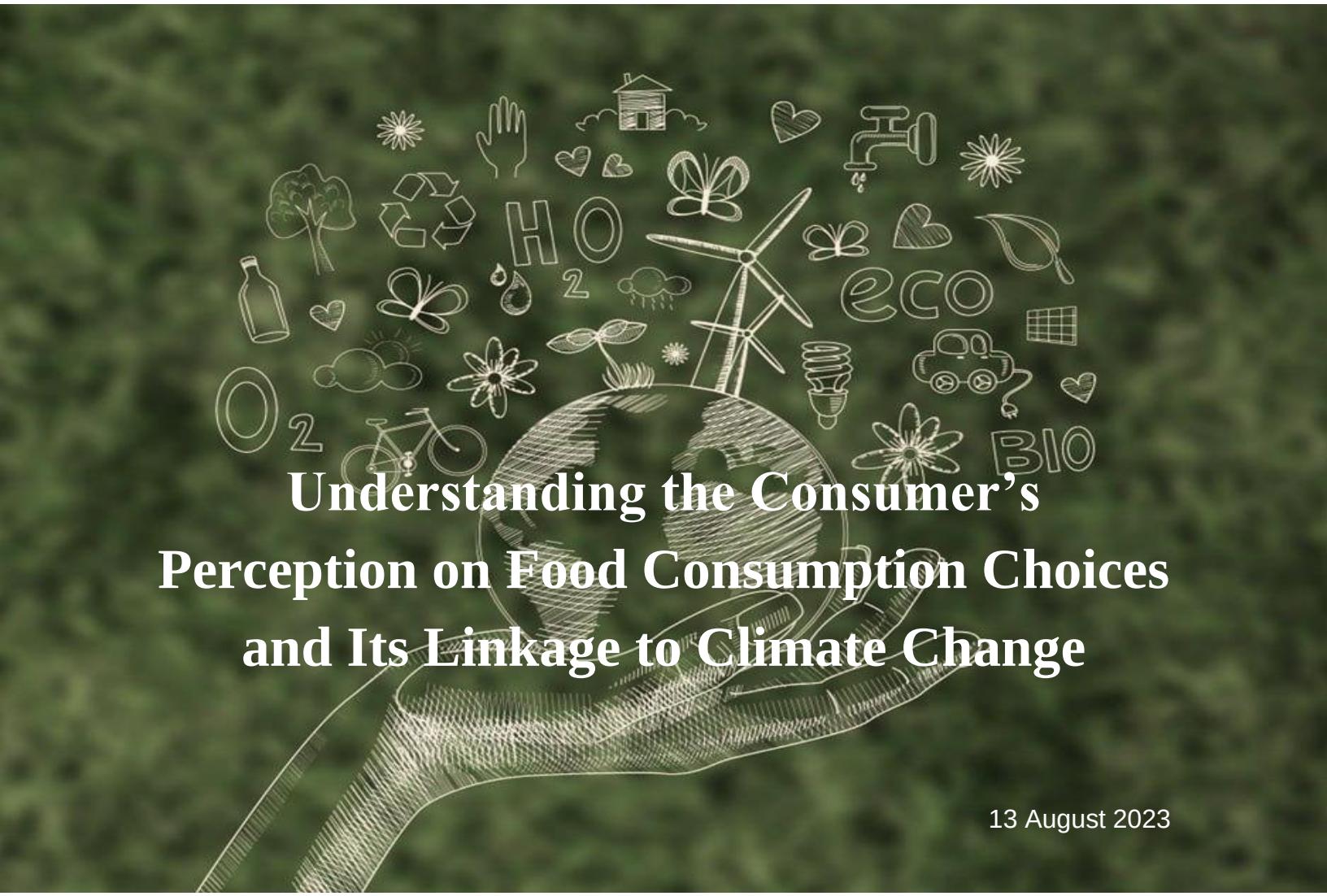
Findings Report



Understanding the Consumer's Perception on Food Consumption Choices and Its Linkage to Climate Change

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Understanding the Consumer's Perception on Food Consumption Choices and Its Linkage to Climate Change

BDLINK (Cambodia) Co., Ltd

Executive summary

Understanding the consumer's perception on food consumption choice and its linkage to climate change is crucial in addressing the climate change and linking to sustainable development. On a consumption pattern, consumers play a significant role in shaping the demand for different types of food, which in turn has implications for greenhouse gas emissions, deforestation, and land degradation while production side, particularly the production, transportation, and processing of food also contribute to greenhouse gas emissions and other matters including the release of methane from livestock.

Given such prominent issues and align with the government's efforts to combat climate change and promote sustainable development, this study aims at 1) determine consumers' general grocery shopping behavior, with special regard to sustainable options, 2) understand consumers' knowledge and perceptions of sustainable consumption and production through determining the current level of awareness and perceptions of food consumers in linkage to climate change and environmental degradation 3) identify and suggest ways and mechanisms that could trigger behavioral change among the targeted consumers, so that more sustainable products will be chosen/ purchased (mainly targeting urban consumers).

Using the Knowledge, Attitude, and Practices (KAP) survey model to investigate Sustainable Consumption and Production (SCP) issues, BDLINK (Cambodia) surveyed 360 respondents including university students, employees, self-employed, etc. in Phnom Penh. Additionally, BDLINK (Cambodia) conducted interviews with 19 key informants from businesses, including chain restaurant groups, food retailers, and food delivery services.

Findings:

Knowledge

Key finding 1: Knowledge of Sustainable consumption versus sustainable products - respondents indicate that they heard more about sustainable consumption/green consumption (yes, 70%), than about sustainable products/green products (yes, 49%). Which is more or less the same for men and women, but within age categories younger people have heard more often of both. Younger people under the age of 20 account for 76% and 73% of those who are aware of sustainable consumption and products, respectively.

Key finding 2: Channel via which knowledge was shared – social media, particularly Facebook, Instagram, etc., was by far the largest knowledge sharing channel, for all age groups and among men and women and is also differentiated by occupation. The runner

up channel was through school and to a certain extend via TV (particularly for unpaid work respondents).

Key finding 3: Knowledge and Awareness of impact of products on the environment – respondents were very concerned about climate change or environmental degradation (very concerned 52% and somewhat concerned 33%), however they were not very aware of the impact of the products they use on the environment (fully aware 13% and familiar with the impact 37%), 49% of respondents know little about the products' adverse environmental impact. Respondents with a post graduate and a vocational training seemed to be most aware of the impact of products.

Key finding 4: Knowledge of Food consumption and environmental/climate impact – respondents were much more aware of the impact of their food consumption on the environment. Other food consumption topics having an impact on the environment that were mentioned were agriculture land use (45%), food processing (44%) and transport of food (33%). Up to the age of 35 years, food packaging was mentioned most, while the older respondents also mentioned agricultural land use.

Key finding 5: Knowledge of Plastic bags and their impact on the environment – Most respondents (71%) are aware and are concerned about the impact on the environment of plastic bags.

Key finding 6: Perception on willingness to buy a sustainable alternative food product – Respondents were asked if they would buy: 1) if products are made from natural materials or a renewable resource; 2) if products use minimal or recyclable, compostable, or biodegradable packaging; and 3) if products are locally produced. Overwhelmingly respondents agreed that they would buy these products. 99% of respondents would buy locally produced products/food, 96% would buy products or food that use minimal or recyclable, compostable, or biodegradable packaging, and 97% would buy products or food if they are made from natural materials or a renewable resource.

Attitude and practice - food

Key finding 7: Attitude & Practice to food waste regarding household consumption - respondents think about the environment when they purchase food (91%) and avoid food waste (72%). However, for a sub question which asked why the respondents avoid wasting food, the finding showed that 38% of these respondents do not have a lot of money to spend on food, and 20% of respondents buy just enough food to not have to waste it, more or less equal between male and female respondents.

Key finding 8: Attitude & Practice towards food miles – surprisingly 72% of respondents avoid food that has been transported from far, as they think about transport CO2

emissions, hence it is not surprising that a large percentage mentioned they buy locally produced food (84%) due to this concern.

Key finding 9: Attitude & Practice towards food buying (different considerations) - The survey questions asked what the main considerations were when buying food (price, quality, both or other). 73% of the respondents mentioned the price-quality balance as the main consideration, the second highest consideration is environmentally friendly food, accounting for 33%. The overwhelming majority (98%) would buy organic food if the price, quality and availability were the same. But at present respondents find organic or environmentally friendly food difficult to access (59%) and have a high price (55%), not available (22%) and also 'no trust' (22%), several answers were possible. Differences between male and female answers were not significant.

Key finding 10: Attitude & Practice towards Food labeling – Only ten percent of the respondents mentioned that they read food labels. A majority (61%) do not care about food labeling, they do not read the food labels. Only 29% sometimes read labels.

Key finding 11: Attitude and Practice towards changing behavior if a negative impact is known – Almost all (96%) respondents agreed that they would change their behavior if they knew a specific food would have a negative impact on the environment. The changes they would make are: buy organic food even if the price is a bit higher than other food (60%), while 54% would eat less. There is a small part that does not want to change their behavior because they are used to it and they want to eat what is affordable and available, 19% of respondents think that locally produced food is expensive.

Attitude and practice – plastic bags

Key finding 12: Attitude & Practice towards food packaging – While 94% of respondents mention that they are cautious about food packaging they buy. 46% of respondents always use a plastic store bag (and 54% sometimes), but almost all (98%) are willing to switch to bringing their own reusable bags. People use the bags because it is easy and available or at least reduces the use of plastic bags.

Key finding 13: Attitude & Practice towards choosing between more sustainable or save money – Respondents were asked what they would choose from the options to be more sustainable or save money around the topics of: recycling/composting, limiting use of single use plastic, buying locally produced food, buying food/drink produced by sustainable practices and reducing consumption of meat/animal products. For the first four options, three quarters (70% to 82%) of respondents do both 'be sustainable and save money'. For the 'reduce meat option' only half of the respondents wanted to choose the sustainable and save money option, around a third wanted to save money. Meta or animal products clearly had a different answer compared to the other topics; more people chose to buy cheaper.

