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Substitutes for Single-Use Plastics in Sub-Saharan Africa and South Asia

Executive Summary

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Note

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The lead author was Mahesh Sugathan, with substantive contributions from Dr. Prachi Aggarwal (Consultant at Centre for Policy Research, New Delhi and Asian Development Bank). Chapters 3,4 and 5 were contributed by Philip Stothmann, Sanjeevan Bajaj, Nydia Suppen and Andres Martinez Arce from the Forum for Sustainability through Life Cycle Innovation (FSLCI), with support from Dr. Mohammade Mosharraf Hossain (IFESCU), Dr. Mohammad Sujauddin (ESM, NSU), Kishwar Jahan Chowdhury (NSTU), Tasnima Dilshad (IFESCU), Asef Al Alam (ESM, NSU), Tashfia Mahiat (ESM, NSU), Shaiyan Siddique (ESM, NSU), Ayushi Khan (ESM, NSU) and Jane Nyakango (KNCPC). The study has benefited from peer review, substantive inputs and suggestions from Carolyn Deere Birkbeck (TESS); Henrique Pacini, Claudia Contreras, David Vivas Eugui, Robert Hamwey, Alexey Vikhlyaev and Teresa Moreira (UNCTAD); as well as Jonathan Hassall (FCDO), Amanda Dinan (South South North) and Alessandro Sanches Pereira (Instituto 17). Chris Whyte (African Circular Economy Network Foundation) and technical officers at FCDO regional country offices in Bangladesh and Kenya contributed to the revision. Parnika Jhujhunwala and Purvi Chaturvedi (Graduate Institute of International and Development Studies) contributed to the final review and generation of the graphs and references. Editing was done by Lise Lingo. Lana Barcellos and Lia Tostes collaborated on the cover art. Desktop formatting was done by Lia Tostes and Rafe Dent (UNCTAD).

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INTRODUCTION: THE PROBLEM OF SINGLE-USE PLASTICS IN SUB-SAHARAN AFRICA AND SOUTH ASIA

Single-use plastics (SUPs), often also referred to as disposable plastics, are commonly used for plastic packaging and include items intended to be used only once before they are thrown away or recycled. They include everyday items such as grocery bags, food packaging, drink bottles, straws, containers, cups, plates and cutlery that are usually disposed of after one use. The polymers mainly used in the production of SUPs include polyethylene terephthalate (PET), polypropylene, low-density polyethylene (LDPE), high-density polyethylene (HDPE), polystyrene and expanded polystyrene. The widespread use of SUP occurs mainly because of its versatility as a material and its low price point.

The amount of plastic waste in the environment has grown rapidly since the 1950s, fuelled by rising production, trade and consumption combined with a lack of proper waste, collection and disposal, resulting in negative environmental and health impacts. Non-plastic materials used for packaging have increasingly been replaced with SUP materials. However, as a synthetic, fossil fuel-based material, plastics do not decompose easily when discarded into the natural environment and, depending on the feedstock used, could fail to fully decompose for decades or even centuries after disposal. Disintegration also creates micro or nanoplastic particles that have made their way into food systems and human and animal bodies.

Plastic debris has been found in all major ocean basins. A recent study estimated that 11 million tonnes (megatonnes, or Mt) of plastic waste entered the oceans in 2016 (Pew Charitable Trusts and SYSTEMIQ, 2020), mainly due to poor waste management, littering and overconsumption. Developing countries, including Nigeria in sub-Saharan Africa and Bangladesh in South Asia, figure prominently among countries with the highest volumes of mismanaged plastic in coastal populations. For all of Africa, the total volume of mismanaged plastic waste in 2010 was estimated at 4.4 Mt out of 32 Mt worldwide. The volume in Africa is projected to grow as high as 10.5 Mt in 2025 if no additional action is taken to deliberately reduce the flow of land-based plastics to the ocean. For South Asia, the contribution to global plastic waste has been estimated at roughly 26.72 Mt of plastic waste every year since 2016 (11 per cent of the global total). In addition, some 32 per cent of plastic packaging escapes collection systems; in many developing countries, this runaway packaging often chokes drains and waterways, triggering flooding and related damage to property during periods of heavy rain.

Plastic pollution also imposes economic costs, both worldwide and on individual countries. Its short first-use cycle and lack of circularity mean that every year the global economy loses an estimated 95 per cent of plastic packaging material, valued at $80–120 billion. In addition to these impacts, the production of conventional plastic, derived from fossil fuels, contributes to global greenhouse gas emissions. If demand for plastics continues to grow as projected and incineration replaces landfilling to a greater degree among disposal methods, the combined emissions from plastics production and embedded carbon are estimated to reach as much as 287 billion tonnes (gigatonnes, or Gt) by 2100 – more than a third of the total world carbon budget for the 2°C economy envisaged under the Paris Agreement.

