

Marine Litter Med Lebanon: diagnosis and proposal of policy measures to phase out single-use plastic bags

December 2022

Authored by Sammy Kayed and Pedro Fernandez

Table of Contents

1.	<i>Introduction</i>	3
1.1.	The Marine Litter Med project.....	3
1.2.	The scope of this report	3
1.3.	Methodology	4
1.4.	The Lebanese context	5
1.5.	Research limitations	5
2.	<i>Baseline situation of SUPB: past and current initiatives</i>	6
2.1.	Results of Marine Litter Med phase 1.....	6
2.2.	Other SUPB initiatives.....	9
3.	<i>Update on production and consumption of SUPBs and alternatives</i>	10
3.1.	Estimations	10
3.1.1.	Import and production	10
3.1.2.	Consumption	11
3.2.	Current practices.....	13
3.3.	Stakeholders' views	15
4.	<i>The "reward system"</i>	16
4.1.	Explanation of the delivery based model and stakeholders' role	17
4.2.	Explanation of the supermarket based model and stakeholders' role.....	20
5.	<i>Charging for SUPBs</i>	21
5.1.	Explanation of the model and stakeholders' role	21
5.2.	Expenditure of the revenue.....	22
5.3.	Management of the tax.....	23
6.	<i>Comparison of the two systems</i>	24
7.	<i>Conclusions and next steps</i>	26

1. Introduction

1.1. The Marine Litter Med project

The Marine Litter MED Phase II project, funded by the European Commission, DG Environment (EC-DG ENV), further supports the implementation of the updated Regional Plan on Marine Litter Management in the Mediterranean approved by COP 22 (Antalya, Türkiye, 7-10 December 2021) at national, sub-regional and regional level with a particular focus on southern Mediterranean countries namely Algeria, Egypt, Israel, Lebanon, Libya, Morocco, and Tunisia. The project builds on the outcomes of the EU-funded Marine Litter MED project (2016-2019).

The overall objective of the Marine Litter MED II project is to reduce and prevent the generation of marine litter in the Mediterranean through an expanded implementation of key reduction and prevention measures as provided for in the updated Regional Plan on Marine Litter Management in the Mediterranean. It is executed for a duration of 36 months by the UNEP/MAP-Barcelona Convention Secretariat and MAP Components, namely MED POL, MedWaves, SPA/RAC and REMPEC, in line with their respective mandates and areas of expertise.

In the case of Lebanon, in consultation with the Ministry of Environment (MoE) and following the first phase of the project, MedWaves is continuing the work aiming at reducing the consumption of single-use plastic bags (SUPB). In the first phase of the Marine Litter Med project, regional guidelines to tackle SUPB were produced by MedWaves, and the proposed approach is applied in the current work.

1.2. The scope of this report

The study focuses on Single Use Plastic Bags (SUPBs) given their continued environmental damages in polluting shorelines and severely damaging marine ecosystems with over one million birds and 100,000 marine mammals dying each year from SUPBs alone. Furthermore, continued public concern over plastic pollution, relatable regional and global successes in SUPBs phase out measures, and readily available alternatives to SUPBs, justify the focus on SUPBs. SUPBs relate mostly to high-density polyethylene (HDPE) bags, including oxodegradables, designed to be used once. This is usually determined by the width or grammage. This report focuses on SUPBs with handles that are generally used as shopping carrier bags.

The report intends to provide the baseline situation of SUPB in Lebanon, including past and current initiatives, and give recommendations on paths forward to reduce consumption. It begins with a breakdown of the interview and desk review methodology used to further assess the current situation. It later presents the Lebanese context and associated research limitations, breaks down the key results of Marine Litter Med Phase 1 conducted in 2019, presents other recently implemented or ongoing initiatives related to SUPBs, and provides an overlay on production, consumption, and end of life (EoL) practices around SUPBs. The report ends with descriptions and comparisons of two types of measures to reduce the consumption of SUPBs; incentive based instruments and tax or charge based instruments.

1.3. Methodology

- 1) Development of the research approach: This stage involved agreeing on a method for research and data collection by the national expert, with input from the international expert. At this stage, the likely gaps in data collection were identified, such as specific data on the costs of various SUPBs in Lebanon’s current economy, or data on the distribution practices of SUPBs in enterprises of interest.
- 2) Baseline development: The national expert conducted a detailed literature review (see Annex I) and consultations with rally point figures to provide a characterization of the market and value chain for the SUPBs in Lebanon. Key stakeholders were identified during the literature review and market research was conducted by the national expert. They were approached for an interview to fill in some of the information gaps, focusing on two categories of stakeholders:
 - a) delivery providers, and
 - b) small, medium, and large grocery stores

Table 1: The types and individual stakeholders consulted during this study

Type of stakeholder	Name of the company
Small, medium, and large grocery stores	Fakahani
	Spinneys
	Abou Kareem Minimarket
	Le Sage
	Obeid
	Fahed
	Ghosn Minimarket
Food delivery companies	Kabalan delivery
	Gozilla
	Delivery Stay Home
	Nok Nok

- 3) **Identification and analysis of potential measures to reduce consumption of SUPBs:** Two types of instruments were utilized to propose measures to reduce SUPB consumption. The first relies on an incentives based method that recognizes that private enterprises are willing

and capable of instituting organizational policies if they and their customers are incentivized to do so. The second instrument is a tax-based method that would place a government supported fee on the consumption of SUPBs at the point of sale which has proven effective in other national contexts at drastically reducing SUPB consumption. Both systems are analyzed in terms of environmental and economic impacts to provide the basis for discussion and further action.

1.4. The Lebanese context

The Lebanese economy remains severely depressed against continued deadlock and inaction over much needed economic reforms and high degrees of financial and monetary volatility and instability. The nation's GDP has contracted by over 40% since 2018, and sits at approximately 18.08 billion USD in 2021 (compared to 51.9 billion USD in 2019) ([World Bank, 2022](#)). The GDP per capita is at 4,576 USD with an estimated population of around 6.86 million as of 2019 although no official government census has been completed (*ibid*). Inflation remains in triple digits and is averaged at 200% for 2021 while the parallel exchange rate has reached 38,000 LBP per USD compared to 1,508 LBP per USD in early 2019. Amidst these collapsing revenues and dramatically suppressed spending, public sector institutions are failing, and already strained basic service provision has been drastically cut if provided at all ([IMF, 2022](#)). Unemployment and poverty are at historically high rates with more details provided in the below section. The context is further explained in Annex 1.

1.5. Research limitations

The socio-political and economic context in Lebanon over the last years, which is further explained in Annex 1, has a direct influence on consumption and production and waste management, thus affecting this research. Lebanon's context placed research limitations on the study in the following ways:

- 1) In most cases, a wide sweep of data collected prior to 2020, is considered irrelevant given the deep social, political, and economic transformations the country has undergone in the past couple years.
- 2) Relative to 2019, stakeholders were much less responsive to requests to be interviewed given that most are operating with dramatically reduced staff and those who remain are occupied with more primary occupational tasks.
- 3) Although still a relevant public concern, relative to 2019, the issue of plastic pollution is considered secondary to issues of basic needs particularly among the private sector.
- 4) Trust in Lebanon is at an all-time low, causing respondents to either outright refrain from sharing key information or resort to difficult to justify reasoning for not being able to share.
- 5) Packaging for products is not counted in plastic imports and exports in the Lebanese Custom Data (e.g. bottles for drinks, packages for electronics), underestimating the amount of SUPs generated as well as plastic flows in Lebanon (UNDP, 2021).
- 6) Waste characterization in several references was not conducted at the source level (i.e. households or waste bins in the streets) but after collection at the dumpsite or landfill. Thus,

the figures do not include the amount of recyclables recovered by scavengers, NGOs and other actors (UNDP, 2021). Also, there is no reliable national data available for the subdivision of plastic waste composition by polymer type (PET/LDPE/HDPE/PVC others) at source level.

- 7) Lebanon's SUPB consumption patterns vary from global statistics beyond the norm given characteristics such as associations with customer service and SUPB provision by SMEs, deeply rooted delivery culture, and influences from the economic crisis.
- 8) Data from desk research can at times be contradictory or highly variable and not comparable.