Policy and practices of restaurant chains

Key finding 14: Restaurant chains and plastic free policies – two out of six restaurant chains have a policy around not using plastic. But the restaurants without policy are also not serving customers with plastic materials for food packaging and straws. One restaurant does not even allow the staff to bring plastic to the workplace, or they will be fined. This restaurant conducted training on the impact of plastic on the environment. All restaurants use paper bags for take away, although paper bags are more expensive and must be stored properly.

Key finding 15: Restaurant chains and use of organic food - Most restaurants do not use organic products for their dishes, they focus on regular supply and meeting restaurant standards of quality. Organic produce is also indicated as scarce in the market (not a regular supply) and expensive.

Key finding 16: Restaurant chains waste management – Restaurants chains mentioned they separate waste into: 1) solid waste for CINTRI to collect, 2) cans and 3) plastic bottles, the latter two being returned to the supplier for a reward. One restaurant donates leftover bread to an NGO daily. Restaurants agree that there is a lack of knowledge around waste management and a lack of staff to carry it out. Restaurants do not separate organic from non-organic food waste.

Practices of food retailers

Key findings 17: Food retailers and plastic free practices – Most food retailers (12 interviewed) are aware of issues caused by plastic waste. They have been made aware through social media mainly. However, they do not prioritize plastic free food delivery. Plastic bags, plastic boxes, plastic cups, plastic spoons and forks, and Styrofoam are commonly used by these food retailers to serve and pack food for their customers. The main reasons to not be 'plastic free' are: 1) the cost of environmentally friendly materials is too high, 2) the supply of these products is limited, and 3) there is no demand from customers for plastic free food packaging or cutlery.

Key findings 18: Food retailers waste management – All food retailers dispose their waste (not separated in organic-non organic) in trash bins for collection by a garbage truck.

Relationship between KAP answers and respondents' characteristics

Key findings 19

A. Occupation - There is a correlation between the level of education and a higher score on knowledge and a more positive attitude towards sustainable consumption, as

well as a higher score on the ability to incorporate sustainable practices in daily lives. The student occupation category, show a more solid understanding of sustainable living and are more positive toward implementing sustainable practices. Employees show a similar correlation. Self-employed respondents have a slightly lower score on knowledge but still a relatively high score on practices.

B. Gender – both men and women score similar on knowledge, attitude and practices and both are committed to sustainable consumption and environmentally friendly behavior.

C. Age - the results suggest that there is a negative relationship between age and the KAP components, suggesting that older respondents tend to have less knowledge, attitude, and practice regarding sustainable consumption behavior

Recommendations

Understanding what are sustainable products

- Informing target audiences such as consumers (i.e. student, household, employee, and public), businesses and industries, NGOs, government, education institution, and medias, about specific characteristics to look for in sustainable products. What are sustainable products (names of suppliers) and how can they be recognized (trustworthy labeling), what should consumers look for and what should they ask for
- Informing target audiences such as consumers (i.e. student, household, employee, and public), businesses and industries, NGOs, government, education institution, and medias more clearly about the impact of products and practices on climate change and land degradation in relation to Cambodia. Focus on closer to home.

Triggers to behavior change towards sustainable options

Knowledge of the negative impact

- Enhance the information dissemination to consumers to educate them more in depth on sustainability issues. It is important to make consumers aware of the level of sustainability they are contributing to by buying certain sustainable products, contributing to informed decisions. Raising awareness levels regarding sustainability should be linked to sustainable consumption by emphasizing options that are more aligned with natural conservation by purchasing organic products or good agricultural practices (GAP) as they are pesticide and herbicide free.
- Consumers would benefit from knowing, in easy-to-understand terms, what negative impacts they could help to reduce and what they need to do for this, what actions should they take.

Price

- It is essential to reduce price asymmetry regarding the price of sustainable products by emphasizing to consumers the link between labeling and certification and price information. This could help consumers in making informed decisions by considering the environmental impact of their purchases and the price disparities between products.
- Businesses that support environmental friendliness should think about discounted prices for green alternatives, and this must be done collectively. Customers who bring their own shopping eco-bags, for instance, would receive a discount, a discount coupon, or other environmentally friendly incentives.
- It is also beneficial to encourage consumers to purchase locally produced, affordably priced food.
- Additional research is required to improve understanding of the relationship between sustainable consumption and the willingness and capacity to pay for sustainable products.
- Subsidies and incentives at the national and subnational policy levels can be a viable alternative when utilizing price as a mechanism to promote sustainable consumption. However, this can be difficult as the question of who will bear the cost arises.

Price – quality balance

- Suppliers need to make sure the right price -quality balance is reached for consumers.
- Regulators could support this by levying taxes on unsustainable products, making them more expensive for the consumer.

Information channels

- Social media is the most mentioned channel, hence a good channel. This channel could be used to present sustainable products to consumers. Influencers (trustworthy people or NGOs) might help with positioning sustainable products.
- TV is mentioned by consumers who stay at home, TVs are also available in most food retailers, and information and calls to action would reach a large audience. The messages should combine information on sustainable products and practices and how these actions and practices lead to sustainability
- The study found that students have a greater understanding of SCP compared to general consumers and employees. Thus, they can advocate for and share sustainable consumption and production (SCP) knowledge to peers, classmates,

teachers, family, and the community. Since students are experienced with technology and social media, empowering them to share SCP can be an optimal approach. They can reach a wide audience and spread their message by sharing information on social media. They also bridge the knowledge gap between generations, especially elders and parents. Thus, it is important to consider empowering them to advocate and share knowledge regarding SCP and climate change, as they can be the front for sustainable actions.

Lesser developed channels but with potential for immediate action:

- Workplaces - awareness raising about sustainable consumption and products in the workplace is limited at present.
- Educational institutes as main information providers were mentioned by university and vocational training students. Training modules should be made available for all education institutions, including primary/secondary schools, engagement of parents could be very beneficial as well.

In general: as consumers showed an understanding of the issues at hand, but they did not seem to be fully aware of products that would fit their 'want to buy sustainable' attitude.

- Food retailers mentioned that there was no demand, from consumers, for them to be more sustainable
- In other countries consumers expect regulators to play a stronger role when it comes to increasing health and sustainability in food retail.

Specific topics

Plastic bags and plastic food packaging

- Consumers could possibly be encouraged to demand plastic free food packaging, especially as they indicated that they are willing to change practices. It might be a topic for a campaign. It is concrete, several stakeholders could be involved and it would stimulate policies around one-time plastic usage to be put in place.
- Consumers themselves are however slow to change their using plastic store bag and using plastic food packaging habits
- Regulators could play a more significant role, for example: In Africa eleven countries (Tanzania, Kenya, Mali, Cameroon, Uganda, Ethiopia, Malawi, Morocco, South Africa, Rwanda and Botswana) have strict policies on use of single-use plastic

Food waste and other waste

- Waste separation into organic and nonorganic waste seems to be a priority, to reduce the amount of organic food waste in the landfill site (cutting methane production and potentially producing biogas or organic fertilizer). Organic waste is a resource and should be treated as such and there are a number of examples of solutions to be found in neighboring countries

Food miles

- While an interesting finding, the negative impact from CO2 emissions might be more of an issue in the case products are transported by air at this point in time, as all products are transported by truck/ship including sustainable green products. Buying locally is not always more relevant for CO2 emissions locally.
- Deciding which impacts are most important in relation to food miles is inevitably subjective, but consumers should be capacitated to make their own informed decisions.

Organic food and produce

- If organic food is to be promoted as a sustainable food option, these four considerations need to be addressed. While the high price is a challenge (not only in Cambodia), the other three considerations could be addressed through bringing suppliers, regulators, marketing and labelling stakeholders together, possibly through PPPs to bundle efforts to make organic produce available and establish a regular supply to food chains and food retailers at a reasonable price.

Food labelling

- Food labelling is supposed to be a great help to diversify products and make it clear which products are sustainable and green. However, labels could be made easier to read for consumers.
- Labelling and standards should apply to all selling locations, including wet markets.

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Abbreviations and acronyms

ASC	: Attitudes towards Sustainable Consumption
EPR	: Extended Producer Responsibility
GHGs	: Greenhouse Gas
IDI	: Individual In-depth Interview
KAP	: Knowledge, Attitude, and Practice
KII	: Key Informant Interviews
LEB	: Logging Enumerator Behavior
NSDP	: National Strategic Development Plan
SCK	: Sustainable Consumption Knowledge
SCP	: Sustainable Consumption and Production
SDGs	: Sustainable Development Goals

1. Introduction

Climate change has become one of the biggest concerns for every nation. The existing threat of climate change worsens global problems, affecting humans' lives and the environment. Human activities have also caused numerous issues for environmental sustainability as they interact with economic systems. The triple planetary crises of climate change, biodiversity loss, and pollution are caused by unsustainable production and consumption patterns. These crises and related environmental degradation threaten the accomplishment of the Sustainable Development Goals (SDGs) and human well-being.[1]

Resource depletion, pollution and degradation can be seen as contemporary global challenges and are all attributable to our current climate change and unsustainable development. However, comprehension of consumption and production patterns has become an ever-increasing necessity for sustainable development and potentially mitigating the risks of climate change. For example, human consumption and many food system activities contributes to an increase of greenhouse gas (GHGs) in the atmosphere and affect climate change. The food system contributes 19%–29% of total global anthropogenic GHG emissions. Of this, agricultural production contributes 80%-86% at the global level. The components of the food system/food chain that negatively impact climate change include fertiliser, animal feed, food processing, packaging, refrigeration, transport, retail activities, catering, and consumer waste.[2] On top of that, in the food system, consumers' food choices could significantly impact reducing the environmental burden. The increased media attention given to sustainability, may make consumers more aware of environmental problems and the impact that their food choices have on the environment. Since consumers are important in the transition to a more sustainable food system, it is critical to understand how they interpret "sustainability" in relation to the food supply chain.[3]

Therefore, to achieve long-term development, this issue requires both individual (Consumers and firms) and collective (governments) actions. For example, international communities have currently petitioned for the adoption of sustainable development principles due to the growing awareness of these environmental issues. Even the 2030 Agenda for Sustainable Development includes it as a target, namely SDG 12 to "Ensure Sustainable Consumption and Production Patterns". A specific goal of the agenda was to "protect the planet from degradation, including through sustainable consumption and

[1] https://www.un.org/sustainabledevelopment/sustainable-consumption-production/

[2] Vermeulen, S. J., Campbell, B. M., & Ingram, J. S. (2012). Climate change and food systems. *Annual review of environment and resources*, *37*, 195-222.