International trade plays an important role in the global diffusion of all plastics. Although many developing countries are important producers of plastic, several – including those that are plastic producers – are also overall net importers of plastic packaging in particular. In sub-Saharan Africa, dependence on imports varies widely, ranging from 70 per cent of plastics consumed in primary form and as products in Egypt and Nigeria to only about 27 per cent of primary plastics in South Africa. The South Asia region is also a net importer of plastics, with India being the only net exporter of plastic products, mainly to countries in East Asia and Europe.

Overall, in terms of magnitude, the volume of global trade in plastic packaging (14 Mt) is significantly smaller than the volume in other categories, such as primary plastics (196 Mt), but it is still a high-value sector, with the total value of exports reaching $53 billion in 2018. However, packaging products are also typically single-use.

With regard to sectoral sources of plastic pollution, the fast-moving consumer goods segment is a major contributor. In South Asia, as in sub-Saharan Africa, there is a lack of comprehensive and systematic data on the various sources of SUP pollution. However, audits, surveys and evidence from SUP litter collected

at beaches worldwide reveal particularly problematic SUP sources. These include food wrappers, plastic beverage bottles, plastic cups and plates, plastic grocery bags and takeaway containers. Containers such as plastic water bottles and sachets used for packing water and beverages have been highly implicated in marine pollution. In Nigeria, for example, there are more than 1,500 sachet-water factories in Lagos alone, with about 60 million sachets being consumed daily and typically disposed of by littering or in drains. Deposit schemes could be one option to address sachet waste, yet in many developing countries such schemes are rare. Certain establishments may also be sources of particularly high levels of SUP waste generation. A 2019 study by the Environment and Social Development Organization, for instance, indicated that in Bangladesh restaurants use more than 2,000 tonnes (t) of SUPs every year, with an additional 685 t used by airlines and 638 t by high-end residential hotels.

Specific data on the share of SUP in the overall plastic waste stream have been hard to come by. Nevertheless, it is estimated that plastic constitutes 10–12 per cent of the solid waste stream in Kenya and about 20 per cent in Nigeria. Bangladesh is estimated to produce 87,000 t of SUP waste annually. Overall levels of recycling of municipal solid waste are very low in both sub-Saharan Africa and South Asia, with few formal recycling systems and little adherence to practices essential for effective waste management, such as sorting. Controlled or uncontrolled open dumping is commonly practised in both regions, and there is a lack of adequate infrastructure for handling various plastic waste streams. The problem is even more acute in rural areas, where the use of plastic is growing and systems for adequate disposal of non-organic waste are lacking, with most of it burned or dumped in the open.

There is thus much scope for further development of waste management and recycling infrastructure, which will also need to benefit informal economy workers in the sector. There are prospects for setting up well-regulated regional recycling hubs in sub-Saharan Africa and in South Asia that could enable plastics recycling at scale and open up opportunities for cross-border trade in recyclable plastic waste as well. However, this will take time and also require supportive policy and regulatory frameworks. For these reasons a switch to fully compostable materials for use in manufacturing products that can replace SUPs could be a desirable course of action for countries in South Asia and sub-Saharan Africa. In addition, further assessment of plastic substitutes that are fully recyclable, such as glass and aluminium, could also be desirable, particularly as recycling of glass and metal appears to be established in many sub-Saharan African and South Asian countries, even if not at scale. In addition to domestic deployment, trade opportunities for these substitutes may also arise for developing countries. For example, in 2007 Senegal and Tunisia earned $20 million and $30 million from exports of recovered metal scrap, aluminium and plastics. Recent bans by countries such as China could affect countries that have not established local end-use markets. In sub-Saharan Africa, South Africa has established some resilience to such shocks in global recycling markets, exporting for example only 4.6 per cent of paper and packaging collected for recycling. Developing countries need to be cognizant of the development of international, national and private standards for compostable, biodegradable and recyclable products that could affect trade opportunities.

SMEP ECONOMIES, MAIN MANUFACTURING SECTORS AND KEY POLLUTING INDUSTRIES

The report identifies potential non-plastic substitute materials for four product categories in three case-study countries, namely Bangladesh, Kenya and Nigeria. These countries were selected on the basis of a number of criteria including coastal location, problems and challenges faced with regard to SUP pollution, a certain degree of existing manufacturing capacity, and both awareness of plastic pollution and initiatives to address it among government and civil society groups. Specifically, the case studies look at potential alternatives for single-use grocery and other bags; takeout/takeaway containers for food and beverages; plates, straws and cutlery; and bottles and sachets for water and other beverages made from plastic. As a way to identify possible non-plastic options, a general list of potential substitute feedstocks was generated, which was then narrowed down by in-country experts on the basis of the prevalence or potential of each feedstock in the country and its availability in the market. Finally, all

feedstocks that were transformed into polylactic acid for the production of end products made with bioplastics were eliminated. The initial screening produced an overview of feedstocks that was subsequently analysed for each country by product category in terms of their environmental performance. Common materials that were considered for all countries for various product categories include paper, jute, cotton, bamboo and wood, as well as glass and aluminium for bottles.