2. Baseline situation of SUPB: past and current initiatives

2.1. Results of Marine Litter Med phase 1

It's becoming common knowledge that single use plastics are polluting shorelines and severely damaging marine ecosystems with over one million birds and 100,000 marine mammals dying each year from plastic bags alone ([UN Ocean Conference, 2017](#)). But the difficulties behind phasing out this cheap, lightweight, and easy to make material that pervades our consumptive lives, are immense. In the first phase of Marine Litter Med program in Lebanon, the focus was on studying the possibilities for creating local funding and opportunities for community driven sustainable development in the context of phasing out SUPBs in Lebanon and the historic Municipality of Jbeil Byblos. The work aimed at fostering implementation of the Regional Plan on the Management of Marine Litter, adopted by the Contracting Parties of the Barcelona Convention in 2013 to explore and implement prevention measures for the reduced consumption of SUPBs.

With little governmental capacity to institute and enforce environmentally responsible measures; continuing public outcry at the severity of pollution; willingness of some key stakeholders to take matters into their own hands; and a sense of local and national pride, the Lebanese context continues to offer interesting opportunities to pilot Voluntary Agreements and Commitments to begin phasing out consumption of SUPBs. By relying first and foremost on more surefire drivers of change amidst Lebanon's economic crisis and political instability (i.e. recognition, rewards systems, and organization based policies) models can effectively scale horizontally while still recognizing and responding to changes in context. The work performed under the first phase of Marine Litter Med enabled better identification of what are the key concerns of stakeholder groups and supported the development of a more powerful model and roadmap that was designed with and for municipal communities, enterprises, and public authorities to more organically initiate, strengthen, and catalyze policies along with economic and social measures that aim to reduce SUPB consumption.

After dozens of consultations and hundreds of surveys with community members, shops, plastic industrialists, NGOs, and public authorities, the research in phase one gave a glance into the scale

and patterns of consumption and production of SUPBs in Lebanon. According to the study, each Lebanese resident was on average consumes 596 SUPBs per year. This rate of consumption beats even the world's most consumptive economies with the United States averaging 307 and the EU member states averaging 202 SUPBs per person per year. This means the small Mediterranean country carrying a population of about 6.86 million was putting out 4.01 billion bags per year. But what made this figure alarming is Lebanon's history of open solid waste dumping, the widespread shortage of public garbage bins, and commonplace littering which results in an untold number of SUPBs entering terrestrial and marine ecosystems where they break down into micro plastics, contaminate the food web, and reach our body with largely unknown impacts to human health.

The method to determine SUPBs consumption rates were based on perceptions of 316 consumers and 54 SMEs. Based on the survey conducted in and around the Jbeil area, the frequency of shopping and corresponding bag use is as follows: daily 8% using 3.28 bags on average, every two days 45% using 3.23 bags on average, every 4 days 28% using 6.25 bags on average, weekly 11% using 9.48 bags on average, and every two weeks 8% using 10.57 bags on average.

It appeared at the time the climate was ripe for change, with a whopping 60% of residents in Jbeil area responding as ready to pay a fee on SUPBs. Such fees have proven themselves effective at reducing consumption of SUPBs by around 70% in just a year. The readiness of the local consumer to pay a fee on SUPBs came as a shock to shop owners of whom 90% were under the impression that consumers are not willing to pay. Despite the major economic interest, shop owners reported they were hesitant to support a fee on SUPBs out of a misplaced fear that their customers would purchase their goods elsewhere. As shown in the figure below, consumers reported a willingness to pay between 50 and 150 LLB per bag (at the time \$0.03 - \$0.1). The study found that across household types, customers of chain supermarkets consistently report using more plastic bags on average. Also, consumers shopping at convenience stores were consistently willing to pay more than those shopping at chain supermarkets suggesting that the smaller shops are better positioned to charge a larger disincentive fee for the use of for SUPBs. Another interesting finding for these small and medium enterprises (SMEs), is that the majority prefer to charge a SUPB fee based on the amount of the customer's transaction instead of on the number of bags used. These results suggest that a transaction-based fee for SUPBs, where the greater the purchase the greater the tax, would be easier to integrate into shops. This would be a totally new approach for the Middle East North Africa (MENA) region that could potentially address the issue of lower compliance among small and medium shops with measures to reduce SUPBs.

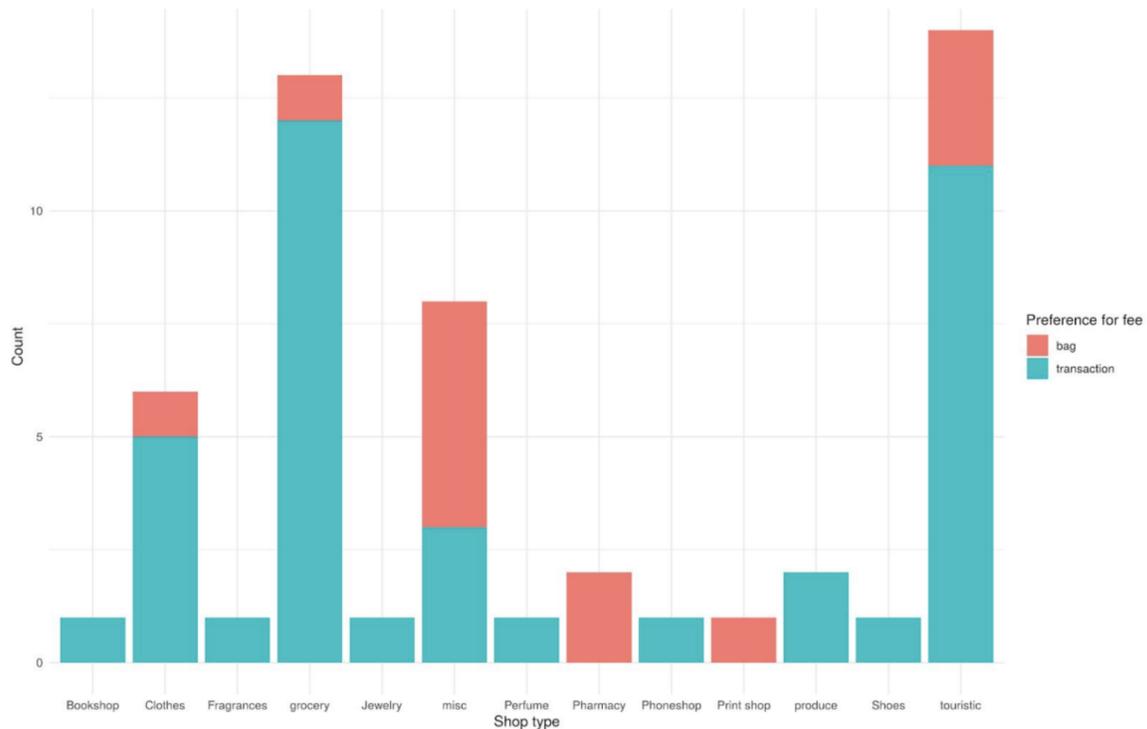


Figure 1: Shows how the majority of shops across shop types preferred a transaction based tax as opposed to a unit based tax on SUPBs (with the exception of print shops, pharmacies, miscellaneous shops).

An interactive digital tool called Unclog was created to better compare both the transaction and unit-based models for disincentivizing consumption of SUPBs and to visualize how financial returns can go directly into a community-controlled fund for sustainable development. The tool is based on geographic, SME, public authority, industry, and consumer acquired data merged from this study and a previous one. It enables the user to choose different fee models, set the size of the fee for SUPBs, enter the municipal population, type of single use bag available in the municipality, and the level of compliance with multi-use bags to visualize how many SUPB are removed from the environment and how much money is generated for the community from a tax. The interactivity of the Unclog tool allows the user to adjust variables and understand alternative models that could be better for the environment, local community, and the public authorities attempting to transition away from SUPBs.

Other concerning statistics emerging from the study include 80% of surveyed consumers believing that SU biodegradables (including oxodegradables, particularly containing D2W) are better for the environment than the PE bags. Given the expert consensus on this type of SU biodegradable bag, this is not believed to be true and these false claims need to be tackled with awareness campaigns on the ineffectivity of replacing SUPBs with biodegradable SU. Also, 76% of consumers were found to use between 2-6 bags per shopping trip and then 68% reported they use them for trash bags. In the study the great majority of respondents claimed that they are willing to pay a fee for SUPBs if they

know it will improve their local environment. The study shed more light on how phasing away from SUPBs can provide great financial returns to the community to expand on their pro-environmental behavior. Heightened public awareness on environmental threats and powerful local governance, continues to position Lebanon as an opportune context to pilot alternative modes of consumption and production around SUPs and the researchers hoped to make this case via grocery bags.