[3] van Bussel, L. M., Kuijsten, A., Mars, M., & van't Veer, P. (2022). Consumers' perceptions on food-related sustainability: A systematic review. *Journal of Cleaner Production*, 130904.

production, sustainably manage its natural resources, and act on climate change to support the needs of present and future generations."[4]

Likewise other countries, the Royal government of Cambodia has put efforts to address the climate change risks and induce policies and strategies for sustainable development. For example, the government has introduced numbers of policies and a master plan to achieve sustainable development as a means of implementing the SDGs. These policies include the national strategic development plan (NSDP 2019-2023), Cambodia National Strategic Plan on Green Growth 2013-2030, and the National Environment Strategic Strategy and Action Plan. The implementation of the policies and action plan lead to achieve the SDGs by 2030-

> i- Achieve the environmentally sound management of chemicals and wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment; and
>
> ii- Substantially reduce waste generation through prevention, reduction, recycling and reuse.

In addition, the government has introduced the Cambodia's Roadmap for Sustainable Consumption and Production (2022-2035). It is a 14-year plan to strengthen the sustainability of Cambodia's consumption and production system that align with the SDG 12's called for environmental sustainability. It is a roadmap building on a range of initiatives already underway in Cambodia by both the private and public sectors and prioritises future actions that build on this foundational work. The SCP Roadmap identifies short, medium, and long-term actions that the Cambodian government can take to enable SCP, alongside Cambodian and international businesses, and civil society organisations, and supported by development partners.[5]

Other sustainable priorities in the Cambodian's SCP Roadmap include the Extended Producer Responsibility schemes (EPR) and Eco-labelling. The EPR scheme will encourage companies producing plastic products to consider their products' end-of-life impacts. Under these schemes, companies are responsible for reducing waste at the source and promoting product design for the environment. The eco-labelling will identify products or services that have been proven to be environmentally preferable. The implementation of the environmental labeling programme will raise consumer awareness

4 https://sdgs.un.org/goals/goal12

5 https://opendevelopmentcambodia.net/topics/sdg-12-responsible-consumption-and-production/

and influence consumer behavior towards more environmentally friendly products and services.[6]

Therefore, making consumers aware of how their consumption decisions could impact the environment and the climate is essential for changing consumption patterns. For Cambodia specifically, there is currently not much information about the relationship between consumption behavior and environmental degradation, climate change, and the effects on human well-being. These connections have remained mainly unstudied.

2. Objectives of the study

The main aim of this consultancy is to conduct a survey to:

- Determine consumers' general grocery shopping behavior, with special regard to sustainable options.
- Understand consumers' knowledge and perceptions of sustainable consumption and production through determining the current level of awareness and perceptions of food consumers in linkage to climate change and environmental degradation.
- Identify and suggest ways and mechanisms that could trigger behavioral change among the targeted consumers, so that more sustainable products will be chosen/ purchased (mainly targeting urban consumers).

6 https://www.switch-asia.eu/resource/cambodias-roadmap-for-sustainable-consumption-and-production-2022-2035/

3. Methods and Data

The Knowledge, Attitude, and Practices (KAP)[7] survey model were applied to investigate issues related to Sustainable Consumption and Production (SCP). The KAP survey model provides greater access to quantitative and qualitative information, particularly for the baseline information, that could link toward the understanding of consumer perception, choices, and other behaviors. In addition, a KAP survey allows us to capture obstacles and gaps in activities that could impend behavioral change. It is also going to reflect and illustrate mechanisms and ways forward for transforming consumers' behavioral change as stated in the expected outcome of the study.

Using a convenience sampling technique, we interviewed with 19 key informants located in Phnom Penh, including 6 chain restaurant group samples, 12 food retailer samples, and 1 food delivery service samples (See Table 1). Also, we estimated the sample size for a consumer survey. Given 95% Confident Interval and 5.5% margin of error, we obtained 318 samples from the calculation and rounded up to 320 samples in Phnom Penh. From the actual fieldwork, we obtained 360 samples- including university students, general consumers, and employees (See Table 2).

The semi structured questionnaires were employed to obtain information from target business sectors: 1. Chain restaurant group 2. Food retailer, 3. Food delivery service. The structured questionnaire developed was used for Urban Consumers, university students, and employees. The questionnaire includes sections on consumer knowledge, attitude, and behavior, as well as demographic and socioeconomic data. The questionnaire will incorporate sustainable consumption and production (SCP) elements including sustainable consumption knowledge (SCK), attitudes towards sustainable consumption (ASC), and sustainable consumption practice (SCP).

To ensure the quality of the data and to optimize data consistency, we use a digital survey application (Kobo humanitarian toolbox) to deploy our survey questionnaire on tablet and mobile devices for a face-to-face interview in which the quality control procedures are applied throughout the course of data collection. We perform a two-step process data quality control by validating survey data in the field and in the office (See detail in Quality Control section).

[7] https://www.spring-nutrition.org/sites/default/files/publications/annotation/spring_kap_survey_model_0.pdf

3.1. Samples

Based on the ToR, BDLINK conducted the interviews with 1) Chain restaurant group, 2) Food retailer, 3) Food delivery service, and 4) Consumers.

3.1.1. Chain restaurant groups, food retailers, and food delivery services

Using a convenience sampling technique, we interviewed a total of 19 food supplier samples only in Phnom Penh, including 6 chain restaurant group samples, 12 food retailer samples, and 1 food delivery service samples (See Table 1 below).

Table 1: Business Sector Samples, Key informant interview

Samples	Proposed KIIs	Actual Complete KIIs
Chain Restaurant Group	5	6
Food Retailers	10	12
Food Delivery Services Providers	3	1
Total Complete KIIs	18	19

Source: BDLINK's fieldwork between July 3rd and 28th, 2023

To approach these samples, BDLINK collected a list of chain restaurants, food retailers, and food delivery services. Contacts and locations were determined and the team made appointments with potential respondents by sending an invitation email and following up with phone calls. The interview was done based on the respondent's consent and was either online (Google Team, Zoom, or other platform) or in person.

3.1.2. Consumers

Since the national population census provided us the population of urban consumers in Phnom Penh, statistically, we were able to compute the sample size for Phnom Penh. There are a total of 2,281,951 individuals in Phnom Penh.[8] It is important to note that the motivation for calculating the sample size of urban consumers is because of the urban concentration of the chain restaurant group, food retail, and food delivery services. Also, gender distribution was taken into account.

Using Maih and Miya (1993), the sample size was estimated as follows:

[8] https://www.nis.gov.kh/nis/Census2019/Final%20General%20Population%20Census%202019-English.pdf

$$n = \frac{Nz^2p(1-p)}{Nd^2 + z^2p(1-p)}$$

Where n denotes sample size, N is total population, d denotes precision, z is 95% confidence interval, and p is the population proportion. Given 95% CI and 5.5% margin of error, we planned for 318 samples, rounded up to 320 samples. However, after the fieldwork we surveyed 360 samples.

It is essential to note that we collected samples that were distributed and dispersed throughout Phnom Penh. BDLINK therefore dispersed the interview team in five different directions: North (Khan Prek Pnov, Sensok, and Russie Keo), South (Dangkoa, and Meanchey), Central (Doun Penh, 7 Makara, Chamkarmon, and Toul Kork), East (Chroy Chongva and Chbar Ampov), and West (Por Senchey). The prospective consumer samples were approached in the public places such as parks, general market, supermarket, recreation centers, university…etc.

Table 2: Consumer samples

Zone	Khan in Phnom Penh	General consumers			University Students			Employees		
		Men	**Women**	**Total**	**Men**	**Women**	**Total**	**Men**	**Women**	**Total**
North	Prek Pnov, Sensok, Russei Keo	17	19	36	12	12	24	na	na	na
South	Dangkor, Meanchey	17	19	36	11	13	24	na	na	na
Central	Daun Penh, 7 Makara, Chamkarmon, Toul Kork	18	18	36	11	13	24	na	na	na
East	Chroy Changva, Chbar Ampov	17	19	36	11	13	24	na	na	na
West	Por Sen Chey	17	19	36	11	13	24	na	na	na
Total complete samples		**86**	**94**	**180**	**56**	**64**	**120**	**30**	**30**	**60**

Source: BDLINK's fieldwork between July 3rd and 28th, 2023

In addition, the distribution of consumer samples was separated by gender (48% male and 52% female) and age (between 18 and 50 years old), as these variables influence buying attitude and, consequently, environmentally friendly purchasing behaviors. We also took into account respondent's occupation, and we incorporated this into the survey questionnaire (such as employees, self-employed, housewife/cook – current use, university students – future use etc.

3.2. Cronbach's Alpha validity

To ensure internal consistency of the data on each component of the KAP, it is important to perform the Cronbach's alpha test.[9] This test is performed for all variables that link to knowledge, attitude, and practices on the consumer's behaviors of the chain restaurant group, food retailer, food delivery service, and consumers. If it is found that the overall value of the test is above 0.7, we confirm and conclude that there is no violation or any inconsistency of the data; therefore, the data is reliable and can provide robust findings (See Section 6).

