructures and strengthening the agri-food sector as part of their national priorities for climate action. The prominence of food value chain priorities is particularly evident in the contributions from Sub-Saharan Africa, the Least Developed Countries and Small Island Developing States, reflecting the socio-economic and environmental characteristics of these regions. By outlining the priority areas for the agri-food sector in the NDCs, this paper provides a guidance on the key interventions where future investment and international support is needed to enable climate-resilient and low-emission food value chains.



I. Introduction

In December 2015, at the 21st Conference of the Parties (COP 21) of the United Nations Framework Convention on Climate Change (UNFCCC) in Paris, negotiations concluded with the unanimous adoption of the Paris Agreement. This was a landmark achievement for the international community in the response to climate change and the commitment to limit the global average temperature increase to well below 2°C above pre-industrial levels and pursue efforts to limit the increase to 1.5°C. Through the Agreement, Parties also committed to undertake ambitious efforts towards reducing the impacts and effects of climate change and enhance the support to assist developing countries to do so.

The Paris Agreement specifically recognizes the need to prioritize food security and food production systems in the response to climate change. In its preamble, the Agreement refers to “the fundamental priority of safeguarding food security and ending hunger, and the particular vulnerabilities of food production systems to the adverse impacts of climate change”. Furthermore, Article 2.1 of the Agreement also emphasizes the importance of “increasing the ability to adapt to the adverse impacts of climate change and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production”.

Ahead of COP 21, Parties prepared and communicated their pledges outlining how they intend to address climate change, which were submitted in the form of Intended Nationally Determined Contributions (INDCs). The INDCs constitute the main national policy frameworks under the UNFCCC and reflect each country’s objectives for climate action, based on their national priorities, circumstances and capabilities. While no standard format was provided, most countries prepared their INDCs following the non-binding guidance, defining the mitigation actions they plan to undertake to address the causes of climate change, through greenhouse gas (GHG) emission reduction measures. Many of the INDCs also included priorities for adapting to the effects of climate change and reducing vulnerabilities, along with finance and investment aspects related to mitigation and adaptation costs.

The INDCs served as the basis for the negotiations at COP 21 and altogether provided the foundation for the Paris Agreement and its post-2020 implementation period. Additionally, the INDC preparation and formulation process followed a bottom-up approach, which helped to ensure that national mitigation and adaptation priorities were defined by Parties themselves. While the INDCs are not legally binding, they are expected to act as the main road map in driving forward national ambitions for post-2020 climate action under the Agreement.

Once Parties ratify the Paris Agreement, their INDC is automatically converted into a Nationally Determined Contribution (NDC). Under the provisions of the Paris Agreement, Parties will be expected to revise and submit an updated NDC every five years. Furthermore, as part of the Enhanced Transparency Framework under the Agreement (Art. 13), Parties will report on the



© FAO/Roberto Faidutti

progress of their NDC implementation as well as the support needed towards achieving their climate targets.

This paper presents a global assessment on how food value chains and the agri-food sector have been considered in the NDCs. It provides an overview of where value chain interventions and references have been included and outlines their specific context. In particular, it takes a closer look at the socio-economic activities that tie the agri-food sector with livelihoods, in the context of national climate change mitigation and adaptation priorities. The rationale behind this analysis is to identify how post-harvest aspects of food systems feature in the NDCs and particularly to examine how the value-adding activities are considered. Against this background and by focusing on food value chains, this analysis aims to complement the FAO study *“The Agriculture Sectors in the Intended Nationally Determined Contributions (INDCs): Analysis”*, which provided an in depth assessment of the role of the agriculture sectors (crops, livestock, forestry, fisheries and aquaculture) in the INDCs.

2. Methodology

This analysis is based on the information communicated by Parties in their NDCs. At the time of writing (July 2018), 191 countries (192 Parties) had submitted a total of 163 INDCs while 174 Parties have submitted their first NDC.¹ For the assessment, 163 NDCs and INDCs were downloaded and in the remainder of this report, they are collectively referred to as NDCs. Due to differences in national circumstances, the communicated NDCs vary in structure, length and content. It is therefore important to note that a systematic comparison of the NDCs is difficult due to the distinct lack of homogeneity among the submissions.

Each of the NDCs were studied with the aim of identifying relevant references to food value chain aspects. In this respect, a combination of an extensive keyword search² and detailed examination of submissions were applied. In order to cross-check initial findings, a keyword search was conducted. The list of key words was selected based on an understanding of food value chains and the initial reading of the NDCs. Key words relating to value chain interventions were selected and relevant results were highlighted and collated. The original texts of these 163 NDCs were translated (automatic translation) into English where necessary. Notably some of the translations used in this study, including NDC examples provided in the boxes, are non-official.