In an effort to maximize the uptake and application of our results, survey data was made completely open to concerned citizens and stakeholders. A plotting dashboard was created for user produced visualizations. For the great majority of people, images speak way louder than words and through the plotting dashboard users were able to take any of our survey questions and variables and plot them against one another, choose different types of display graphs and plots, and customize them as they see fit. Data analysis and visualization can in itself be biased since the person or organization conducting the communication activity makes a choice to visualize and communicate certain variables and not others. With both the plotting dashboard and the Unclog tool the study hoped to help move data analysis toward democratization in the belief that this is a powerful way to stimulate decision makers and make the transition to a circular economy more ethical and clear.

2.2. Other SUPB initiatives

So far in Lebanon there have been four known substantial attempts, one national and three local, at placing a government supported measure to phase out SUPBs. In 2019, the Environment Minister of the time, Mr. Fadi Jreissati, announced a voluntary agreement between the Ministry of Environment, Ministry of Economy, and select supermarket franchises that starting Oct. 15, SUPBs will cost LL100 (at the time \$0.07) at participating large supermarkets. To avoid the fee consumers were to bring their own multi-use bags. For those without multi-use bags, supermarkets were to provide multi-use alternatives to customers at an affordable price ranging from LL500 and LL1,500 (at the time \$0.33- \$1) depending on their size and durability. Previously interviewed supermarket chains that were part of the program along with the syndicate of supermarkets in Lebanon were very cooperative with the initiative, which is expected since it would not only remove a substantial business cost but would create two new lucrative revenue streams; fees for SUPBs and sale of multi-use alternatives. It was agreed that a small portion of the revenue generated by the supermarkets (reportedly around \$100,000) would go to the Ministry of Environment to conduct environmental programs targeting single use plastics. In the excitement of the moment and the momentum of this initiative, the Ministry of Economy and Trade, under Minister Bteish at the time, had begun to formulate a draft law to submit to the Secretariat of the Council of Ministers to reduce the consumption of SUPBs. The popular uprisings of October 2019 put a halt to the program which was only operational for 17 days. It was never reinvigorated primarily due to the financial and economic collapse in the country.

Another SUPBs phase out initiative was enacted by the Municipality of Jbeil Byblos. In July of 2018 the municipality issued a decision informing shop owners within their jurisdiction to replace SUPBs with eco-friendly alternatives in accordance with the city's environmental plan. Retailers were given

a deadline to phase out of SUPBs by 31 December 2018. However, one of the most accessible replacements to SUPBs were D2W biodegradable bags which are not to be considered an environmental sound replacement. Compostable and paper bags were also offered as potential replacements. The municipality's website offered clarity on the alternative options and where to get them. Additionally, the municipality provided a single multiuse cotton bag to all households which included a brochure inside explaining the negative impacts of plastic on the environment. Given the lower costs and market accessibility, the shops who adhered to the municipal decision on a voluntary basis opted for D2W biodegradable bags rather than paper or compostable bags. Regardless, the decision was met with adversaries who claimed it was nothing more than words on paper and that it would not be possible given people's reliance and customs around SUPBs. The ban was put into place but there was no serious enforcement mechanism instituted. The municipality got as far as assembling a list of all businesses that have yet to eliminate SUPBs and had begun formulating a plan for fining those who have not complied before priorities shifted when the October 2019 popular uprising took place in Lebanon.

The Municipality of Beit Mery also attempted to reduce the use of plastic bags in shops and supermarkets within the municipal area through a tax system. The decision signed on May 2 of 2019 by the mayor stipulated that shops within the municipal jurisdiction should have multiuse bags (MUBs) with their logo and the logo of the Beit Mery Municipality on them. The MUBs were distributed for free for each transaction exceeding 50,000 Lebanese pounds. The municipal decree also stipulated that SUPBs are to be made available for the price of 250 LBP/bag for those who did not bring their own bags wish to purchase them. The proceeds from this fee was to be used to finance the private production of MUBs in each of the participating shops. To launch this campaign, the municipality distributed an untold number of MUBs, to provide time for local shops to secure their own inventory of MUBs. In November of 2018, south Lebanon's Municipality Deir Zahrani also made an attempt to transition to reduce consumption of SUPBs through an education campaign and a creative proposition from the municipality. Shop owners within the jurisdiction of the municipality were encouraged to offer a gift for each person who returns 25 relatively clean SUPBs to the shop for reuse. For many shops the gift was a 1Kg of a lower cost vegetable such as tomatoes or cucumbers or the provision of a bread bundle

3. Update on production and consumption of SUPBs and alternatives

3.1. Estimations

3.1.1. Import and production

Currently there is no available comprehensive national statistics of plastic industries and production of SUPBs in Lebanon however there are some indicative statistics. From the balance of import and

export, 283,832 tonnes/year (2015-2019 average) of plastics remain in Lebanon (UNDP, 2022). About 120,382 tonnes/year of plastic virgin feedstock (also 2015-2019 average), are estimated to be used as SUPs such as packaging (UNDP, 2022). Plastic imports and exports were categorized into PE, PP, PVC, PS, and other resin which include (epoxy, polyamide, polyurethane, etc.). Depending on the year, ELARD found that these four categories constitute between 65-70% of all plastic imports to Lebanon, whereas the non-resin portion constitutes 30-35% of imported plastics (ELARD, 2021).

According to the Association of Lebanese Industrialists, as of 2015, 51 plastic companies are officially registered. Among them, 34 industries manufacture SUPs (UNDP, 2022). The largest fraction are specialized in F&B food packaging with 11 companies making plastic cups, take-away material, and cutlery (primarily from PET, LDPE, PP, and PS) followed by 9 companies making containers and miscellaneous bottles (UNDP, 2022; Edessa 2021). However, out of the 51 plastic manufacturing companies that were registered in 2015 under the plastic manufacturing sector (Blominvest, 2015; ALI, 2020), the EDESSA/UNDP study conducted in 2020 utilizing the Ministry of Industry database found that 34 out of the 51 industries produce SUPB. The industry around SUPBs is primarily supplied with HDPE and LDPE which constitutes 46% of the market share by resin type as per Figure 2, and is projected to grow at an annual rate of 3.4% (ELARD, 2021).

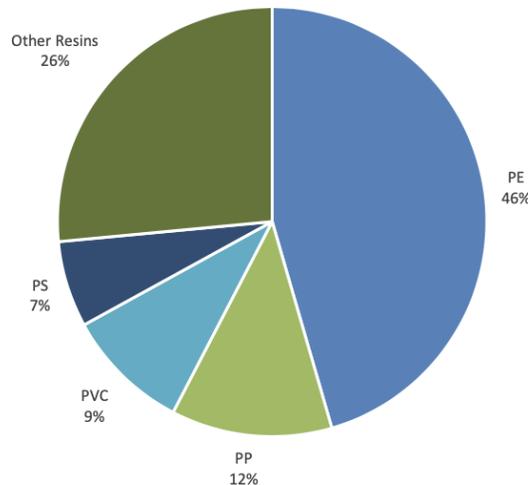


Figure 2: Market share by resin type in Lebanon as retrieved for 2011-2020 from ELARD 2021

3.1.2. Consumption

In Marine Litter Med Phase 1, consumption of SUPBs was estimated at 596 SUPBs per person per year. The economic crisis which has drastically intensified as of late 2019 has influenced these consumption patterns. From interviews with stakeholders and expected reductions in consumption as a result of the economic crisis, it is likely the case that the number of SUPBs consumed per capita has decreased. Consulted market owners reported increased incidence of customers taking excess

SUPBs for home use but the primary effects on consumption stem from the economic crisis. In order to make the 2019 figure more representative of the current situation in Lebanon, an estimated 15% reduction in waste generation, as per the ELARD 2021 study, was applied to SUPB consumption resulting in an estimated 507 SUPBs consumed per person per year (about 10 bags per person per week) and 3.478 billion SUPBs are consumed nationally per year with a population of 6.86 million. As for the geographical distribution of use and consumption of SUPBs, the distribution of population may provide an indication of consumption hotspots.