3.3. Quality control

During the fieldwork implementation, enumerators worked with a list of contacts of businesses and consumers (numbers/characteristics) for the interview to ensure that the target samples were reached. The fieldwork included quality control and validation questions by the supervisor before the questionnaire reached the entry stage into the system.

The fieldwork team structure was rigorous and ensured that we were able to control quality in the field. Below we provide the interview and quality control measures:

Box 1: Quantitative approach, process, and its quality control

Quality control procedure for online platform-based interview:

- Enumerators are required to do a double-check of the completed questionnaire (Kobo toolbox form) to ensure all questions are answered before leaving the respondent and filled in properly.
- Necessary information from the fieldwork is noted.
- Enumerators must ensure that there are no blank pages in the questionnaire (Kobo toolbox application) before submitting it; otherwise, the fieldwork supervisor will require a re-interview in person or by phone.
- Field supervisors utilize the logging enumerator behavior (LEB) system to check and validate forms. With such a viable system and quality control technique offered by the Kobo toolbox, supervisors navigate the form, duration, and the position of enumerators during the interview.

[9] https://hosted.jalt.org/test/PDF/Brown13.pdf

- The LEB system provides individual forms of auditing reports based on the changes in the form made by enumerators and field supervisors.
- Although the LEB system offers advantages, supervisors also validate interviews by randomly selecting forms for quality control. Also, field supervisors did field spot checks and field back checks.
- The database manager checked and validated every observation (respondents) again in the office and crosschecked with enumerators individually, ensuring that a high level of accuracy and survey quality is achieved. If there were cases that require a re-check, the enumerator made a phone call to the respondents to verify the questions and later validate them with their supervisors.
- The database manager reviewed all completed survey questionnaires and validated the good quality survey before proceeding to data cleaning and synthesis in the next phase.

Box 2: Qualitative approach, process, its quality control

✔ *Approach respondents and conduct interview*

A draft data collection guide was developed for field-testing, all materials were prepared before and after data collection, and ensuring that researchers going into the field understand all forms and procedures used for data collection and management.

The Fieldwork was carried out as soon as possible by the research team following the targeted areas. There were some different stages of the implementation such as approach and setup, getting consent, setting ground rules that set the appropriate tone for the discussion to follow, conducting a discussion or interview, and participating in a debrief following a discussion or interview

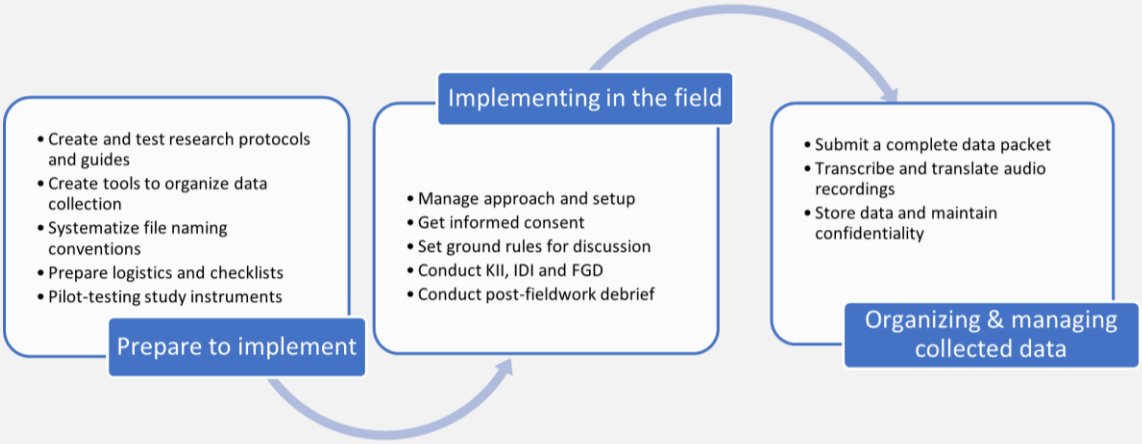
✔ *Double check completed questionnaire*

✔ *Supervisor check and validate questionnaire*

The field supervisor controlled the quality of transcribing to ensure the quality and accuracy of transcripts. The raw data collected by KII, IDI method, which is comprised of audio records, field notes, and transcripts was prepared and coded before submission to the data manager.

✔ *Apply quality control*

Summary of Data Collection Process for Qualitative Approach



3.4. Ethical Procedures

In this context of the study, the ethical considerations were determined based on the agreement between the consultant team and the WWF research team for this project. The consultant team ensured that participation was entirely voluntary and based only on consent. On the one hand, the consultant team ensured that respondents were informed that their personal information were anonymized (encrypted into numbers and codes that cannot be decoded to expose their identities). Lastly, there were two versions of the questionnaires, a Khmer and an English version, to ensure the understanding of enumerators and the respondents and to ensure unbiased language.

3.4.1. Consumer survey

To ensure the appropriate, safe, and nondiscriminatory participation of all stakeholders in this study, as well as the consideration of the needs of women and children, and other vulnerable groups, the following procedures were used:

1. Informed Consent: Obtained informed consent from respondents clearly explained the purpose of the research and any potential risks or benefits.
2. Random Selection and Voluntary Participation: Ensured that participation in the research was voluntary and randomly selected, and participant had the right to withdraw at any point without repercussions.

3. Confidentiality and Anonymity: Maintained strict confidentiality and anonymity by removing identifying information or using pseudonyms to protect the children or young people's privacy.
4. Risk Assessment: Performed a comprehensive risk assessment to anticipate potential risks to the child's welfare and implement measures to minimize or eliminate them.
5. Research Design: Ensured that the research design was age-appropriate, e.g., using language and activities that are easy to understand.
6. Consent to record: Explicitly seek consent from participants to record audio, video, or images during the research and inform them of how these recordings will be used.
7. Data Management: Stored all data securely, limited access to authorized personnel, and only used it for the purpose of the research.

3.4.2. Key informant interview

For the key informant interview, we conducted interviews with chain restaurant groups, food retailers, and food delivery service providers. It was essential to highlight procedures in conducting the key informant interview:

1. Preparation: Since we had already identified the KIIs, it was important to schedule a convenient time for the interview. Meanwhile, it was also crucial to clearly explain the purpose of the project and participants were comfortable and understood what was expected of them. The interview took place in a private space where there were no distractions.
2. Open-Ended Questions: We encouraged key informants to express themselves freely by using open-ended questions and allowed them to share their views, opinions, and experiences related to the project.
3. Follow-Up and Clarification Questions: We maximized the opportunity for the interview to acquire all important aspect for the baseline study. In specific cases, we gave them a call to encourage elaboration on a point, clarify ambiguous responses, or explored the topic more deeply.
4. Confidentiality: Finally, the KIIs were informed that their privacy and confidentiality were protected in case they had any concerns about the interview process or the information they have shared.

4. Limitations of the study

Although the study, to some extent, provides evidence of knowledge on sustainable consumption and climate change among Cambodian citizen and businesses. It is important to highlight several shortcomings of the study.

- It appears from the answers that consumers are aware of sustainable green consumption but they know less about sustainable products. There was no time to check (as the survey was already long) with respondents what products they know to be sustainable or green, or whether they were actually buying those as a matter of principle. Nor were we able to identify how large the percentage of sustainable products is that consumers bought, as compared to their 'non sustainable products'.
- We were not able to check what people understood as being sustainable/green consumption.
- It is possible that some respondents have given socially desirable answers, given the topic of sustainability/green consumption. People might have answered in a way they think was favorable to the interviewers. Responses for different questions have been triangulated to identify this potential, but it was not observed.
- Perception around agricultural practices in neighboring countries were not studied and hence it is not known how much those perceptions impact on buying locally.

5. Findings

5.1. Respondent's Characteristics

This section comprises of figures and tables relating to the characteristics of respondents of the consumer sample. It includes data on gender, sex, age, level of education, occupation, and household income and expenditure.