The substitute feedstocks thus identified were assessed in terms of their environmental performance on the basis of a review of life-cycle assessment (LCA) meta-studies as well as by conducting a screening LCA for a selected number of cases. Conducting screening LCAs helped identify feedstocks with lower environmental impact while revealing trade-offs across the various impact categories. All substitute feedstocks were then ranked in terms of their environmental performance. A number of previously identified feedstocks such as wood, coconut and clay were deleted from further consideration for techno-economic assessment because of their comparably poor performance.

Even though plastic pollution is a major issue that needs to be addressed, when taking into account multiple environmental indicators, plastics may at times perform better than the substitute materials identified on some of the LCA indicators. This holds especially true where plastic pollution can be managed well, not just in developed countries but across the globe. Governments and relevant stakeholders should make significant efforts to enhance waste management infrastructure in the three case-study countries. To address the specific issue of plastic pollution in the short term, the conclusions of the LCA meta-studies as well as the screening LCA point to two initiatives as the way to advance: a shift towards selected alternative materials – at the cost of some other environmental impacts – and campaigns to raise consumer awareness regarding reuse as a strategy to achieve the lowest environmental footprint.

Following the ranking of potential substitute feedstocks from an environmental perspective, a techno-economic assessment was carried out for each of the three case-study countries. The assessment revealed that for some materials the domestic industry is simply not ready to produce the products required at a scale that enables a shift away from existing products. This is the case, for example, for the weak paper industry in Nigeria. For other industries, other materials might replace plastic products only partially, even if they could be scaled up easily. In Bangladesh an example is jute or cotton bags, which can be used only for carrying pre-packaged items, whereas plastic bags are also needed to package fresh meat or moist products. Finally, some materials perform well in all countries, such as glass bottles that are reused or recycled. They can be considered a viable option, but given their loss of significant market shares after the introduction of PET bottles in all three markets, they would need considerable support through policy measures.

From the LCA-based screening and the techno-economic assessment, the feedstocks listed in table 1 were identified as holding promise for replacing SUPs in the selected product categories. For certain products such as sachets, no viable alternative feedstock material could be identified as a replacement. The report identifies potential non-plastic substitute materials for four product categories in three case-study countries, namely Bangladesh, Kenya and Nigeria. These countries were selected on the basis of a number of criteria including coastal location, problems and challenges faced with regard to SUP pollution, a certain degree of existing manufacturing capacity, and both awareness of plastic pollution and initiatives to address it among government and civil society groups. Specifically, the case studies look at potential alternatives for single-use grocery and other bags; takeout/takeaway containers for food and beverages; plates, straws and cutlery; and bottles and sachets for water and other beverages made from plastic. As a way to identify possible non-plastic options, a general list of potential substitute feedstocks was generated, which was then narrowed down by in-country experts on the basis of the prevalence or potential of each feedstock in the country and its availability in the market. Finally, all feedstocks that were transformed into polylactic acid for the production of end products made with bioplastics were eliminated. The initial screening produced an overview of feedstocks that was subsequently analysed for each country by product category in terms of their environmental performance. Common materials that were considered for all countries for various product categories include paper, jute, cotton, bamboo and wood, as well as glass and aluminium for bottles.

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Table 1. Options to replace SUPs for selected product categories in Bangladesh, Kenya and Nigeria

Country	Takeaway containers	Grocery bags	Plates	Straws	Bottles	Sachet
Bangladesh	Areca leaves Banana leaves Paper	Cotton (jhoot) Jute Banana pseudo-stem and fibre Paper	Areca leaves Banana leaves	Paper Bamboo	Glass Aluminium	No viable option available
Kenya	Paper	Paper Sisal	Coconut husks	Wheat stem	Glass Aluminium	No viable option available
Nigeria	Banana leaves Paper	Cotton Jute Paper	Banana leaves	No viable option available	Glass Aluminium	No viable option available