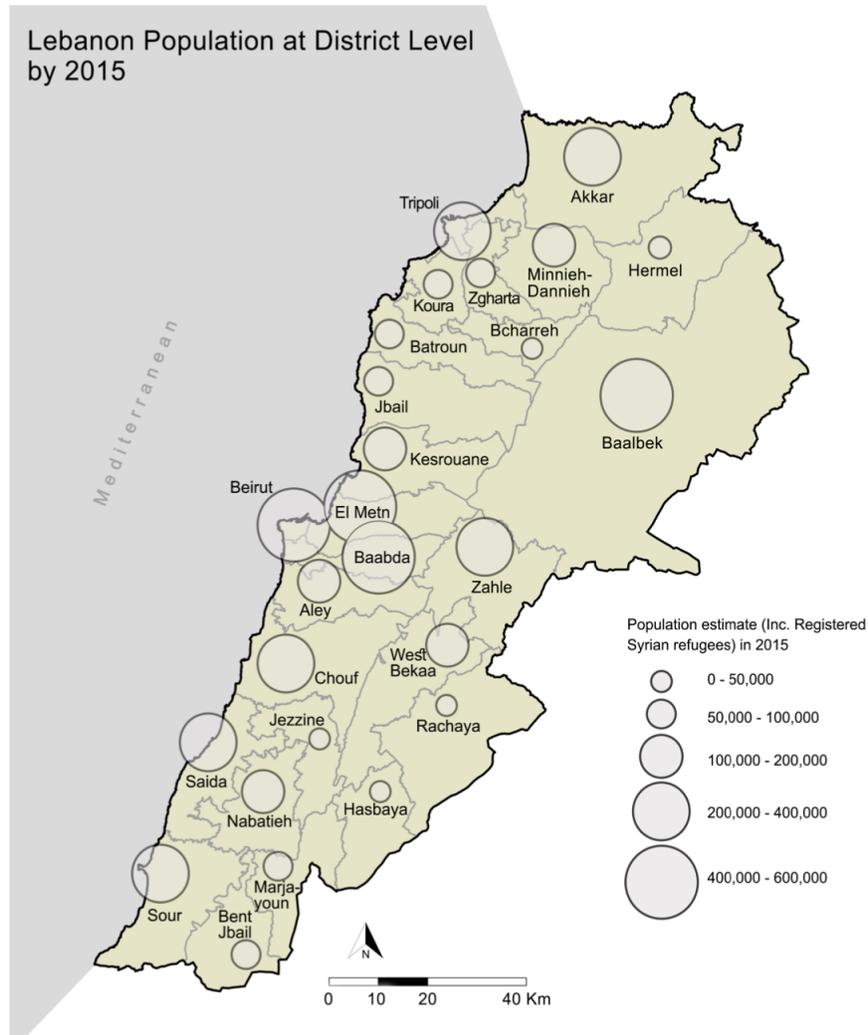


Figure 3: The population of Lebanon by area designed by Rita Nasr for Democracy Reporting International.

Results from another recent study shed light on how not only population density but also affluence is a determinant for the production of recyclables including SUPBs. High-income areas were found to produce a lower amount of organic wastes and a higher quantity of SUPBs in comparison to low-income households ([Massoud et al., 2022](#)).

Despite the economic crisis, data from small to large markets was gathered and customer consumption rates are believed to be very high by the markets' operational personnel relative to other developing countries. The interviewed medium sized markets in the country use around 72,000 SUPBs per year and small convenience stores use around 14,000 SUPBs per year. There is no mapping on the number of medium and small markets in the country in order to determine how many SUPBs are consumed per year nationwide by shops of those sizes. One of the largest supermarket chains in the country, with 16 branches distributed across the country, is consuming around 23,244,950 SUPBs per year (1,452,809 per branch). Of the large supermarkets surveyed, it was found that the average consumption per branch is 1,446,404 SUPBs per year. According to the average of two mappings of supermarkets in Lebanon, there are about 414 supermarkets in the country which would equate to 598,811,256 SUPBs distributed through supermarkets per year or about 17.2% of the nation's total yearly consumption of SUPBs ([Where Leb, 2022](#) & [Index of Lebanon, 2022](#)).

It was difficult to ascertain consumption levels of SUPBs from the delivery providers interviewed. On average they reported providing 3 SUPBs per order. The relatively smaller delivery companies interviewed reported that they were the lead service provider in their villages and that they would estimate they cover 50% of all deliveries in their areas which have an average population of 5,300 individuals. Taking this into consideration with the reported average of around 30 orders per day, we would expect that a ratio of around 180 SUPBs are delivered per day over this population size. If this was extrapolated discounting rural vs. urban consumption patterns, it would mean that the city of Beirut consumes around 39,825,320 SUPBs per year (with a population of 2.406 million) through delivery providers and 85,038,113 SUPBs are consumed yearly through delivery providers nationwide. This roughly equates to about 2.45% of the total SUPB daily consumption in Lebanon. Given increased reliance on delivery in urban centers, these figures are likely an underestimate.

3.2. Current practices

Gareiyou et al., 2022 has reported a decrease in use of MUBs after the pandemic as show in the table below. It's been reported, that many shops did not allow the use of multi-use bags or containers out of concern of contamination associated with COVID-19 (de Sousa, 2020). This was particularly the case during the early days of the pandemic when much was uncertain about this new disease. These measures turned out to be unwarranted particularly when adequate transmission mitigation measures were applied. According to a recent study on the use of plastics during the height of COVID-19, the risk of infection within the plastic life cycle lies primarily in municipal collection of SUPBs from households (de Sousa, 2020).

Table 2: Results of a survey from Gareiou et al., 2022 comparing Greece and Lebanon and showing a decrease in reusable (multi-use) bag use after the COVID-19 pandemic.

Response	Never (%)	Rarely (%)	Often (%)	Very Often (%)	Always (%)	Mean (%)	Std. Dev.
To what extent do you use cloth shopping bags?							
Greece Before COVID-19	14.10	22.90	20.50	23.20	19.20	3.10	1.338
Greece During COVID-19	12.80	23.20	17.20	23.60	23.20	3.21	1.368
Lebanon Before COVID-19	42.90	25.00	14.30	13.10	4.80	2.12	1.236
Lebanon During COVID-19	44.00	21.40	23.80	6.00	4.80	2.06	1.165
To what extent do you transfer shopping to reusable bags?							
Greece Before COVID-19	11.80	19.50	23.90	27.90	16.80	3.19	1.261
Greece During COVID-19	11.40	21.20	19.50	26.30	21.50	3.25	1.318
Lebanon Before COVID-19	46.40	22.60	14.30	10.70	6.00	2.07	1.259
Lebanon During COVID-19	48.80	16.70	17.90	9.50	7.10	2.10	1.304

A couple of the interviewed delivery companies discussed how a number of restaurants are not including cutlery packs in their takeaway or delivery orders unless a customer explicitly requests them. Cutlery packs have an average unit cost of 6,000 LBP (around 0.15 USD at the rate of 40,000LBP to 1USD) which can accumulate quickly especially for the SMEs that are highly dependent on takeaway and delivery. One delivery company also discussed how consumer preferences are at play for some of the F & B businesses they deliver for with perceptions of SUPs as cheap, conventional, and “lower class” which is pushing the businesses to establish an alternative identity and cater to a more affluent segment of the population by switching away from SUPs. Proving that some of these decisions are made not for financial reasons at all, some F & B SMEs are using pasta straws which reportedly cost 20 times more than their plastic counterparts. It was reported that this is being done primarily on environmental grounds. Other SMEs are not engaging in delivery or take away in part because of the perceived SUP implications. Another interesting practice discussed by a smaller delivery provider is a program to reduce the number of SUPBs used in delivery. The delivery service provider used to purchase around 1000 durable and multi-use paper bags per year. These would be purchased for 1 USD per paper bag before the crisis. They would give these bags to the customers for free and then take it back in the next delivery to reuse it in future orders. The stakeholder claimed it worked well but they stopped during the economic crisis. The delivery service providers understand that they are primarily facilitators of the relationship or consumption patterns between customers and the SMEs. However, the above case gives an example of how they can positively influence the number of SUPBs consumed in these transactions.