Figure 1: Respondents by gender

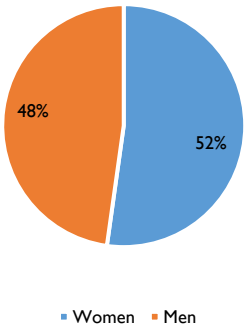


Figure 2: Age distribution

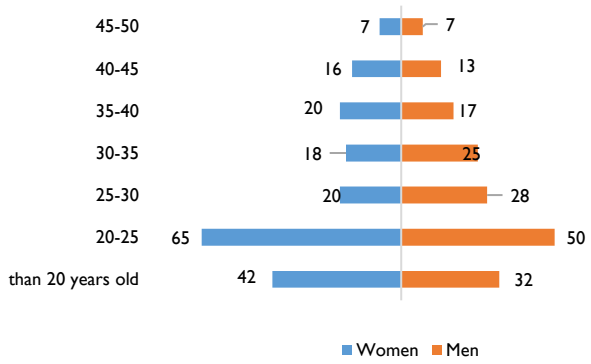


Figure 3: Education level

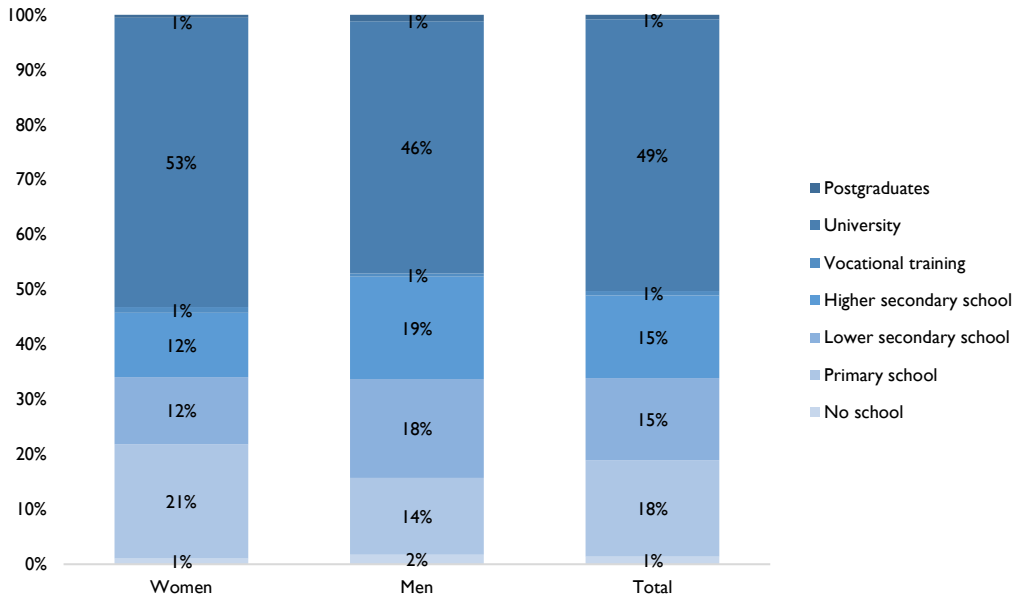


Figure 4: Occupation

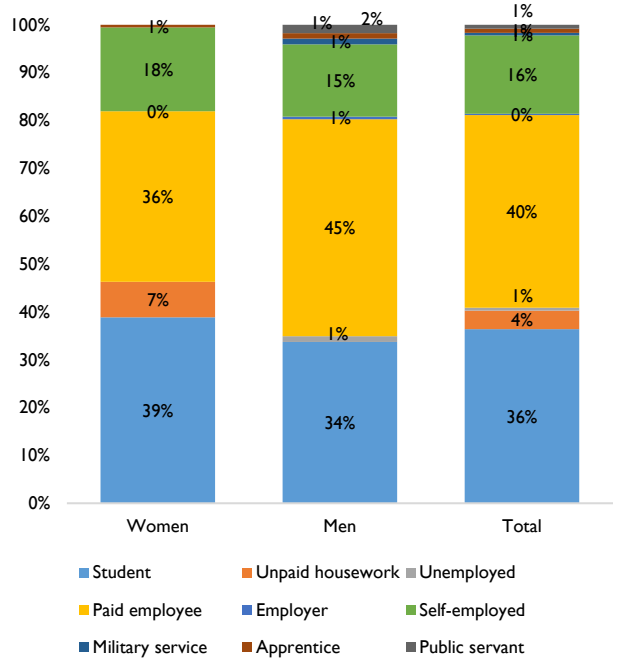
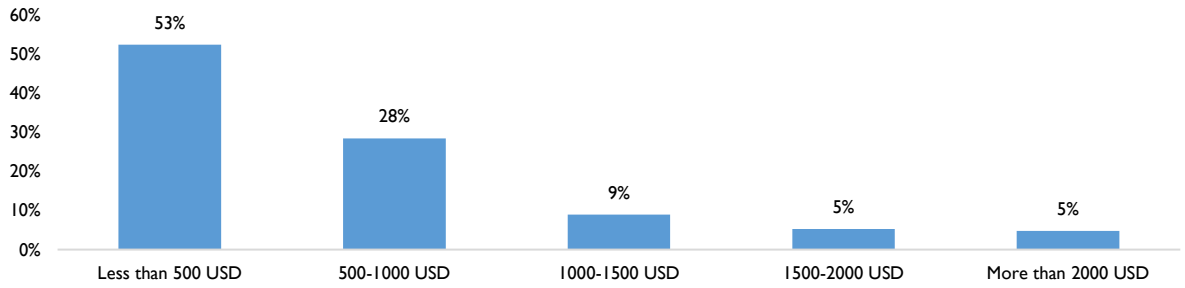


Figure 5: Occupation categories

Figure 6: Household income



5.2. Consumer's knowledge and perception of sustainable consumption and impacts of food on the environment

According to the survey results, half of the respondents have heard the term "sustainable products or green products" before, while the other half have not (See Figure 7: Q1). The majority of those who have heard about sustainable products learned the term from social media (74%), followed by school (29% of total respondents) (See Figure 8: Q2).

When asked if the respondents had received any specific education and training on the environment and sustainability, only 37% of the total respondents responded "Yes" (see Figure 9: Q3. Most of them are individuals belonging to the vocational training category (33%), the university category (57%), and the postgraduate category (33%).

Figure 7: Q1. Hearing the term "sustainable products/green products"

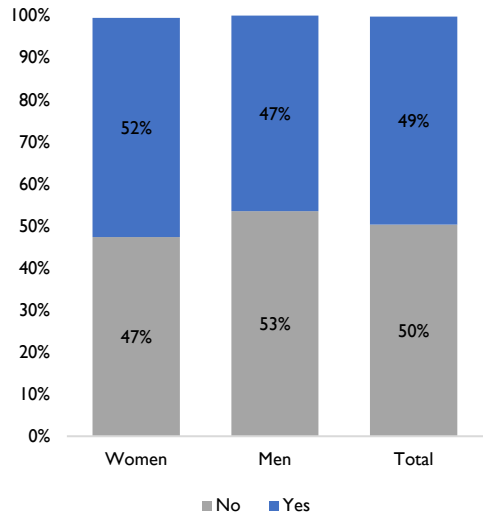


Figure 8: Q2. Where the respondents have heard "sustainable products/green products".

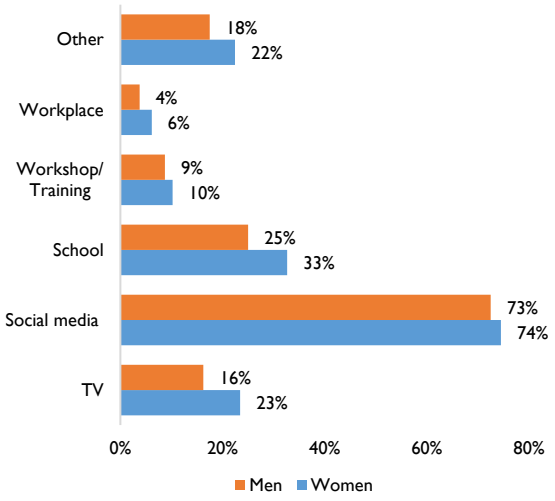
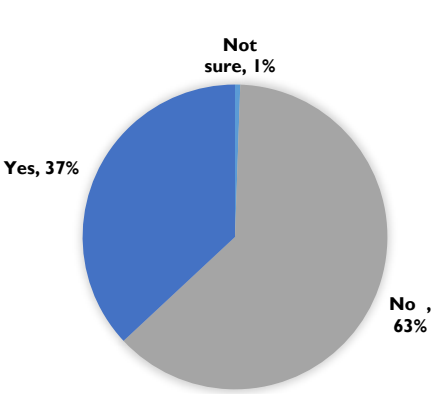
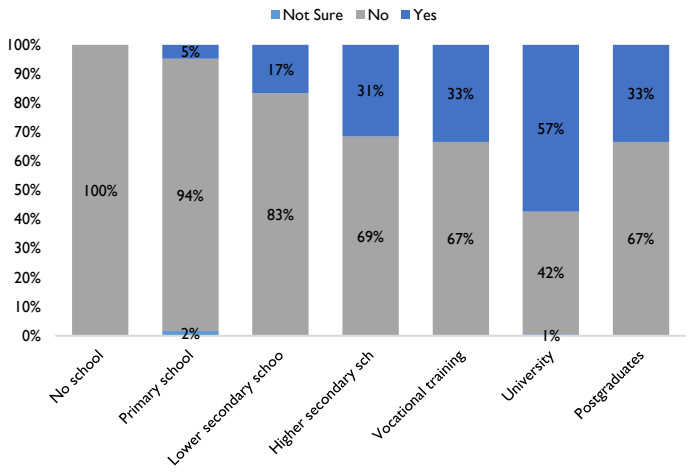


Figure 9: Q3. Education or training related to environmental and sustainable education





The respondents were asked if they had heard about the term "sustainable consumption/green consumption". Surprisingly, 70% of the total respondents report that they have heard this term before. Most of these respondents (60%) belong to the University education level category (see Figure 10: Q4). Social media is by far the most popular platform that the respondents have learnt about sustainable or green consumption, accounting for 67% of all the platforms (see Figure 11: Q5).

Figure 10: Q4. Hearing the term "sustainable consumption/green consumption"

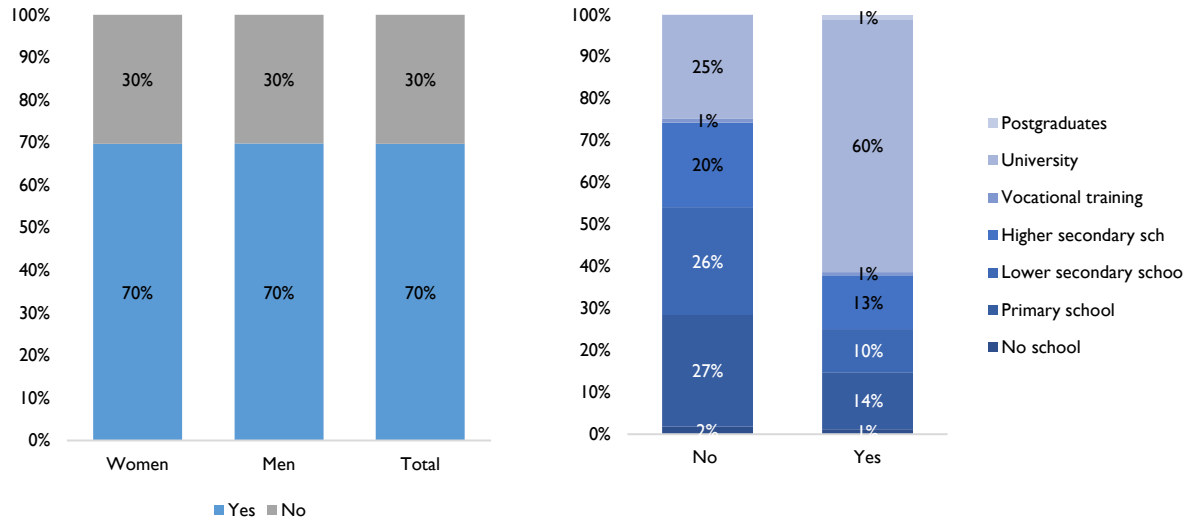


Figure 11: Q5. Where the respondents have heard "sustainable consumption/green consumption" from.