TRADE TRENDS IN PLASTICS AND NON-PLASTIC SUBSTITUTES AND BARRIERS TO TRADE FOR SUB-SAHARAN AFRICA AND SOUTH ASIA

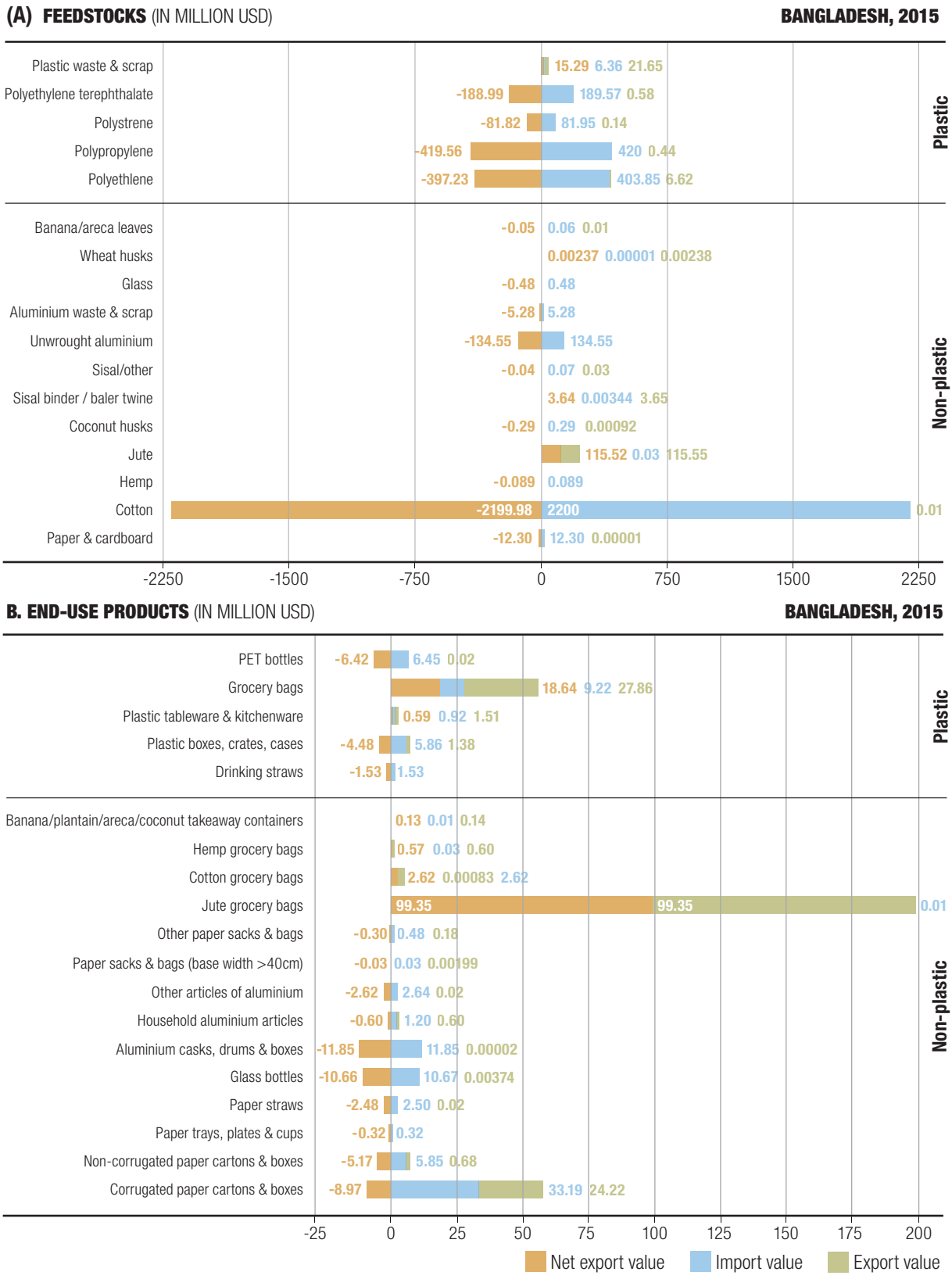
An analysis of trade flows in both plastic and non-plastic feedstocks for SMEP countries (which include Bangladesh, Kenya and Nigeria) reveals that all are net importers in both categories. The exceptions are for natural fibres (Kenya, Nigeria, Senegal, Uganda and Zambia), agricultural by-products (Bangladesh, Ghana and Kenya) and minerals (Ghana, Nigeria, Rwanda and Zambia). In plastic end-use products, most SMEP countries appear to be net importers, with the exception of Ghana (grocery bags and food containers), Kenya (food and liquid containers) and the United Republic of Tanzania (food containers) in sub-Saharan Africa and Bangladesh (grocery bags) in South Asia. For non-plastic end-use products, a similar situation prevails, although in certain categories – such as bags – net exports of non-plastic products are much larger and spread over more SMEP countries than net exports of plastic products. This indicates that there is potential for SMEP countries to supply non-plastic substitutes for SUP bags. In other categories of non-plastic end-use products, SMEP countries are largely net importers. Greater expansion of manufacturing capacity based on locally available feedstock could perhaps help reduce dependence on imported non-plastic as well as plastic end-use products.