This methodology is comparable to methods used in similar publications that analysed INDC contents like UNFCCC (2015), Richards *et al.* (2015), and more recently FAO (2016). The FAO (2016) study provides an extensive overview of the inclusion of the agricultural sectors in the INDCs, covering mitigation, vulnerabilities, and key adaptation areas and priorities. This analysis aims to complement the global FAO study by providing a closer look at the inclusion of interventions that are relevant to the agri-food sector, particularly the value-adding activities in food systems that occur post-production.

Where quoted in the analysis, percentages refer to percentages of NDCs.

¹ The EU submitted an INDC on behalf of its 28 member states, whereas the same NDC was submitted by the EU and each of the 28 EU countries.

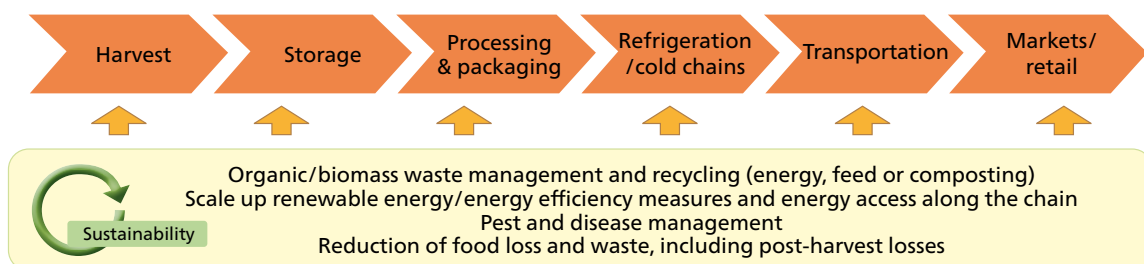
² Including: food, value chain, supply chain, harvest, process, preservation, loss, waste, spoilage, packaging, transport, market, refrigeration, drying, cold chain, storage, conservation, pest, disease, technology.

3. Scope and overview of food value chain priorities in the NDCs

Food value chains are the linked activities in the production of food, where four core functions are distinguished in the chain: production, aggregation, processing and distribution (FAO, 2014). Their structures are diverse and can be highly complex with many final products drawing on the production of crops, livestock, forestry, fisheries and aquaculture along with the utilization of their by-products.

In this analysis, references to food value chains are primarily focused on the post-production side of food systems and also cover circular economy approaches, which as an industry can be referred to as the agri-food sector. The scope is therefore to identify relevant references which fall within or across the three core value chain functions of aggregation, processing and distribution. Figure 1 provides an illustration of the different stages of a food value chain along with cross-cutting aspects that have been considered in this analysis due to their ability to influence the overall efficiency of the value chain and the agri-food sector as a whole. While the stages of a value chain can vary depending on the commodity and final output, most products follow a trail of activities from harvesting (or slaughtering/landing) until reaching the end-user, which may include storage, cooling, processing and transportation. Energy often plays a key role throughout chain, and pest and disease infestations as well as food loss and waste can occur at all stages of the process. Finally, by-products and biomass waste also arise along the course, particularly from food processing.

Figure 1. Schematic overview of the value chain components and aspects considered in the NDC analysis



Source: Author's elaboration.

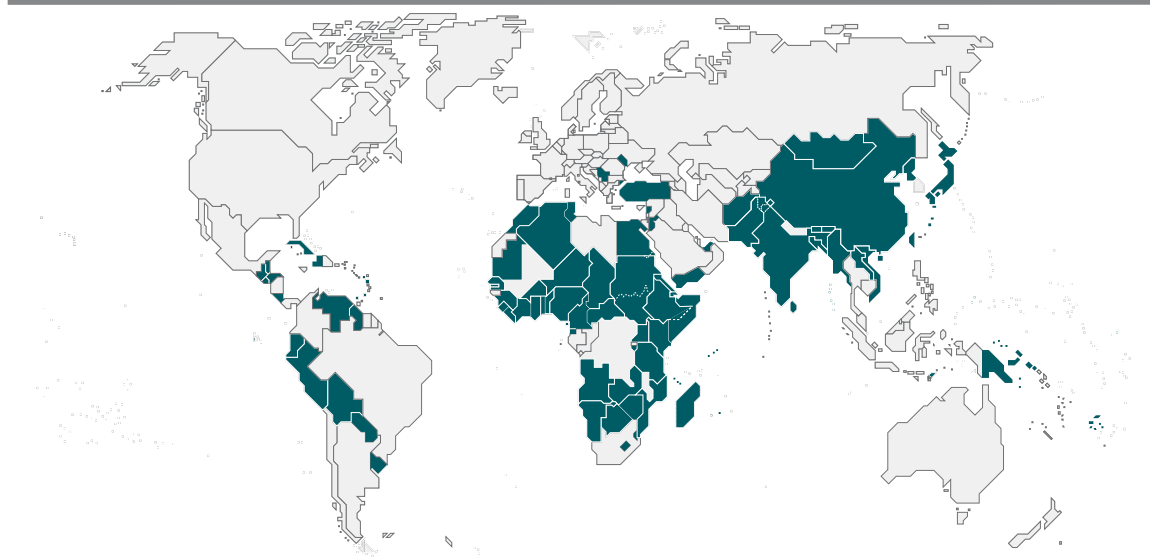
Due to the systemic nature of value chains, they cannot be categorized into a standard IPCC sector used for reporting on GHG emissions, but are rather cross-sectoral, which is also reflected in the way references appear under different sectors and areas in the NDCs. While food value chain components tend to fall under the agriculture sector, they are also referenced under different areas, such as the energy or waste sectors as well as under food security and nutrition considerations. The same applies to GHG emissions from post-harvest value chains, where proposed mitigation actions cover reduction or avoidance of carbon dioxide (CO₂), methane (CH₄) and hydrofluorocarbons (HFC). While not specifically mentioned in the NDCs, certain actions would also have an indirect mitigation effect on nitrous oxide (N₂O) emissions.