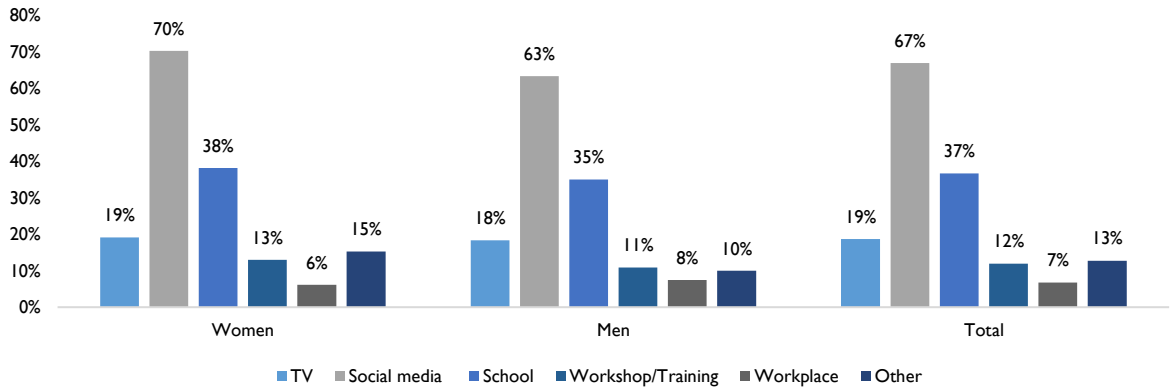


Figure 12 (Q7) indicates the level of respondents' awareness about the impact of the products they use on the environment. The finding shows that only 13% of the respondents are fully aware of the impact, and 37% of the respondents are familiar with the most significant impact. In comparison, 49% know little about the products' adverse environmental impact. Remarkably, when asked if they were concerned about climate change or environmental degradation, 52% of respondents expressed that they were very concerned, while 33% claimed that they were somehow concerned about it (see

Figure 13: Q8).

Figure 12: Q7. How much the respondents know about the environmental impact of the products they buy or use.

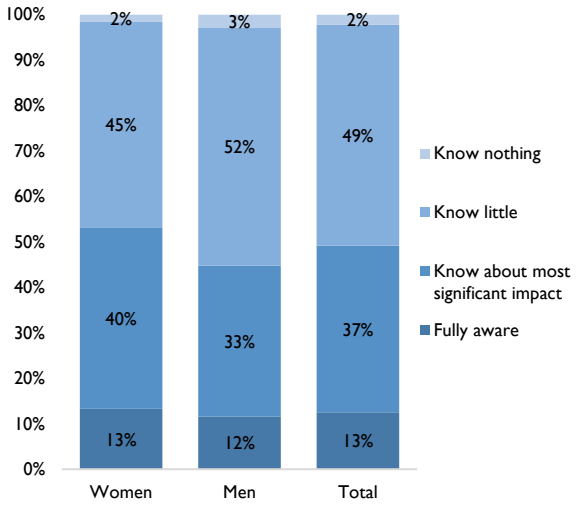
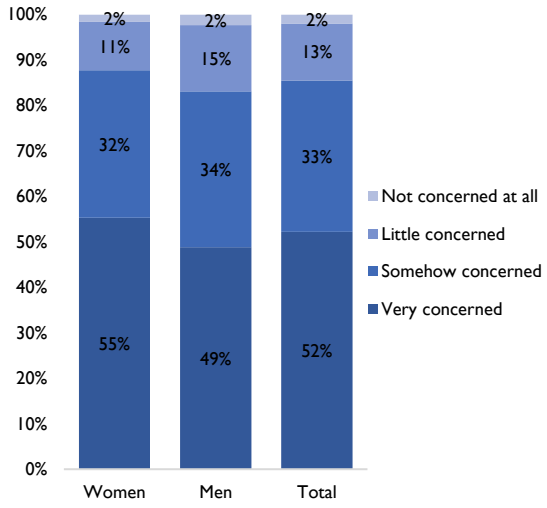
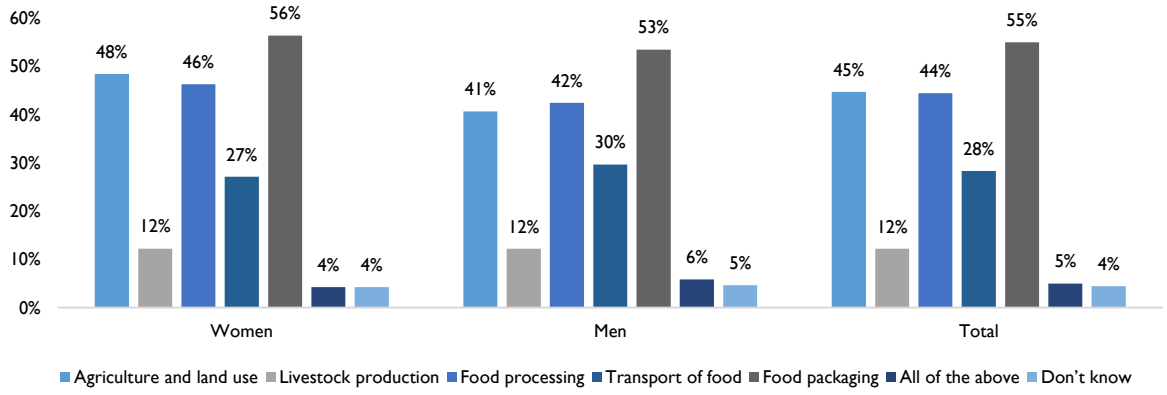


Figure 13: Q8. Respondents' concern about climate change or environmental degradation.



The vast majority of the respondents (84%) also reported knowing that their food consumption could impact the environment and climate change. They believe that some elements of food consumption, such as food packaging (55% of respondents), agriculture and land use (45% of respondents), food processing (44% of respondents), and transport of food (30% of respondents), have effects on the environment (see Figure 14: Q10).

Figure 14: Q10. Elements of food respondents think could most affect the environment.



When asked about the impact of their food choice on the environment, 28% of the respondents expressed that they strongly agree that their food choice has an adverse impact on the environment, 64% agree, and 8% disagree with the statement (see Figure 15: Q11). A similar question was also asked about the impact of food waste on the environment. Surprisingly, 55% of the respondents strongly agree, 41% agree, and only

4% do not agree with the statement (see Figure 16: Q12). Meanwhile, nearly all the respondents (89%) state that they strongly agree that their consumption activities, including the purchase and use of food, clothing, housing, etc., have an impact on the environment (see Figure 17: Q13). Moreover, most respondents (70%) strongly agree, and the other 29% agree that plastic waste from food packaging could affect the environment and climate change (see figure 18: Q14).

Figure 15: Q11. Food choice could affect the environment.

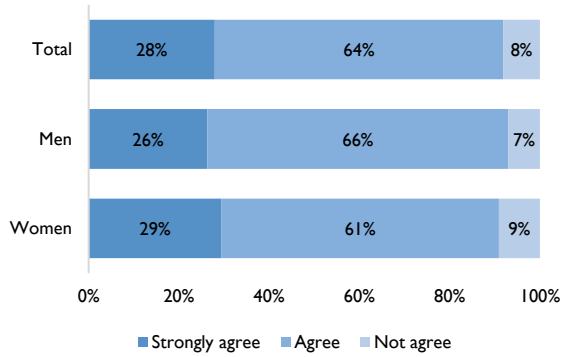


Figure 16: Q12. Food waste could have an adverse impact on the environment.

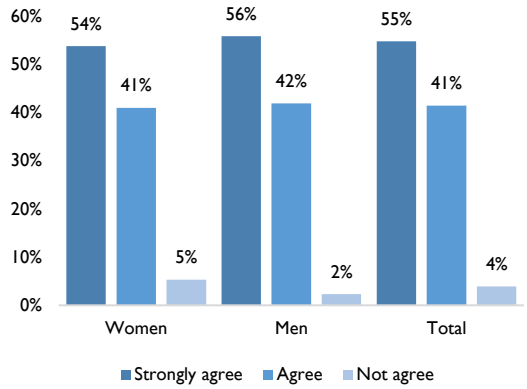


Figure 17: Q13. Impact of consumption activities on the environment.

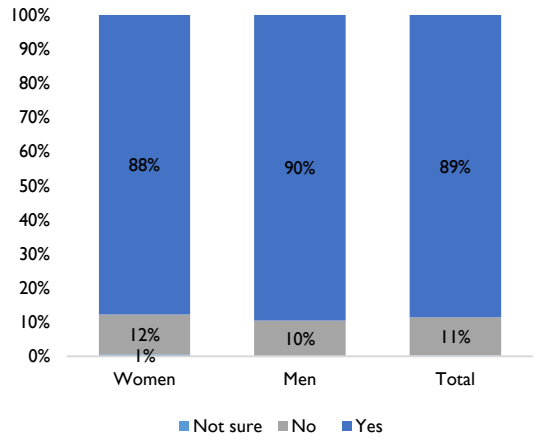
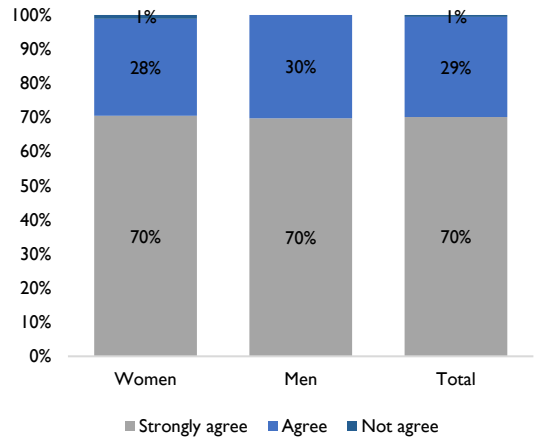


Figure 18: Q14. Plastic waste from food packaging could affect the environment and climate change.