SMEP countries across the two regions display a revealed comparative advantage in exports of non-plastic feedstocks, particularly in natural fibres. In South Asia, both Bangladesh and Nepal display competitiveness, whereas in sub-Saharan Africa, most SMEP countries seem to be competitive, with the exceptions of Ghana, Nigeria and Rwanda. Pakistan appears to be the only SMEP country in South Asia with a revealed comparative advantage in exports of agro-waste feedstock; data from sub-Saharan Africa were hard to obtain. Ghana and Pakistan also appear to show revealed comparative advantages in exports of the mineral-based feedstocks (glass and aluminium) analysed in the report.

For plastic end-use products, most SMEP countries do not have a revealed comparative advantage, with some exceptions: Bangladesh, Ghana, Kenya, Nepal, Senegal, the United Republic of Tanzania and Uganda have an advantage in specific categories, such as food and liquid containers, or grocery bags. For non-plastic end-use products, most countries in South Asia and sub-Saharan Africa have a revealed comparative advantage in exports of non-plastic grocery bags and packaging, with the exception of Ethiopia and Rwanda. Imports of feedstocks can also provide a foundation for the development of value-added manufacturing, as illustrated in Bangladesh, which imports raw cotton while being a net exporter of cotton bags.

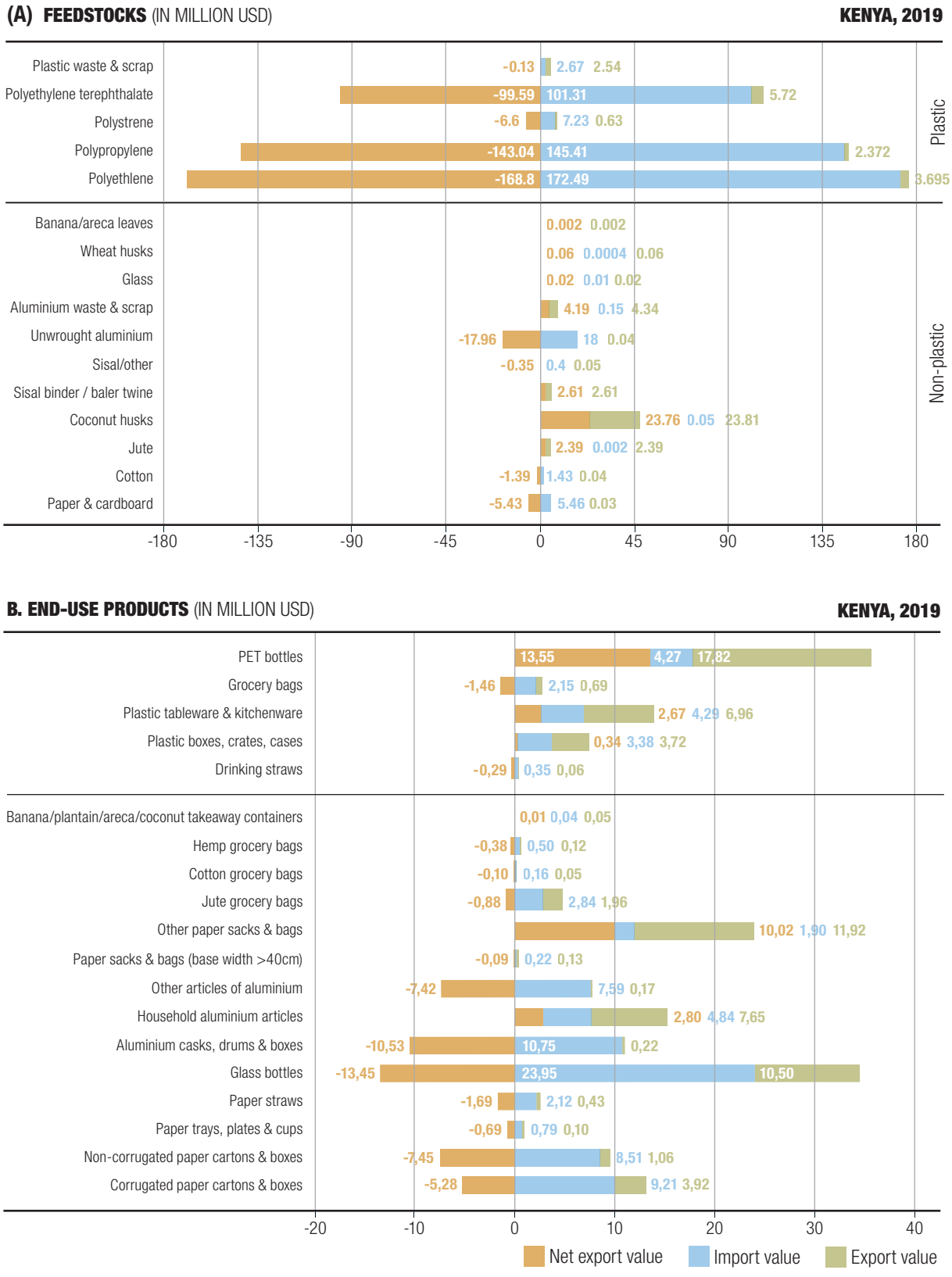
Trade flows for the three case-study countries – Bangladesh, Kenya and Nigeria – in the categories of plastic as well as non-plastic feedstocks and end-use products are illustrated in figures 1, 2 and 3. They reveal the importance of regional markets, particularly in Africa for plastic end-use products, as well as many large developing-country markets in Asia and the Middle East. This underscores the potential role that regional trade agreements (RTAs), including South–South trade agreements, could play in further shaping trade-related opportunities in both plastic and non-plastic feedstocks and end-use products.