4. Geographical scope

Out of the 163 submissions analysed, over half of them (55 percent) provide references to various aspects of food value chains. Figure 2 provides a geographical overview of the countries, which have cited food value chain aspects in their NDCs. All of them, with the exception of one country, are Non-Annex I Parties to the Convention.

Figure 2. Geographical overview of the countries that have provided references to food value chain aspects in their NDCs



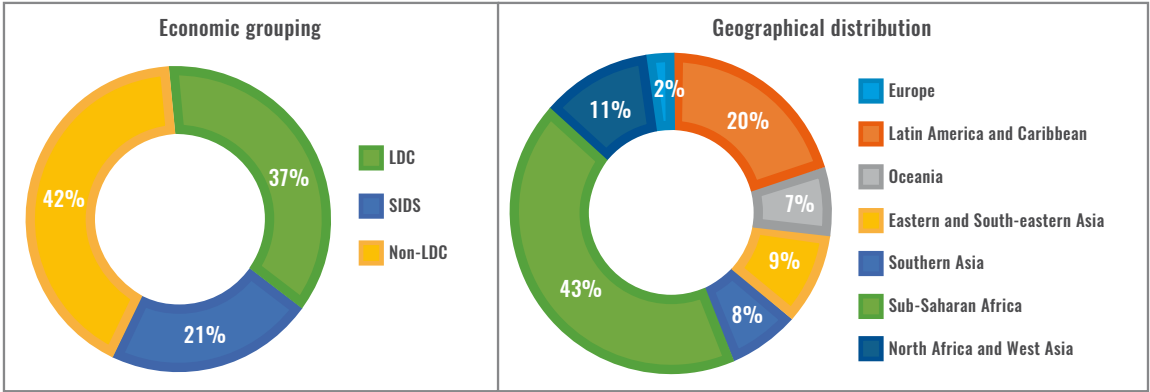
Source: NDCs.

Food value chain considerations appear predominantly in the NDCs from Least Developed Countries (LDCs) and Small Island Developing States (SIDS) (58 percent), while in terms of geographical distribution, 43 percent of the NDCs with relevant references are from Sub-Saharan African Parties (see figure 3). Looking at the continent as a whole, 43 of the African contributions include food value chain dimensions in their NDCs, which equals to 80 percent of the total submissions from the African continent, while exactly half of all SIDS³ have mentioned different value chain components in their submissions.

The following sections provide an examination of the pertinent references and how they are featured in the NDCs.

³ Based on the SIDS group of 38 UN Member States.

Figure 3. Percentages of countries that include food value chain aspects in their NDCs by economic grouping and region



Source: NDCs.



5. National circumstances, risks and vulnerabilities

Food systems are intrinsically tied to the environment and are therefore particularly sensitive to climate change and variability. This is also highlighted in the NDC sections related to national circumstances, where countries frequently refer to the risks and vulnerabilities of the agri-food sector due to the biophysical impacts of climate change (see box 1). These include increases in outbreaks of pests and diseases due to higher temperatures and greater humidity, resulting in physical and economic losses. Similarly, the damage caused by extreme weather events such as drought or floods on food products and supply chain infrastructure, is also highlighted as part of the impacts from climate change.

Losses due to climate-related hazards such temperature increases and extreme weather events along with the threats from pest and disease infestations are cited in 29 NDCs. In this context, the economic impact is often highlighted as a main consequence of increased climate hazards and six countries mention the specific value of the economic losses in the agri-food sector with some being commodity-specific. The majority of submissions that provide relevant references to vulnerability impacts are from Sub-Saharan African countries (12) and Caribbean and Pacific SIDS (7), while the remaining 10 were scattered across other regions. Crop losses resulting from climate-related impacts were mentioned in 17 NDCs, whereas loss of livestock and fisheries were specified in 8 and 5 NDCs, respectively.