According to the survey, 16% of respondents are fully aware of the impact of plastic bags on the environment, 45% are aware of the most significant impact, and 39% know little about the impact of plastic bags on the environment (see Figure 19: Q15). Meanwhile, 57% of the respondents show their big concern about the plastic bags' impact on the

environment, 33% are somehow concerned about it, while 9% demonstrate little concern (see Figure 20: Q16).

Figure 19: Q15. Awareness of the adverse impact of plastic bags on the environment.

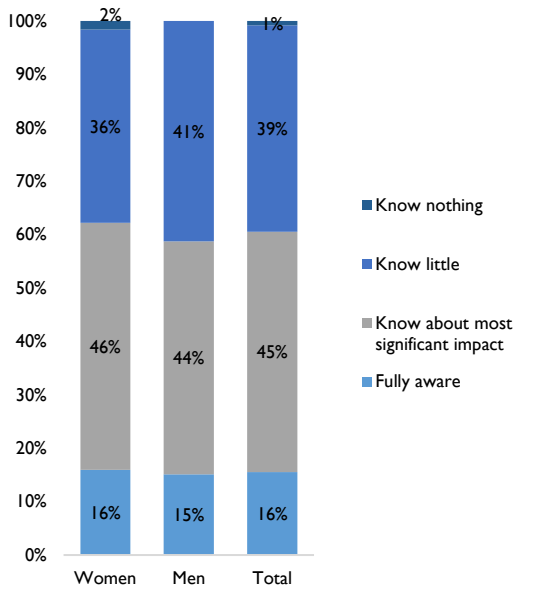
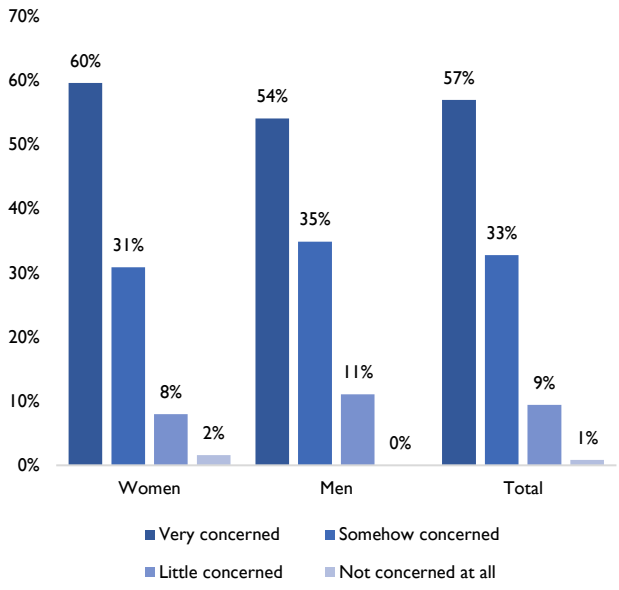
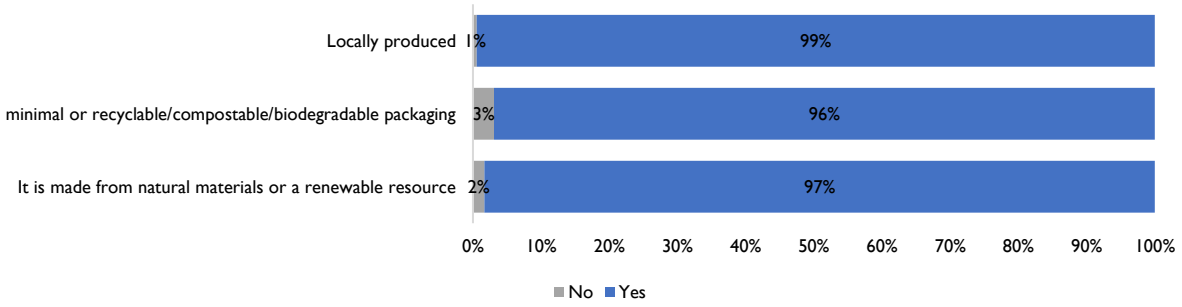


Figure 20: Q16 Respondents' concern about the impact of plastic bags on the environment.



The respondents were also asked about their perception of products they were considering purchasing. Three main options were given to the respondents if they would consider purchasing the products: 1) if they are made from natural materials or a renewable resource; 2) if they use minimal or recyclable, compostable, or biodegradable packaging; and 3) if they are locally produced. The finding reveals that almost all respondents would purchase a product if the three options applied to it (see Figure 21 Q17–19).

Figure 21: Q17-19. The alternatives the respondents think make a product 'sustainable' AND which are very important when considering a purchase.



5.3. Consumer's attitude and practice regarding food consumption and plastic use

This section evaluates the individuals' attitudes and practices regarding food consumption and plastic use.

5.3.1. Consumer's attitude and practice regarding food consumption

The respondents were asked if they always think about the impact of food on the environment when they purchase it. Surprisingly, when we asked "Q20. whether they think about its impacts on environment when it comes to purchasing foods?", the finding shows that almost all the respondents strongly agree and agree, accounting for 35% and 56%, respectively. Only 9% of the respondents do not think about the impact of their food on the environment when they buy it. These individuals indicated that they never know that food consumption would have an impact on the environment. Most of the individuals who respond, "Strongly agree" and "Agree" belong to the University education level category, accounting for 49% of the total respondents.

We asked respondents the reason why they avoid wasting food, and 38% of respondents mentioned that they do not have much money and need to use all the food, while 20% of respondents said they just do not buy too much food, so there is no waste and 30% of respondents mentioned that they always think about the environment.

Figure 22: Q24. I avoid food that has been transported from far away, because of the 'food miles' (transport CO2 emissions)

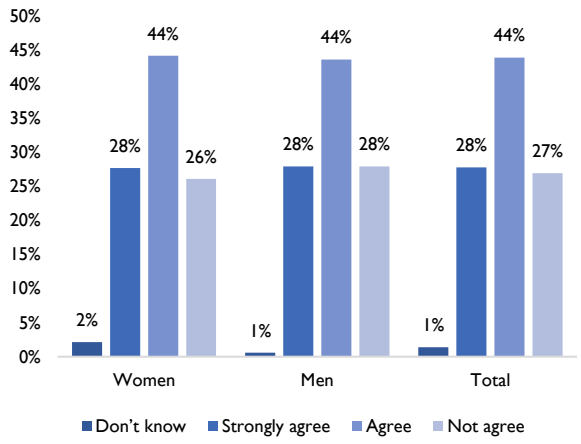
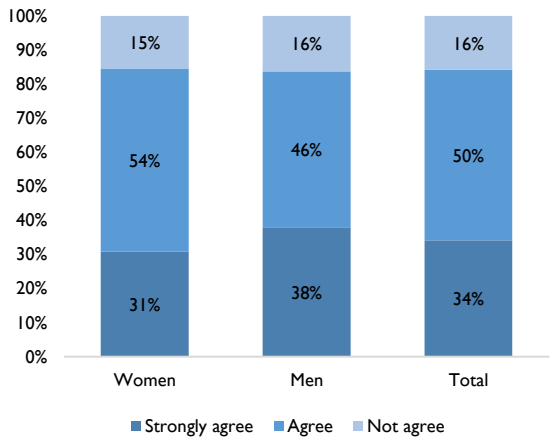


Figure 23: Q25. I always buy locally produced food as it has less impact on the environment due to transport.

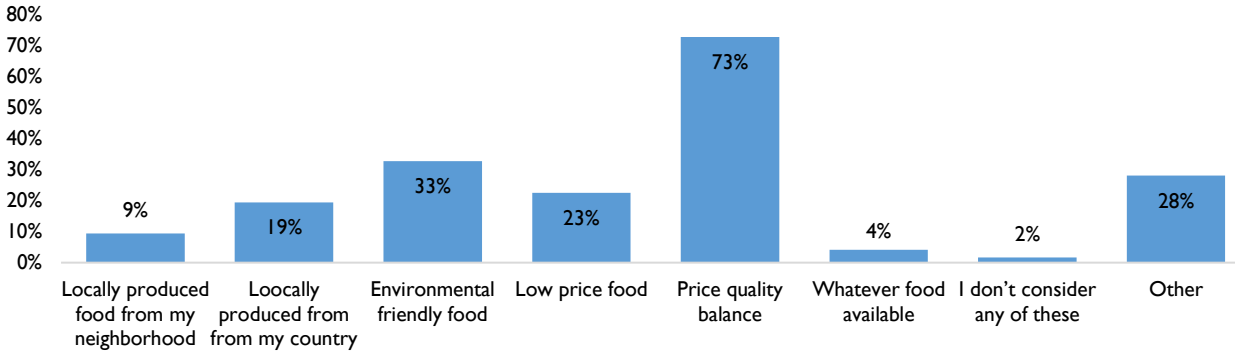


When asked whether they avoid food that has been transported from far away because of the "food miles" (transport CO2 emissions), a high proportion (72%) of respondents agree (44%) and strongly agree (28%) (See Figure 22: Q24). Likewise, the proportion of individuals who generally agree and strongly agree with the statement "I always buy

locally produced food as it has less impact on the environment due to transport" is significantly high (84%) (See Figure 23: Q25).