Figure 1. Bangladesh: Exports, imports and net export values for plastic and non-plastic feedstocks and end-use products



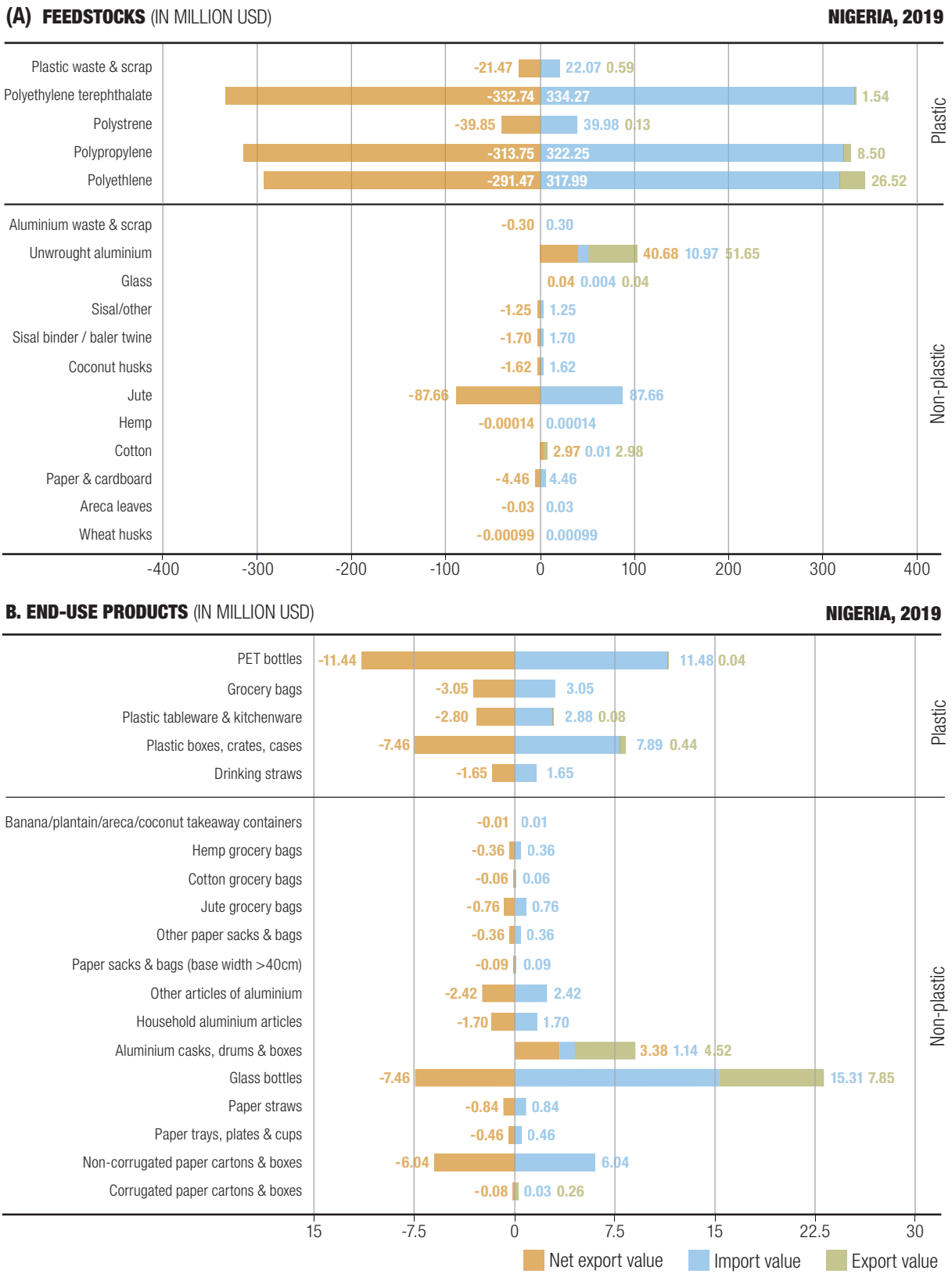
Source: Based on UN Comtrade analysis, 2021.