© UN Photo/Logan Abassi

Box 1. Selected examples of the relevant climate-related impacts mentioned in the NDCs

Cote d'Ivoire	Loss of agricultural production (at least 10% of annual rice production or 50 billion FCFA/US\$ 85.6 million - based on the cost of imported rice, 10% of annual cocoa production or about US\$ 202 million based on the price of cocoa exports).
Liberia	These factors result to crops and livestock losses that intensify food insecurity and loss of income.
Rwanda	This is expected to lead to increasing rainfall intensity, leading to a higher frequency of floods and storms resulting in landslides, crop losses, health risks, and damage to infrastructure, as well as an increase in temperatures resulting in proliferation of diseases, crop decline and reduced land availability that impacts on food security and export earnings.
Sri Lanka	Livelihood systems those are already vulnerable to food security face immediate risk of increase crop failure, net pattern of pests and diseases, lack of appropriate seeds and planting materials and loss of livestock.
Dominica	<p>Agricultural access roads have been severely damaged or destroyed by Tropical Storm Erika in August 2015, which resulted in losses to the agriculture sector of US\$30.83 million (est).</p> <p>The damage caused by Hurricane Lenny in 1999 on the Roseau Fisheries Complex were very obvious during the following fishing season when there was a marked increase in tuna landings, however, the lack of storage facilities posed a major problem in terms of selling the catch. This resulted in wastage and the loss of revenue to fishermen.</p> <p>Sea level rise – combined with increased incidents of storm surges - Damage to coastal infrastructure (roads, ports, jetties, storage, processing, packing, landing sites) used for agricultural trade and access to markets.</p>

Source: NDCs.

6. Mitigation coverage

All Parties' NDCs include contributions related to climate change mitigation, through the reduction or avoidance of anthropogenic GHG emissions covered by the UNFCCC as well as through increased sinks such as forest cover. Forty-five NDCs refer to specific mitigation measures which are of relevance to this analysis, including approaches to retain value and minimize waste from the agri-food sector. Most frequently cited are measures for managing and utilizing biomass waste, mainly as a source of renewable energy or as organic fertilizer. The majority of the NDCs that provide relevant references as part of their mitigation measures are predominantly from Sub-Saharan African Parties, and out of the 45 identified NDCs, 64 percent are either LDCs or SIDS (see figure 4).

Thirty-six countries provide specific references to a range of mitigation actions that they intend to undertake, which concern agriculture, livestock and other organic waste streams and by-products, to reduce emissions from biomass waste and promote circular economy approaches. Technology measures for mitigation and waste valorization include renewable energy sourcing such as biogas or biofuels, composting as a substitute to energy-intensive chemical fertilizers, or animal feed production. Box 2 provides some examples of measures cited in the NDCs. It is important to note that only biomass waste-related aspects have been included in this study and the assessment did not screen for specific measures such as biogas production or anaerobic digestion.



Box 2. Selected examples of mitigation measures from biomass waste featured in the NDCs

Zambia	Generation of electricity from agriculture waste.
Afghanistan	Composing of biodegradable waste instead of landfill.
Pakistan	Use agricultural and animal wastes to produce biogas and organic fertilizer.
Democratic People's Republic of Korea	Widely introduce recycling technologies of agricultural residuals for the production of biogas and organic fertilizer.
Vietnam	Widely replicate technologies that treat and reuse by-products and waste from agricultural production to produce animal feed, mushrooms, materials for industries, biogas, and organic fertilizer.
Palau	Palau is investigating a project to convert waste cooking oil to biofuel for diesel vehicles, beginning with public school buses and a potential public bus route.
Belize	Promote and facilitate Clean Production systems in the processing of Agriculture and Forestry outputs to co-produce bio-fuels and/or electricity. Promote the adoption of appropriate processing technologies to convert biomass from waste, forestry, agriculture and microbial production into food, feed, fibre, chemicals and energy (electricity, heat and bio-fuels).
Cuba	The use of organic waste for biogas production and obtaining biofertilisers that replace chemical fertilizers will contribute to reducing emissions and reducing pollution of watersheds and bays. Special attention have residues of animal production, industry and municipal solid.
Guyana	The Government of Guyana will continue to work closely with farmers in agricultural areas across Guyana to encourage the use of bio-digesters to reduce waste, produce biogas and provide affordable, healthy and efficient cooking means at the household level.
Uruguay	Cogeneration from agroindustrial and forest waste.
Cameroon	Develop the production of energy from agricultural waste, including through the promotion of cocoa pods, cashew apples, sugar cane bagasse, molasses, cassava waste, rice straw to produce briquettes; etc.
Rwanda	Reduce methane emissions from anaerobic decomposing of organic matter by composting and reduce waste generation by recycling.
Malawi	Mitigation interventions recommended are reduction of waste generation, recovery and use of landfill bio-gas, controlled waste incineration, and composting for organic manure as technological approaches to mitigate GHG emissions in the waste sector.