In interviews with markets, it was found that all markets are provisioning different sizes of SUPBs. Larger markets reportedly provide SUPBs not only at the cashiers but also inside at the meats, fish, and dairy sections. Of those interviewed, 71% of the markets do not have a particular preference for the kind of SUPBs that they procure. A couple of those interviewed claimed to be interested in acquiring SUPBs that can be recycled or come from recycled plastics. However, one of those

supermarkets is procuring oxodegradable bags while another tried to acquire SUPBs made from recycle and complained about the quality of the SUPBs most notably the smell. None of the markets interviewed are engaging in substantial SUPB reduction measures at the point of sale. Some of the smaller practices that were cited to reduce the consumption of SUPBs include, 1) charging extra if a customer would like to take additional bags beyond the ones necessary for carrying their order, 2) allowing customers to take shopping trolleys home if they live close by or are parked nearby and the staff will bring it back, 3) requesting that staff who support in bagging customer purchases fill SUPB to capacity (although this is often not adhered to), and 4) provided all customers for a week with a multi-use nylon bag in 2018 but reportedly none of them brought them back to the market to reuse them. When asked about alternatives to SUPBs, some markets reported 1) certain items are given in paper bags (such as takeaway food options) and perishables are placed in nylon wrap, 2) perceived “ecofriendly” oxodegradable SUPBs are given to customers, and 3) 42% of the markets interviewed sell multi-use bags at their premises.

3.3. Stakeholders’ views

Regarding consumers’ perception, in a recent survey with around 30 key public and private sector stakeholders involved in the plastic sector, over 80% strongly agree that plastic consumption and pollution is a serious problem requiring an urgent solution (Kayed, 2021). Furthermore, the study by Gareiou et al., 2022, over 80% of the 476 respondents in Lebanon reported they believe plastic pollution to be one of three largest environmental issues in the country, over 80% believed or were unsure if bioplastics were actually biodegradable, and over 60% believed that SUPs should be completely eliminated. The below tables extracted from the study provide more details on the perceptions around plastics and SUPs with Greece as a comparative.

Table 3: Results of the questionnaire from the Gareiou et al., 2022 study showing perceptions around plastic and SUPs in Greece and Lebanon

Response	Not at All (%)	Not Very (%)	Neutral (%)	Fairly (%)	Very Well (%)	Mean (%)	Std. Dev.
Do you know what is the meaning of microplastics?							
Greece	11.20	12.80	28.00	25.00	23.00	3.36	1.274
Lebanon	33.00	14.90	20.20	19.10	12.80	2.64	1.436
Do you know what is the meaning of bioplastics?							
Greece	15.50	17.10	29.30	20.40	17.80	3.08	1.305
Lebanon	22.30	23.40	26.60	20.20	7.40	2.67	1.239
Do you really believe that single-use plastics (e.g., plastic bags, single-use straws and plastic packaging) show a significant impact on the environment?							
Greece	0.00	2.00	10.20	30.90	56.90	4.43	0.754
Lebanon	1.10	4.30	10.60	27.70	56.40	4.34	0.911
Do you consider plastic pollution to be one of the 3 biggest environmental problems in your country?							
Greece	2.60	8.60	14.80	38.80	35.20	3.95	1.039
Lebanon	1.10	6.40	7.40	40.40	44.70	4.21	0.914
Do you know if there is legislation to ban single-use plastics in your country?							
Greece	11.80	13.20	23.40	26.00	25.70	3.40	1.317
Lebanon	35.10	17.00	27.70	10.60	9.60	2.43	1.324

Response	Strongly Disagree (%)	Disagree (%)	Neither Agree nor Disagree (%)	Agree (%)	Strongly Agree (%)	Mean (%)	Std. Dev.
Do you think that all types of plastics can be recycled?							
Greece	27.30	18.40	17.10	28.00	9.20	2.73	1.364
Lebanon	9.60	16.00	19.10	38.30	17.00	3.37	1.218
Do you think that all bioplastics are biodegradable?							
Greece	12.20	15.80	45.40	22.00	4.60	2.91	1.022
Lebanon	2.10	5.30	52.10	31.90	8.50	3.39	0.806
Do you think that single-use plastics should be completely eliminated?							
Greece	2.70	7.70	6.70	32.00	50.80	4.21	1.044
Lebanon	3.60	8.30	21.40	27.40	39.30	3.90	1.126

The primary barrier cited by supermarkets to not engaging in alternatives to SUPBs is the economic cost of those alternatives followed by a perception that people want SUPBs to use in their homes for various reasons, a lack of awareness on the part of the market's management as to the value of switching away from SUPBs, and lastly a lack of education from the customers on the environmental damages associated with SUPBs. The primary measures cited to help overcome barriers with over consumption of SUPBs was regulation of the prices and providing cheaper alternatives followed by an awareness program for consumers about shifting their behavior to be more eco-conscious and a technical support program on incorporating alternatives into markets. A shocking statistic is that 57% of the interviewed stakeholders only know about multi-use bags and no other measure to reduce SUPs. Other notable perception statements from supermarket stakeholders also included:

- "Problems with customers' behavior not with the availability of alternatives."
- "People want a lot of plastic and they aren't worried about much else during the crisis."
- "People are greedy and they will take everything that is free."
- "I'm very familiar with tote bags but not familiar with other alternatives to SUPs."

There were not many notable perception findings from delivery providers. Some of the more notable perception statements from these stakeholders included,

- "It would be a hassle to ask the customers to take alternatives and give them back. The main issue is with customer awareness. The businesses would love to reduce the SUPs going out."
- "There needs to be awareness campaigns on the trash that's on the streets, to reward people for not throwing. This could have a positive impact on their role in reducing SUPs."
- "I don't think anyone is doing anything to reduce plastics in this delivery provision sector."
- "Government support is needed in the form of tax breaks for those reducing SUPs and reduced costs of alternatives through subsidy."
- "Need to give some kind of incentive for the customer to say yes please reduce my bags."

4. The "reward system"

4.1. Explanation of the delivery based model and stakeholders' role

Two possible reward systems are proposed below. The first model is reliant on economic instruments to reduce consumption of SUPBs through the business to consumer delivery process. It could be applicable to 1) F&B companies that either directly operate delivery with regular customers or 2) delivery service providers with regular customers. If it is the latter, careful attention should be paid to carrying over part of the benefit of cost savings acquired by the F&B SME with the delivery service provider. It should be noted that although the focus of this study is on SUPBs the below would provide even more robust returns (estimated at 10 times more) for SUP cutlery provision.

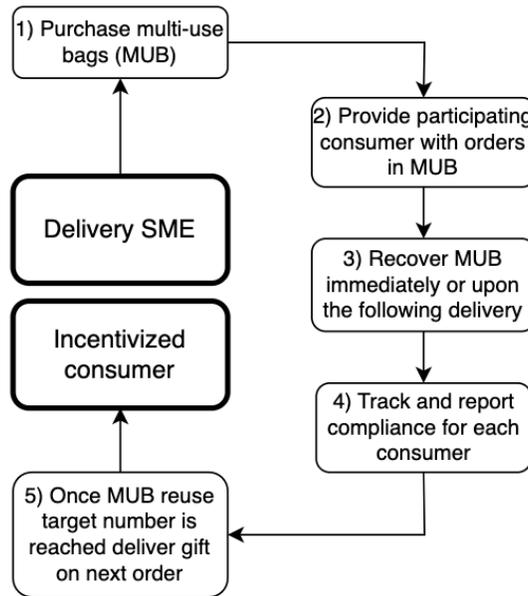


Figure 4: A simplified diagram of the SUPB reduction model through delivery

Table 4: More fully developed actions and considerations for the delivery -based rewards system to reduce SUPB consumption

Action	Considerations
1. Stakeholder (SME) purchases durable and multi-use bags (likely polypropylene, polyester, or nylon) that can also be washed for sanitary purposes	The cost of these multi-use bags is estimated at 1 USD each
2. A consumer incentive campaign is designed to excite compliance with multi-use bags that are tailored to that stakeholder. For example, 1 free drink	This incentive program should make business sense in other words if each SUPB costs around (0.0125 cents) and each order contains 3 bags on average around then 27 orders will