Figure 2. Kenya: Exports, imports and net export values for plastic and non-plastic feedstock and end-use products



Source: Based on UN Comtrade analysis, 2021.

Figure 3. Nigeria: Exports, imports and net export values for plastic and non-plastic feedstock and end-use products



Source: Based on UN Comtrade analysis, 2021.

Import tariffs also play a role in determining to what extent trade policy can be used to grant preferential trade access for non-plastic feedstocks and end-use products relative to their plastic counterparts. Such tariffs include not only those based on most-favoured nation (MFN) treatment but also those prevailing under preferential, bilateral and regional trade agreements. A review of import tariffs for Bangladesh, Kenya and Nigeria revealed that on an MFN basis as well as under bilateral and regional trade agreements, they apply zero or very low duties on plastic feedstocks relative to non-plastic feedstocks. For example, under the Kenya–United Kingdom economic cooperation agreement, Kenya imposes zero duties on imports of plastic feedstocks. It excludes many natural feedstocks from the scope of the agreement, imposing an MFN duty rate of 25 per cent on them. This could be driven by a desire to procure plastic feedstocks at competitive prices for domestic plastic manufacturers while protecting producers of non-plastic natural feedstocks such as jute, cotton, paper and cardboard within a country or customs union from foreign competition. However, as plastic feedstocks may already enjoy low prices as a result of fossil fuel subsidies, low import duties on them – relative to natural feedstocks – could put producers of non-plastic end-use products at a further price disadvantage.

Bangladesh, Kenya and Nigeria also enjoy duty-free, quota-free access to developed countries and many developing countries. Yet, such access could be expanded further to other developing-country markets, some of which are top export markets for many of the plastic substitute feedstock and end-use products identified. As tariffs come down, through MFN-led liberalization as well as through RTAs, non-tariff barriers can all affect the prospects for exports of plastic substitute products from developing countries. These barriers include standards and labelling requirements, sanitary and phytosanitary measures, complex and bureaucratic customs and administrative procedures, and import licensing requirements. Such measures are already faced by exporters of natural fibres and processed natural products. As exports of other categories of plastic substitutes are still nascent, exporters do not yet face numerous restrictions, but this could change as new standards and requirements are adopted in major export markets. Examples include the packaging requirements to be adopted under the European Union's Green New Deal and Circular Economy Action.

REGULATORY FRAMEWORKS TO RESTRICT SUPS AND PROMOTE SUBSTITUTES FOR SELECTED COUNTRIES IN SUB-SAHARAN AFRICA AND SOUTH ASIA

A review of the regulations that address SUPs in sub-Saharan Africa and South Asia reveals a patchwork of policy and policy instruments. Some countries have adopted outright bans, whereas others have relied on market-based instruments such as taxes. The scope of regulation also varies, with some countries focusing their efforts only on plastic bags while others target additional categories of SUPs. The range of policy instruments covered also varies. Certain countries have adopted a range of instruments, including extended producer responsibility and labelling requirements for biodegradable materials, whereas others have focused mainly on banning one or more categories of SUPs or discouraging their use. The geographical scope of measures also varies, with some countries imposing bans or measures throughout the country whereas others restrict the scope to specific cities or apply varying measures for different regions. In some countries, as in Bangladesh, there are also mandates for the use of alternative packaging materials such as jute. Nonetheless, in most cases regulatory support for substitutes is generally missing in policies that aim to address SUPs.

Although many SMEP countries (including the three case-study countries) have ratified a number of international and regional conventions related to plastic pollution, there is no coordinated regional approach to address SUPs specifically in a harmonized manner. This is particularly notable given the rise of regional markets driven by RTAs, particularly in Africa. A notable exception is the East African Community Polythene Materials Control Bill 2016, reflected in the laws of member states of the East African Community (which includes Kenya). In general, what is missing is a holistic regulatory framework that covers all aspects of the value chain of SUPs, from raw materials to end-of-life management. Policies supportive of circular economy measures, such as reuse and take-back systems, will also be critical for the diffusion of SUP substitutes made of reusable materials such as glass or aluminium. Finally, constraints related to infrastructure, funding and capacity often impede

effective enforcement of SUP laws in many SMEP countries, including in Bangladesh and Kenya. At the time of writing Nigeria had yet to implement a nationwide policy to address SUPs.