Source: NDCs.

Seventeen countries refer to other mitigation measures in the agri-food sector, mainly to reduce CO₂ emissions from energy production and HFC emissions from refrigerant leakage. These include emission reductions from introducing new technologies that replace fossil fuels with renewable energy alternatives and/or are more energy efficient. Box 3 outlines some examples of mitigation measures cited in the NDCs, which are of relevance to food value chains. Some of the contributions are less specific in their mitigation outcomes and only refer to actions such as improved infrastructure for agri-food logistics, reduction of post-harvest losses, market access, resource efficiency along the supply chain, etc. Out of the 17 NDCs with pertinent references, 7 are from non-LDCs including one developed country, 6 are LDCs and 4 are SIDS.

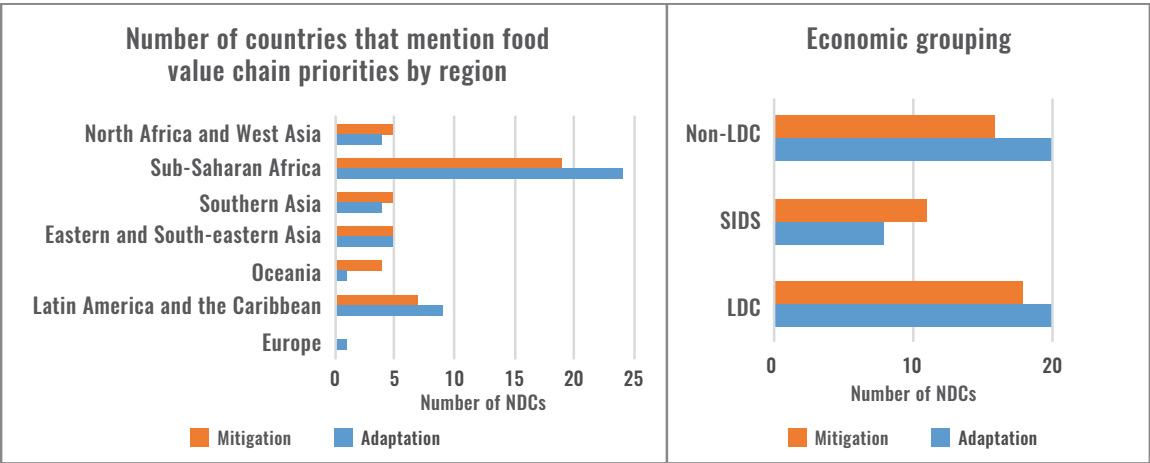
Box 3. Selected examples of mitigation measures relevant to food value chains cited in the NDCs

Cameroon	Develop an efficient mechanization of agriculture and improve processing and packaging infrastructure to extend the value chain.
Eritrea	Accelerated replacement of refrigerators: Incentives for households to replace their refrigerators at the end of their life cycles by other, more efficient (Class A) units. An average of approximately 4,500 annually.
Rwanda	Under the mitigation scenario, Rwanda is committed to achieve energy efficiency by starting with agro-processing industries as large consumers of wood fuels. By 2030, Rwanda intends to avoid total GHG emission reductions of 146,000 tCO ₂ e from Tea and Coffee industries. This action will focus on energy efficiency improvements through the installation of less energy intensive equipments and technologies for drying, roasting packaging.
Senegal	Promoting effective food refrigeration equipment: replacement of 95% of the equipment fleet.
Japan	Introduction of energy efficiency and conservation equipment in horticultural facility.
Vietnam	Research and develop solutions to reduce GHG emissions in farming, livestock, fisheries and animal feed and food processing.
Costa Rica	To be able to develop market incentives and commercialization of agricultural products with lower carbon footprint, it is necessary to strengthen local and national markets, with timely access to information.

Source: NDCs.

Figure 4 outlines the economic grouping and regional distribution of the identified mitigation and adaptation measures. Fifteen countries refer to food value chain priorities under both their mitigation and adaptation coverage.

Figure 4. Number of countries that include value chain aspects in their adaptation and/or mitigation sections, by region and economic grouping

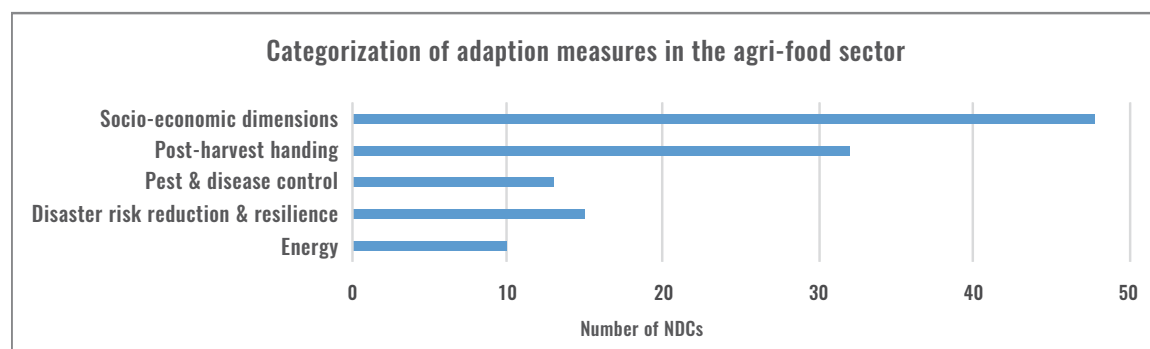


Source: NDCs.