<p>for every 20 usages of multi-use bags that were taken from and returned to the SME stakeholder.</p>	<p>equate to 1 USD saved. So, the number of compliant orders made and the point at which a reward of an acceptable cost is given should be studied. There may be other costs to factor into this study such as the washing of the multi-use bags after each use and the lifetime of these bags/ how often they need to be replaced.</p>
<p>3. Delivery drivers are trained on how to engage in this program in two different ways of equal efficacy. A) The order is taken in multi-use bags and is given at the destination of the consumer and the same multi-use bags are immediately returned with the delivery driver to the SME stakeholder or B) The order is taken in multi-use bags and is given at the destination of the consumer and the multi-use bags is left with them. At the time when the consumer makes their next order the multi-use bags from the last order are returned.</p>	<p>The delivery driver will have a key role to play here in ensuring that the program is effective and careful consideration to their concerns and capacity to effectively carry out the program should be given particularly for reporting back to the SME stakeholder as per action 6.</p>
<p>4. The campaign is launched notifying customers of this new initiative to reduce SUPBs with customers and the incentive for their compliance.</p>	<p>Customers should be made aware not only of the incentive, but of the number of SUPBs they would be able to save from the environment (and their associated damages) if they are part of the program.</p>
<p>5. Bags are washed after each use with the cost of washing them factored into the incentive program.</p>	<p>Washing the bags should not only clean off any stains, but should neutralize any pathogens that are transmissible</p>
<p>6. Reporting and monitoring compliance of consumers and other costs of the program may take a digital or physical form. In either case it should be noted if A) the multi-use bags were immediately returned to the SME stakeholder in which case compliance would be met or B) that a consumer kept the multi-use bags and that compliance is achieved on the next order when the multi-use bags are returned. Lastly all costs of the</p>	<p>It is important that the number of compliant orders and other costs is well documented so that provision of the reward actually results in cost savings for the SME.</p>

<p>program should be factored into the reward system.</p>	
<p>7. Cost appropriate rewards are given to consumers who reach the target number of compliant orders in the form of a physical reward provided in their next order or virtually if the reward is for example a gift card or discount on future orders.</p>	<p>It may be useful to also acknowledge how many bags the consumer saved from going to the environment every time they receive the reward</p>
<p>8. Program improvement should always be kept in mind and this will best be enabled through periodic surveys/interviews with delivery drivers and consumers along with careful monitoring of the costs associated with the program and how to reduce them.</p>	<p>Delivery provision companies will be at an advantage in implementing and improving on this program given their reliance on digital platforms and greater capacity to monitor consumer behavior and program flows.</p>

Delivery model impacts and effects

For the small delivery providers that we interviewed for this program, full compliance would equate to 90 SUPBs saved per day or 32,850 per year which equates to 273 KG of plastic worth 410 USD. Assuming that the durability of the multi-use bags means twice the number of items can fit in each when compared to SUPBs, 135 multi-use bags would be needed to cover daily orders. Assuming an additional 50% of bags are required to cover for the bags that are in circulation or are being washed, the delivery provider would require the purchase of 202 bags costing around 202 USD. Not factoring in other costs such as multi-use bag washing and replacement, this equates to a 208 USD cost difference if multi-use bags are used instead of SUPBs per year for a small delivery company. Assuming 50% of delivery providers adopt the program at 30% consumer compliance, for a delivery company that serves the population of Beirut this would equate to 2,213,811 SUPBs reduced per year and a cost savings of \$13,725. Within the same assumption, at the national level this would equate to 6,376,185 SUPBs reduced per year equal to \$39,208 in cost savings. Added value benefit for the delivery providing business would be to further their green branding and associated benefits and more loyalty among consumers who feel inclined to reach their reuse bag milestone to receive the associated reward. Lastly, such a program would create new economic opportunities around multi-use bags.

4.2. Explanation of the supermarket based model and stakeholders' role

The second model is also reliant on economic instruments to reduce consumption of SUPBs through a loyalty points system with supermarkets and consumers. The model is only applicable to supermarkets with a loyalty points system where the supermarket operates a subscription for regular consumers to receive points for their purchases. Points are then used to redeem rewards that the supermarket has already determined to be in demand for the consumer base.

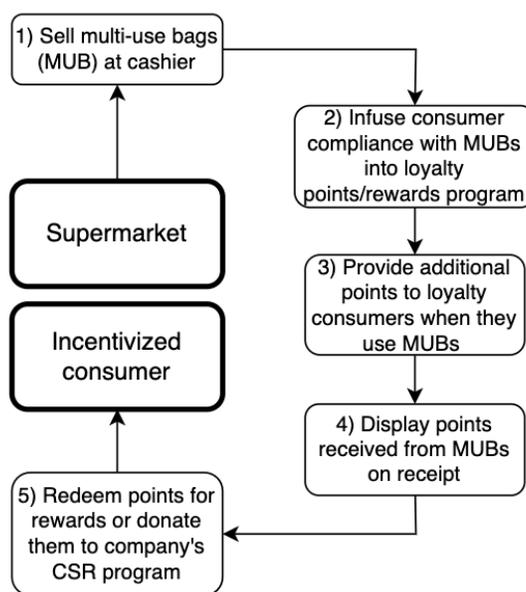


Figure 5: A simplified diagram for the supermarket based rewards program to reduce consumption of SUPBs.

Table 5: More fully developed actions and considerations for the supermarket-based rewards system to reduce SUPB consumption

Action	Considerations
1. Stakeholder (SME) places durable MUBs (likely polypropylene, polyester, or nylon) for sale preferably at the cashier if they don't already have them.	The cost of these MUBs is estimated at 1 USD each
2. A consumer awareness is built on the incentive program letting consumers know that if they complete a shopping trip/transaction with only multi-use bags, they will receive additional	This incentive program should make business sense in other words if each SUPB costs around (0.0125 cents) and each purchase of 1-5 USD usually consumes 1 SUPBs on average (10USD consumes 2SUPBs, 15USD consumes 3 SUPBs,

<p>loyalty points in accordance with the size of their transaction</p>	<p>etc.) when a consumer brings their multi use bags, they should receive points equal or less than the 0.0125 cents saved. If their purchase is between 5-10USD points received should be equal or less than 0.025USD (because 2 SUPBs are estimated to be saves) and so on.</p>
<p>3. Institute the program into the supermarkets loyalty points system and the provision of receipts</p>	<p>In order to further incentivize consumers to engage in the program, the receipt should reveal how many points the consumer received for bringing their own multiuse bags and how many SUPBs they have saved so far.</p>
<p>4. Allow consumers to use points accumulated to receive rewards</p>	<p>Regular market research should be done in order to ensure that consumer rewards are catering to the preferences of target consumers. These rewards could include the obvious consumer items but they could also be trendy multi-use bags or even a CSR program that the supermarket has for the environment.</p>

Supermarket model impacts and effects

The proposed supermarket-based model to reduce consumption of SUPBs is relatively easy to implement seeing that many supermarkets already employ a loyalty points system. These loyalty points systems are proven to be effective at nudging consumer behavior toward preferred consumption patterns. This would also develop economic opportunities around multiuse bags in Lebanon. If 30% of consumers engage in the multiuse program at a single supermarket, an estimated 433,921 SUPBs would be reduced per year per supermarket. If 20% of the saved amount was given to consumers in the form of rewards, a cost savings of \$4,339 would be made in each supermarket each year. If 50% of supermarkets in Lebanon adopt the program at 30% consumer compliance, 89,821,650 SUPBs will be reduced per year collectively equating to \$898,216 in cost savings if 20% of the cost savings are used for rewards.

5. Charging for SUPBs

5.1. Explanation of the model and stakeholders' role

Ecotaxes, taxes, or charges are a proven economic incentive to alter producers and consumers behavior. In this section a SUPB charge model is proposed which could either be considered 1) a SUPB tax model with at least a portion of the generated revenues going to a public environment fund ideally sitting under the jurisdiction of the Ministry of Environment or 2) a SUPB compulsory charge model with all revenue remaining with the retail store. For larger retail franchises it could be

made mandatory that at least a portion of the generated revenues would go to an environment fund that lies under the jurisdiction of the retail store.