CONCLUSIONS AND POLICY OPTIONS: DRIVING ECONOMIES AWAY FROM PROBLEMATIC SUPS

In the short to medium term, neither consumer behaviour nor the insufficient infrastructure to handle plastic waste and enable plastic recycling will change for many, if not most, developing countries. In addition, although reusing certain types of plastics as well as non-plastic substitutes such as glass and aluminium may be more advantageous from the perspective of both the environment and the circular economy, the reality is that only limited reuse models and systems exist in developing countries – and they may not be convenient in all consumer environments. Furthermore, although plastics may fare better in terms of certain overall life-cycle-based environmental indicators such as energy, land and water use, LCA methodologies do not capture other adverse impacts of plastics, such as clogging of drainage systems or effects on riverine or marine pollution.

Under these circumstances it may be feasible to necessitate a switch from SUPs – starting with the most problematic products – to non-plastic substitutes. These alternatives could consist of either (i) fully compostable natural materials or (ii) non-plastic substitutes (a) that are fully recyclable, (b) that provide an incentive for post-disposal collection, including by workers in the informal sector for further recycling, and (c) for which recycling infrastructure is relatively better developed.

A number of options could be pursued with respect to supporting the diffusion of SUP substitutes in Bangladesh, Kenya and Nigeria and also in the other SMEP countries of sub-Saharan Africa and South Asia more broadly. These can broadly be clustered under the following themes:

i. Selecting the right SUP substitutes:

a. Balancing various techno-economic sustainability and trade considerations. A specific supportive step that could be considered in this regard involves strengthening data gathering and developing an LCA inventory.

b. Exploring opportunities to exploit agricultural by-products and post-harvest agricultural waste, given their potential to reduce the overall environmental impact of food crop production and crop wastage as well as to generate livelihood opportunities, particularly in rural areas.

c. Investing further in expanding manufacturing capacity and technology that could enable greater production at scale. This could be supported by harnessing bilateral and multilateral aid and technology initiatives in the agriculture sector by organizations such as the FAO and UNIDO.

ii. Building an effective ecosystem and enabling regulatory environment to address SUP pollution and encourage a circular economy:

a. Adopting a holistic approach towards SUP regulation based on global best-practice examples, such as in Maldives, with targeted intervention along critical stages of the life cycle from production to consumption and sale as well as final disposal.

b. Levelling the playing field between SUPs and plastic substitutes through market-based instruments and specific regulatory support and incentives for plastic substitutes. A supportive initiative in this regard would be to launch global initiatives to address fossil fuel subsidies as well as subsidies granted to producers of plastic feedstock.

c. Exploring regional approaches to address SUP.

d. Introducing policies, regulations and incentives that encourage safer waste disposal and circularity for all material types and invest in required infrastructure. A supportive step in this regard would be to facilitate bilateral and multilateral donor support for circular economy-related infrastructure investment through organizations such as the World Bank.

iii. Harnessing trade opportunities:

a. Addressing the preferential tariff margin enjoyed by plastic feedstocks over natural substitute feedstocks.

b. Expanding the scope of preferential trade access for developing-country exporters of plastic substitute feedstocks and products, including

by major developing countries that have not yet offered such access. An opportunity in this regard is reviving and strengthening preferential trade initiatives such as UNCTAD's Global System of Trade Preferences. Another avenue to explore is the potential for expanding market access for plastic substitute feedstocks and products through plurilateral and multilateral initiatives to liberalize trade in environmental goods, such as the Environmental Goods Agreement and the Doha Round Para. 31 (iii) negotiating mandate for environmental goods liberalization.

c. Enabling developing-country producers and exporters of plastic substitute products to conform to emerging best practices in standards and labelling involving international organizations like UNCTAD, UNIDO, the World Trade Organization, the International Trade Centre and the World Bank, as well as bilateral donors.

d. Further clarifying and developing Harmonised System (HS) classifications relevant to substitutes. Because many natural feedstocks as well as end-use products are not easily identifiable at the six-digit subheading level, it is challenging to calculate precise global trade flows in such feedstocks and products. Given the long intervals involved in the World Customs Organization's review cycles and approval procedures for the creation of new HS six-digit subheadings, one option for both exporting and importing countries to consider in the short term may be the creation of specific national tariff lines at a more detailed 8-, 10- or 12-digit specification. These can enable countries to capture flows of these feedstocks and end-use products more precisely for collection and analysis of trade statistics, at least at the national level.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