7. Adaptation coverage

Forty-eight countries outline direct or indirect interventions related to food value chains under their adaptation priorities and/or targets, as part of their adaptation, resilience and disaster risk reduction measures. Half of the contributions that provide relevant references in their adaptation sections are from Sub-Saharan African Parties, whereas 61 percent of the 48 NDCs are either LDCs or SIDS (see figure 4). The priority areas for the agri-food sector cover different interventions within a wider socio-economic perspective, as a means to reduce vulnerability and strengthen value chain actors' adaptive capacities. This includes addressing the impacts of climate change on losses and productivity, improving value chain infrastructures to increase the competitiveness of the sector and ensuring food security and nutrition (see figure 5). At the sectoral level, the majority of countries place their priority actions for food value chains under the agriculture sectors and in some cases expanding to include food security considerations.

Figure 5. NDC coverage of adaptation measures for the agri-food sector



Source: NDCs.

The adaptation priorities for the agri-food sector highlights its importance from a socio-economic perspective, particularly in developing regions where the sector is the primary source of income for a high share of the population and critical to ensure food security and nutrition. Improving livelihood opportunities through agribusiness and agro-industry development along with the link to food security and nutrition is highlighted in 48 submissions, through different adaptation measures. This includes references to improve income generation through value-adding activities along the supply chain and participation in market systems. Establishing climate resilient food storage and ensuring adequate supplies during extreme weather events is also prioritized as an adaptation measure to improve food security and self-sufficiency in the face of natural disasters.

Technology priorities for post-harvest handling are more frequently featured under the adaptation priorities compared to mitigation contributions and cover food processing, storage and preservation, which have been mentioned in the adaptation sections of 32 NDCs. Improving

processing and storage facilities are in several cases highlighted as a means of promoting value addition and market linkages as well as to prevent food products and commodities from being damaged or lost as a result of weather exposure. Adaptation actions also mention energy aspects in 10 NDCs, in a similar context as outlined under the mitigation coverage. This includes the provision of renewable energy to generate electricity or heat in agro-industries, such as off-grid solutions in rural areas or in islands as well as the conversion of biomass waste for energy and composting purposes. Measures to increase climate resilience and minimize production losses in the value chain are also outlined in the adaptation contributions of 15 countries. Actions include early warning systems, insurance schemes and risk mitigation, and adapting crop calendars (harvest planning) to enhance resilience. Furthermore, improved pest and disease management is mentioned as an adaptation priority in 13 NDCs to prevent pre- and post-harvest losses of crops, livestock and fisheries products. Box 4 highlights direct quotations of adaptation actions for value chain development in the agri-food sector.

Box 4. Selected examples of relevant adaptation measures cited in the NDCs

Energy security	<ul style="list-style-type: none"> Promoting utilization of renewable energy and uses in agricultural and food production sector for cooling and heating purposes, for example in poultry production, nurseries, green houses, olive mill etc (Jordan) Improve agricultural and livestock production activities (drainage, conservation, drying and cold chain) including the use of renewable energy sources (hydraulic, solar and wind). (Burundi) Extend electricity to the rural areas or expanding the use of off-grid solar system to support value addition. (Uganda) By 2030, 100% of electricity demand in the water sector and other essential services (including health, food storage and emergency services) will be met through off-grid renewable sources to enhance resilience to drought and hurricanes. (Antigua and Barbuda)
Disaster risk management	<ul style="list-style-type: none"> Build an early warning system for drought and dzuds to prevent animal loss. (Mongolia) Provide vulnerable communities with micro-insurance and micro-finance to address risks from climate change extreme events (floods, drought, landslides, crop damage, loss of fishery) affecting subsistence agriculture/fishery production. (Dominica) Develop infrastructure and technologies needed for local interventions to combat extreme weather events to protect crops and local communities. (Moldova)
Food security and nutrition objectives	<ul style="list-style-type: none"> Establish logistic centres for grain trade and storage to achieve food security. (Egypt) Diversification of income generating activities in order to increase adaptive capacity of vulnerable farmers' communities in order to achieve food security/reduce poverty. (Sudan) Improve traditional methods that scientifically prevent deterioration of food and feed in storage facilities to enable local communities to store food and feed in productive years and secure food supply in case of extreme weather events. (Ethiopia) Improvement of Community Food Security Through the Promotion of Food Processing and Preservation Technologies. (Lesotho)