The charge would be placed per SUPB consumed at the point of sale and is proposed to be 1,000 LBP or approximately 0.03USD per SUPB at the exchange rate of 40,000LBP to 1USD. This figure is proposed given that the average cost of SUPBs for purchasing stakeholders is 1.5USD per Kg with an average of 120 SUPBs in each Kg. At the same exchange rate, this would bring the average cost of each SUPB for purchasing stakeholders to 0.0125 USD or 500 LBP per SUPB. If a lesser tax would be instituted the implementing parties would run the risk of consumers remaining indifferent to the tax and continuing to consume SUPBs at nearly the same consumption rates. It will be critical to ensure that the SUPB charge amount is high enough to ensure consumer behavior change and low enough to not cause public backlash during Lebanon's sensitive economic times.

To gradually introduce such a charge on SUPBs in Lebanon, key stages will have to be achieved. The first proposed stage is to create a voluntary agreement among 4-8 key supermarket franchises in the country, much like the short lived SUPB charge model in the fall of 2019, the model that the Government of Catalonia followed, and numerous other territories. It is important that at least 4 franchises take part in this first phase to give a national significance to the initiative and to keep it from being perceived as only a for-profit maneuver by the private sector.

Once consumers are acquainted with a charge on SUPBs via the voluntary agreement with a select number of franchises, the tax or compulsory charge would be made into a law targeting only grocery outlets similar to the law adopted by the United Arab Emirates. After a period, phase two would be initiated which would involve a nationwide charge on SUPBs irrespective of retail store type or size. Further timeline based considerations are provided in Table 6.

5.2. Expenditure of the revenue

Under the tax model, it is proposed that the remaining 50% or 500 LBP from the SUPB tax (the other 50% remaining with the private sector stakeholder), is split with 100 LBP remaining with the private sector stakeholder and 400 LBP given back to the MoE for their environmental fund. The purpose of leaving an additional 100 LBP with the private sector stakeholder is to cover the costs of an awareness campaign they are to conduct with their customers to reduce any backlash from their customers. It is critical that there would be key standard statistics and messages included in the awareness campaign conducted by each of the participating private sector stakeholders with the aim of consistent statistics establishing common knowledge among the public on how damaging SUPBs are on Lebanon's environment and messages pulling from other national initiatives that were effective in encouraging the public to participate in SUPB charge programs. To build public trust in the tax program, it will be of critical importance to maintain program transparency and release information to the public on the tax collected in the public environmental fund and what it is being used for.

Under the compulsory charge model the revenue would remain with the retail store to be used at their own discretion. Of course, this would miss the opportunity to create additional public funds for the environment, but it would be considerably easier to implement in Lebanon given under resourced state enforcement. It could still be mandated that retail franchises with high turnover (a turnover threshold would need to be drawn) must give a certain fraction of their revenue to their CSR environmental programming. By placing a portion of the revenue from the SUPB charge into an environmental CSR program consumers would be more inclined to participate and the green branding benefits for the retail franchise would be improved.

A proposed component of the SUPB charge carried out by retail stores is to provide customers with multi-use bags free of charge at the point of sale for the initial period of the program (2 months) on the basis of bracketed transactions. The first multi-use bag is given for purchases between 1-25 USD, the second multi-use bag is given for purchases between 25- 50 USD, three multi-use bags are given for purchases between 50-75 USD and four multi-use bags for purchases between 75-100 USD.

Once a nationwide charge on SUPBs is instituted, it is expected that approximately 30% of the population will immediately be compliant bringing multi-use bags with them when making purchases (UNEP, 2019). Assuming the charge would be adopted across nearly all the private sector, this would equate to 2,836,960,000 SUPBs consumed with a charge with the first year of tax revenue estimated at 113,4784,000,000 LBP or 28,369,600 USD (40,000LBP to 1USD) in revenue (aside from the cost of purchasing SUPBs) that could be used for the public environmental fund or CSR environmental programming. Assuming compliance would gradually increase to 70% after year one of SUPB charge institutionalization, the number of SUPBs consumed would drop to 1,215,840,000 with environmental programming revenue stabilizing around 486,336,000,000 LBP or 12,158,400USD (40,000LBP to 1USD) per year. However, programming with these funds should remain responsive to the public environmental needs of the times.

5.3. Management of the tax

Any agreed upon SUPB charge policy should include a monitoring and reporting system that is in line with the capacity of the government and participating private sector actors to ensure compliance and to know how the consumption of SUPBs is evolving over time. The monitoring and reporting system should feed into enforcement mechanisms. No matter what program is decided upon, the Government of Lebanon should have a dedicated monitoring and enforcement task force. However, as previously mentioned a compulsory charge model where revenue remains with the private sector would require considerably less government effort seeing that the monitoring and enforcement would primarily revolve around ensuring retail stores are charging for SUPBs.

Monitoring and reporting for a tax and public environmental fund can happen among two stakeholder groups: 1) Plastic manufacturers/importers and 2) retail stores. This could take the form of compulsory reporting at a periodic basis that coincides with VAT reporting. In both cases standard reporting templates, tools, and training videos should be issued out, expectations and consequences of non-compliance with the SUPB tax should be clearly defined, and the period for reporting or

updating records should be clearly communicated. Reporting will be easier with the medium to large businesses that usually have a cash register where taxed SUPBs show on the receipt as a line item and can be more easily tracked in the business' accounting system.

Enforcement can happen either through random checks at retail stores, at periods when VAT is reported to the responsible government entity, and/or through the SUPB manufacturers and retailers in order to cross check how many SUPBs are being sold to certain retail stores. Although it may be more effective, a high level of surveillance and prosecution for non-compliance may not be sustainable and therefore complementary actions should be formulated such as self reporting with associated incentives for appropriate reporting (to be collaboratively developed), creating a campaign enabling citizen to act as watchdogs for non-compliance with an associated hotline, and other measures that do not over stress an already stressed government enforcement apparatus.

6. Comparison of the two systems

A reward based system to reduce SUPB consumption is reported to be more appealing among consulted stakeholders given Lebanon's current socio-economic context and concern over consumer backlash. Backlash to taxes as with the WhatsApp tax that helped spark the October 2019 popular uprising, and lack of government capacities to enforce certain policies further justify a rewards based system. Rewards for reduced consumption of SUPBs could be a contextually sensitive way of creating more value around SUPBs and further introducing the public to the importance of reducing consumption and the possibility of becoming a positive stakeholder in doing so.

However, as shown by the figures above, a rewards based system would have considerably less impact on SUPB consumption and is highly susceptible to private sector decision making. The private sector could both quickly adopt a rewards based SUPB reduction model and just as quickly unravel it. The most robust and stable impact would be normally expected from a government supported charge on SUPBs but again, the state of governance in Lebanon infringes on this expectation. Among the two options for charging for SUPBs, it would be considerably easier to implement a compulsory charge although it would still require government enforcement particularly among small retail stores and those who are concerned with losing customers as a result of the policy.

Even in the above proposed widespread adoption scenario with both the delivery based and the supermarket based rewards based model, only 3.4% of the SUPBs would be reduced compared with a fully-fledged nationwide SUPB charge. In addition to governmental capacity, the dramatically different scale of impact is important to consider when weighting which model is worth pursuing.

Table 6: The scope, legal and institutional, social, and engagement considerations for 4 SUPB phase out recommendations over 3 time periods.