Box 4 (continued)

	<ul style="list-style-type: none"> • Support for small scale farmers from the government, in production technologies, agri-business management, good agricultural practices and pest and disease control; policy initiatives to address climate change issues, environmental protection, risk mitigation and fisheries development; and a national plan for dealing with food security. (St. Vincent and the Grenadines) • Establishment of strategic food storage facilities and distribution centres across the country as an adaptive measure to increase accessibility and reduce the risk of food shortages during extreme events. Promotion and introduction of alternative technologies to make local agriculture more resilient. Establish mechanisms to ensure food security to citizens in case of extreme events and market irregularities. (Maldives)
Value chain development	<ul style="list-style-type: none"> • Enhance the resilience of the agriculture, livestock and fisheries value chains by promoting climate smart agriculture and livestock development. (Kenya) • Rwanda targets to have 100% of farmers with access to services for post harvest treatment and storage of food crops and reduce post harvest losses to at least 1% by 2030 from 10.4%, 27.4% and 8.3% in 2014 for maize, beans and rice respectively. The use of solar energy in warehouses will be actively promoted. (Rwanda) • A sustainable modern agriculture supported by new and innovative technologies across all food production supply and value chains. (Seychelles) • Expanding value addition, post-harvest handling and storage and access to markets, including micro-finances. (Uganda)
Technology and infrastructure	<ul style="list-style-type: none"> • Improvement of food processing and preservation methods. (Burkina Faso) • Develop storage and conservation units to limit high post-harvest losses. (Chad) • Establishing food processing and preservation plants close to communities and markets. (The Gambia) • Promote innovations in post-harvest storage and food processing and forest products in 43 administrative districts. (Ghana) • Development of techniques to conserve and process agricultural, forestry and fish-farming products. (Guinea) • Technology development for the conservation, processing and valorisation of agricultural products. (Haiti)

Source: NDCs.

8. Technology needs for food value chains

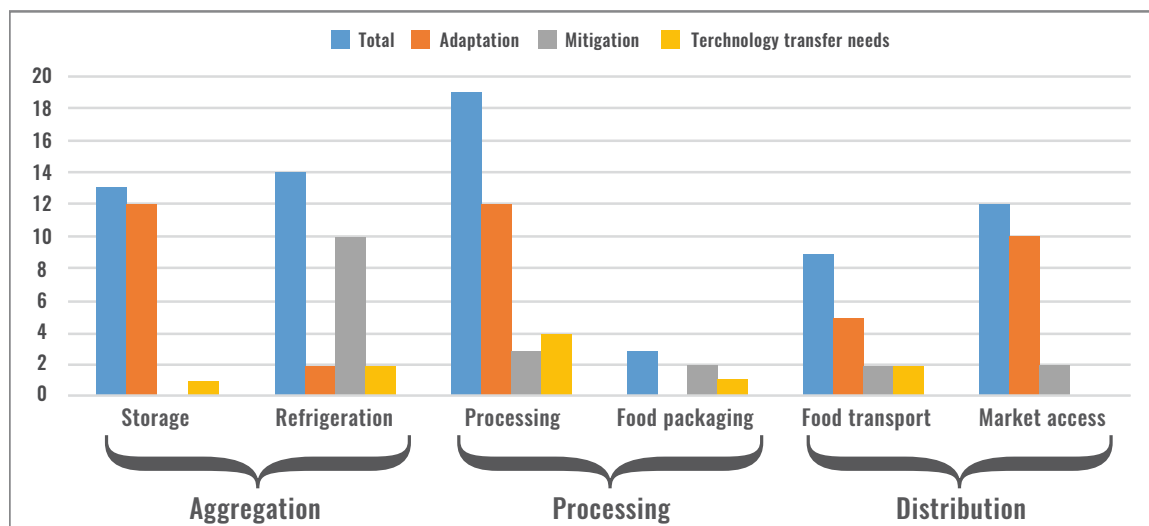
This section outlines the key technology interventions from a value chain perspective, which have been cited in the NDCs to advance towards a three-fold objective: enhance domestic climate action, improve food preservation and drive market development along the supply system through value-adding activities. These intervention areas have either been prioritized as mitigation or adaptation actions, as presented in the previous sections, or they have been placed under technology transfer needs.

In a post-harvest system, the interventions identified in the NDCs can be organized into three core functions (aggregation, processing and distribution) that together form the value chain (see figure 6). Aggregation is the first step after harvest (or landing/slaughtering) and refer to the collection and storing of crop, livestock, fisheries and forestry products. Thirteen NDCs specifically cite improved food storage as a priority. Chilled storage, refrigeration and cold chains, from after harvesting until consumption, are also crucial to preserve perishable foods (fruits, vegetables, meat and dairy, fish, etc.) and prevent rapid food deterioration caused by ambient temperatures. Improving refrigeration technologies, through energy efficiency measures and shifting to climate-friendly refrigerants is an important area for climate action in food systems, which is also reflected in the NDCs. Fourteen countries refer specifically to refrigeration as an intervention area, aiming to increase the use of renewable energy for cooling purposes or phasing out refrigerants with high a Global Warming Potential.

Processing constitute the second core function in the food supply system and 19 NDCs cite different aspects and specificities related to improving food processing. Actions include increasing the use of renewable energy and improving energy efficiency in processing technologies as well as fostering innovation in food processing, while other priorities are to increase access to processing facilities in rural areas. Within the context of processing, 10 countries also mention the need for improved food preservation or conservation technologies while 3 refer to food packaging. Five NDCs mention the use of solar dryers.

Distribution within the food system enables the connection of value chain actors (including consumers) and for this analysis it covers aspects related to transport logistics and market linkages. Seventeen countries cite the need for improving infrastructure and market access in the context of the agri-food sector. The references range from the establishment of markets, diversification of income-generating activities, and strengthening marketing systems and market access for rural producers, which has been mentioned in 12 NDCs. Infrastructure development to improve transport logistics of agriculture and food products is also cited in 9 NDCs. Improving infrastructure is often cited as essential to enhance food distribution networks and provide market linkages in rural areas.

Figure 6. Number of countries that refer to specific technology priorities for different segments of food value chains, and their distribution in terms of adaptation and mitigation or technology transfer needs



Source: NDCs.

Finally, five NDCs prioritize the improvement of food value chains as a means of enhancing mitigation actions as well as strengthening market and export opportunities but without mentioning specific components or interventions in the value chain. Box 5 highlights selected quotations of technology needs and value chain priorities cited in the NDCs.

Box 5. Selected examples of technology needs and value chain priorities quoted in the NDCs

The Gambia	Post-harvest, food processing and preservation techniques and technologies (Drying food preservation, Food preservation freezing, Vacuum packing Food preservation, Canning and bottling food preservation).
Seychelles	Improve port infrastructure for artisanal and industrial fisheries.
Cameroon	Develop basic infrastructure that will improve transport logistics of agricultural, livestock and fish farming.
Morocco	Modernize the agricultural sector to make it more competitive and integrated in the global market to create wealth over the entire value chain.
Rwanda	Rwanda intends to expand local markets by constructing market infrastructure, including roofed market facilities, serviceable road and transport networks, developing decentralized village-based agricultural processing centers that incorporate low-carbon sources of energy, such as biogas-digesters and solar driers, and decentralized compost plants.

Source: NDCs.

9. Conclusion

The development of sustainable food value chains is not only critical to reduce hunger and poverty in developing countries but also provides a key opportunity to address priorities for climate change adaptation and mitigation. Through their NDCs, countries have emphasized the importance of improving value chain infrastructures and strengthening the agri-food sector as part of their national priorities for climate action. The prominence of food value chain priorities is particularly evident in the contributions from Sub-Saharan Africa, LDCs and SIDS, reflecting the socio-economic and environmental characteristics of these regions.

Turning these priorities into implementation, however, will require assistance in the form of financial support, capacity-building and technology transfer. As an initial step, technical support is likely needed to further consider and integrate value chain development appropriately in the NDC implementation process, in ways that can scale up private sector investments. In this respect, NDC implementation support programmes should provide the necessary technical guidance to assist governments in specifying what these value chain measures and priorities might entail in practice and help support the formulation of detailed implementation plans. Such outlines would also be a prerequisite for any financial analysis and investment strategy, and ultimately the ability to secure finance for the implementation of the food value chain priorities that have been specified in the NDCs.

References

- FAO.** 2014. *Developing Sustainable Food Value Chains – Guiding Principles*. Rome, FAO. Also available at www.fao.org/3/a-i3953e.pdf
- FAO.** 2016. *The Agriculture Sectors in the Intended Nationally Determined Contributions (INDCs): Analysis*. Rome, FAO. Also available at www.fao.org/3/a-i5687e.pdf
- Richards, M., Bruun, T., Campbell, B., Gregersen, L., Huyer, S., Kuntze, V., Vasileiou, I.** 2015. *How countries plan to address agricultural adaptation and mitigation. An analysis of Intended Nationally Determined Contributions*. CCAFS: CGIAR. Also available at <https://cgspace.cgiar.org/rest/bitstreams/63683/retrieve>
- UNFCCC.** 2015. Synthesis report on the aggregate effect of the intended nationally determined contributions. Also available at <http://unfccc.int/resource/docs/2015/cop21/eng/07.pdf>



Priorities related to food value chains and the agri-food sector in the Nationally Determined Contributions (NDCs)

Food and Agriculture Organization of the United Nations (FAO)

www.fao.org/climate-change

climate-change@fao.org