Recommendations	Short term (2023-2024)				Medium Term (2025-2030)				Longterm (2030+)			
	Scope	Legal and institutional	Social	Engagement driver	Scope	Legal and institutional	Social	Engagement driver	Scope	Legal and institutional	Social	Engagement driver
Rec. 1: Delivery based model	One delivery SME acts as a piloting enterprise for a delivery based transition from SUPBs to MUBs	MoE backed and promoted through MoE decision	Information campaign with anticipated reduction of SUPBs through delivery	Cost savings for delivery company (buying its own SUPBs) and rewards for customers	Expansion to all delivery providing companies interested in joining on	Ministerial decree defining process	Information campaign with proven reduction of SUPBs through delivery	Proven cost savings for delivery company (buying its own SUPBs) and rewards for customers				
Rec. 2: Supermarket based model	One supermarket acts as a piloting enterprise for a loyalty points transition from SUPBs to MUBs	MoE backed and promoted through MoE decision	Information campaign on anticipated reduction of SUPBs through supermarket	Cost savings for supermarket and rewards for participating customers within existing loyalty points program	Expansion to all supermarket franchises interested in joining on	Ministerial decree defining process	Information campaign with proven reduction of SUPBs through supermarket	Proven cost savings for supermarkets and rewards for participating customers				
Rec. 3: SUPB tax	Engage 3-4 franchise supermarkets in applying a compulsory charge on SUPBs	MoE backed and promoted through MoE decision	Supermarket led and municipality backed information campaign on key reasons to bring your own MUBs	Increased revenue for supermarkets and added cost on the consumers who do not bring MUBs	Convert the supermarkets participating in a compulsory charge to a tax system	Laws and decrees defining process	Supermarket led information campaign on MUBs and use of tax revenue	Increased revenue for supermarkets and added cost on the consumers who do not bring MUBs	Expand tax to all types and sizes of retail stores	Law amendment further defining process	Multi-channel and multi-actor information campaign on MUBs and clarity on the use of additional revenue	Increased revenue for supermarkets and added cost on the consumers who do not bring MUBs
Rec. 4: SUPB compulsory charge					Expand compulsory charge to 10 supermarket franchises	Laws and decrees process	Supermarket led information campaign on MUBs and use of charge revenue for CSR programs		Expand compulsory charge to all types and sizes of retail stores			

7. Conclusions and next steps

This study focused on SUPBs given their severe damage to terrestrial and marine ecosystems, continued public concern over plastic pollution, relatable regional and global successes in SUPBs phase out measures, and readily available alternatives to SUPBs. Building off of Marine Litter Med Phase 1, this report laid out the current Lebanese context and associated research limitations, provided the baseline on the situation of SUPB in Lebanon with a particular focus on grocery and delivery outlets, discussed 4 public authority attempts to phase out SUPBs, and gave 4 possible pathways to reducing consumption through reward and charge based models.

It was found that 34 out of the 51 registered plastic industries in Lebanon produce SUPB and HDPE and LDPE going into making SUPBs constitutes 46% of the market share by resin type. In Marine Litter Med Phase 1, it was found that the average consumption of SUPBs per capita per year was 596 which has gone down by about 15% to 507 SUPBs per capita per year. Of the large supermarkets surveyed, it was found that the average consumption per branch is 1,446,404 SUPBs per year. The interviewed medium sized markets in the country use around 72,000 SUPBs per year and small convenience stores use around 14,000 SUPBs per year. None of the markets interviewed are engaging in any substantial control to reduce the number of SUPBs at the point of sale, however some more nominal practices were cited to reduce the consumption of SUPBs. A main finding of concern is that over 70% of consulted markets do not have a particular preference for the kind of SUPBs that they procure and that oxodegradable SUPBs are still considered eco-friendly by most respondents.

Although stakeholders overwhelmingly preferred a rewards based model to support in phasing out SUPBs, the ones proposed would only result in 3.4% of the SUPBs reduction in comparison with a fully fledged nationwide SUPB charge. This dramatically different scale of impact and an honest grasp of both the government capacities required and the government capacities available for a given measure, necessitates careful consideration of which policy measure to adopt. The next step of this activity will first consider the feedback received on all models to phasing out SUPBs from over 10 main players involved in consultation meetings. The following step will be to present all findings and expert recommendations to the MoE in order to select which supporting SUPB phase out model is most suitable and worthy of implementation in Lebanon.

ANNEX 1: List of reviewed documents

Source name	Authoring organization	Publishing year
Awareness of Citizens for the Single-Use Plastics	Hellenic Open University & Balamand University	2022
Presentation Toward Plastic Circular Economy in Lebanon	UNDP	2021
Data Survey on Plastic Transformation, Recycling, and Waste Composition in Lebanon	EDESSA and UNDP	2021
Towards a Circular Economy in Lebanon	ACTED	2020
Reducing Marine Litter in the Mediterranean through Waste Wise Cities Lebanon (ReMaL)	UNHABITAT	2022
Baseline Assessment of Marine Litter Med in Lebanon	World Bank	2022
Provision of Services for the Preparation of an Analysis of the Plastics Sector in Lebanon: Mapping of Opportunities and Barriers	ELARD and UNDP	2021
Country report on the solid waste management in Lebanon	Sweepnet	2014
Lebanon: Huge Cost of Inaction in Trash Crisis	Human Rights Watch	2018
Solid Waste Management in Lebanon: Challenges and	Lebanese University	2017

Recommendations		
Lebanon: the state of waste	Heinrich Boll Foundation	2020
State and Trends of the Lebanese Environment; Chapter 8	Ecodit	2010
Solid Waste Management in Lebanon: Lessons for Decentralisation	Democracy Reporting International	2019
Inclusive and Sustainable Solid Waste Management in Lebanon: Guidelines for an Integrated Framework	Democracy Reporting International	2019
Bridging the Gap in Solid Waste Management	World Bank	2021
Decentralization of solid waste management services in rural Lebanon: Barriers and opportunities	American University of Beirut	2020
Lebanon Country Report 2022	BTI Transformation Index	2022
2020 State of the Environment Report	UN	2021
Education for Sustainable Consumption, Behaviour and Lifestyles	MED-WAVES and Union for the Mediterranean	2019
Wasteless Lebanon	UNHABITAT	2022

ANNEX 2: Lebanon's socio-economic situation

Lebanon's ongoing economic, political, and social crisis summarized below has presented extenuating limitations on the research study. Firstly, Lebanon continues to pass through a severe and prolonged economic depression. According to the World Bank Lebanon Economic Monitor (LEM) released the crisis possibly ranks in the top three, most severe global crises episodes experienced since the mid-nineteenth century (World Bank, 2021). Lebanon's GDP has collapsed from close to \$55 billion in 2018 to about \$33 billion in 2020 and the GDP per capita has gone down by around 40% in dollar terms. Such a devastating contraction is normally associated with conflicts or wars (World Bank, 2021). Monetary conditions remain highly volatile with a multiple exchange rate system, exchange rate depreciated by 2,500% in August of 2022, and surging inflation (averaged at 84.3% in 2020) which is subject to extraordinarily high uncertainty. Subsequently youth unemployment has reached 60% (International Labor Organization), more than half the population is likely living below the national poverty line, and, as of late 2021, 82% of the Lebanese population is considered to live in multidimensional poverty (an important index which considers factors other than income to assess poverty such as disempowerment) (UN ESCWA, 2021).

The political crisis has also intensified with the higher stakes. Protests and civil unrest, beginning with the October 2019 popular uprising against the State, continue to flare up with policy responses by leading public authorities and political figures in Lebanon being highly inadequate. The shortcomings have much less to do with knowledge gaps and more to do with an inability to form political consensus over policy measures. Living conditions have rapidly deteriorated with over 75% of the population at risk of critical water shortages, state electricity being reduced to two hours per day in the best case scenario, and environmental issues reaching new heights with air quality for example expected to be 300% worse than the 2019 baseline (UNICEF, 2021; The National, 2022). The 4th of August 2020 Beirut blast, the world's most powerful non-nuclear explosion of the 21st century (Rigby et al., 2020) continues to have direct and residual effects on the country. The man-made disaster killed at least 200 people, injured more than 6,500, and left 300,000 homeless among which 80,000 are children (ibid).

The Beirut port explosion along with the economic collapse, political crisis, COVID-19 have taken a toll on the nation's mental health with data showing severe levels of distress compared to 2019 in a country with minimal resources to respond (Farran, 2022). These conditions have also resulted in a dangerous depletion of human capital across the public and private sectors as highly skilled labour explores and secures opportunities abroad with little prospect for returning. This has constituted grave social and economic loss for the country. Lastly Lebanon, self-reports as the second least happy country after Afghanistan and has a crippling issue with 'trust in others,' namely between the national government and the public, remaining very low. Citizens do not trust or feel represented by political and governing institutions. The National Democratic Institute reports there is a pervasive and severe lack of trust in Lebanon, especially for leading national government actors and politicians, however there are higher levels of trust in municipalities with one report placing the figure at 90% (European Parliament Briefing, 2022; BTI Transformation Index, 2022).