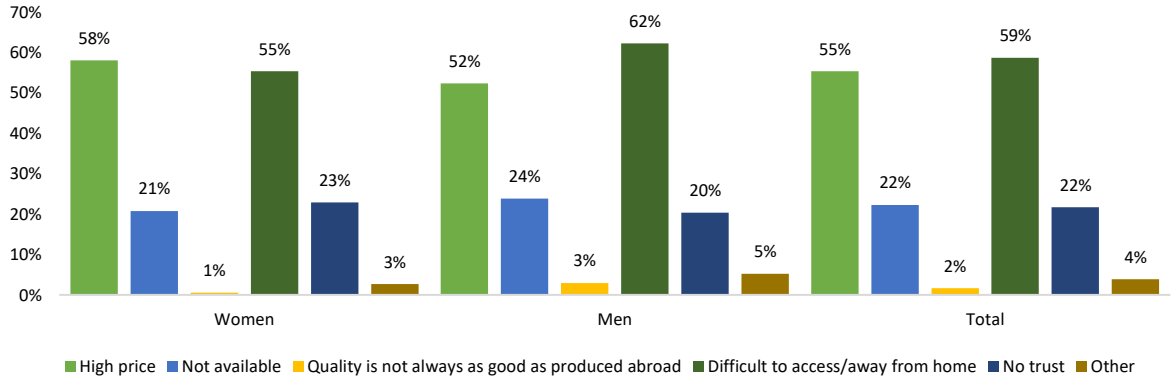
When asked about what they consider when buying food, the survey finds that the majority of respondents (73%) always consider price-quality balance, while only 33% consider buying environmentally friendly food. Notably, 28% of the individuals choosing "Other" said that they are more concerned about their health and sanitation when buying food (see Figure 24: Q26). The most significant proportion of the 33% are individuals belonging to the University education level category.

Figure 24: Q26. When buying food, I always consider:



The respondents were also asked to express their opinion why they would not purchase environmentally friendly or organic food. The finding reveals that difficulty in accessing food (59%) and high price (55%) are two main reasons that the respondents decide not to buy environmentally friendly or organic food (see Figure 25: Q27). However, when asked "Q28. if price, quality, and availability were the same, would you choose environmentally friendly or organic food?", nearly all the respondents (98%) would choose to buy organic food if the price, quality, and availability of the food were the same.

Figure 25: Q27. The reasons for not buying environmentally friendly or organic food.

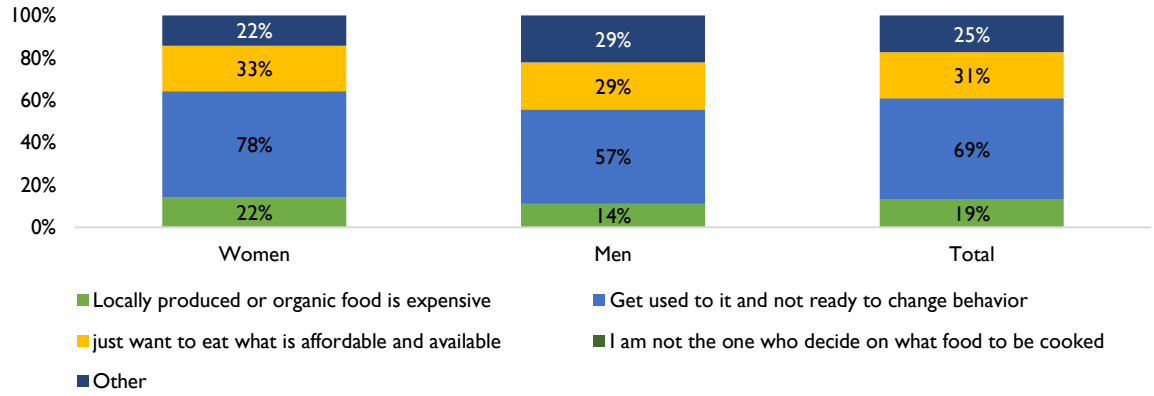


When asked about general practices and behaviors on the food labeling of the product when purchasing, more than half of the respondents (61%) claim that they do not care and they do not read it, while 29% sometimes look for it. Respondents were also asked "Q29. when buying packed food, do you look at the food labeling and what it says about the environment and climate change?". The result shows that only 10% of the respondents always look for food labeling when they buy products.

The majority of the respondents agree (34%) and strongly agree (62%) that they would change their behavior if they knew that a specific food had a negative impact on the environment. Of the 96% of the respondents who agree to change their behavior, 60% will choose to buy organic food if the price is a bit higher than non-organic food, and 54% will choose to eat less. Of the small proportion who disagree with changing their behavior, most of them (69%) get used to what they are practicing and are not ready to change it, and 31% want to eat what is affordable and available, while 19% think that the locally produced food is expensive.

Figure 26: Q31. How the respondents would change their behaviour regarding buying/eating food.

Figure 27: Q32. The reasons that the respondents would not change their behaviour regarding buying/eating food.



5.3.2. Consumers' attitude and practice regarding the use of plastic bags

The general practices and attitudes of consumers toward using plastic bags for food consumption are measured using questions Q33 to Q45. The first assessment was to ask if the respondents are always cautious with the packaging of the food they buy. Remarkably, the finding uncovers that nearly every individual who responds agrees (47%) or strongly agrees (47%) with the statement. Many of these respondents belong to the University education level category, accounting for 48% of all respondents (Q33).

Concerning the use of plastic bags from grocery stores and restaurants, 46% of the respondents always use them, and 54% use them sometimes (Q34). Though, when they were asked about their opinion on whether they would consider switching from plastic bags to bringing their own reusable bags, surprisingly, 96% of the respondents responded "Yes" (Q35).

The respondents were asked for the reasons why they decided to use plastic bags for their groceries and food. Among other reasons, being easy to use is the first reason (65%) the respondents use plastic bags, while the availability of plastic bags and other reasons are the second and third reasons, accounting for 35% and 30%, respectively (Q37). Nevertheless, when asked whether they would change their behavior if they knew about the impact of plastic bags on the environment, the greatest number of respondents agreed (68%) and strongly agreed (28%) to change their behavior (Q38). Using reusable bags is the first option that consumers will choose to replace plastic bags, which accounts for 65%, and reducing plastic bags when not necessary is by far the second option (36%) that consumers will use (Q39).

Figure 28: Q37. The reasons for using plastic bags from the store.

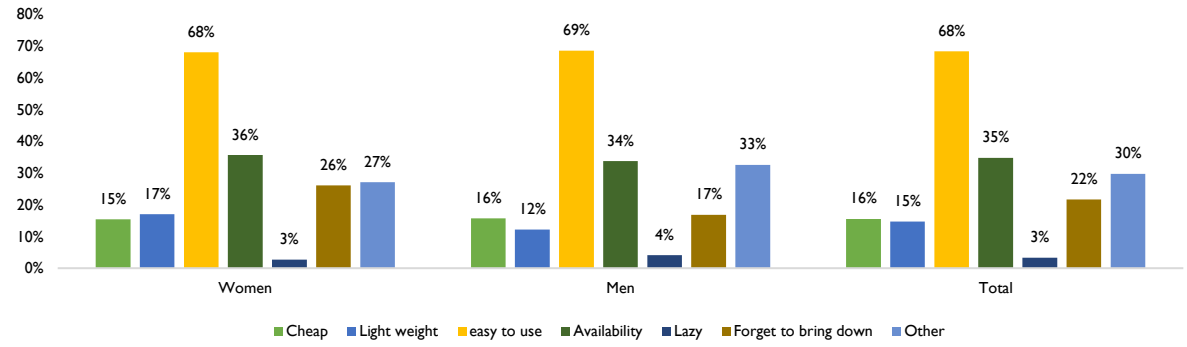
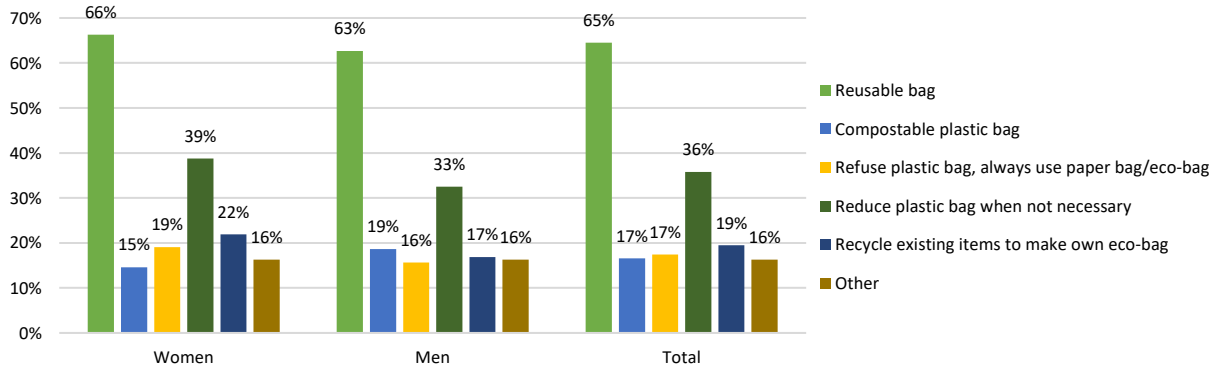


Figure 29: Q39. How the respondents would change their behaviour regarding the use of plastic bags.



Questions 41-45 asked about the consumers' opinion on different sustainable options and what they would choose. This question would have been better if the option both had not been added.

- Recycling or composting waste – 10% of the respondents choose to save money, 8% choose to be more sustainable, and 82% choose both.
- Limiting the use of single-use plastic bags – 21% of the respondents choose to be more sustainable, 8% choose to save money, and 70% choose for both.
- Buying more locally produced food – 18% of the respondents choose to save money, 9% choose to be more sustainable, and 73% choose both.
- Choosing food/drink that has environmentally sustainable practices – 14% of the respondents choose to be more sustainable, 10% choose to save money, and 75% choose both.
- Reducing consumption of meat or animal products – 29% of the respondents choose to save money, 12% choose to be more sustainable, and 58% choose both.

5.4. Policy and practices of restaurant chains and food retailers on food packaging and waste management

This section presents the key findings of restaurant chains' and food retailers' policies and practices on sustainable products and services, food packaging, and waste management. Key informant interviews (KII) were conducted with six restaurant chains and twelve food retailers in Phnom Penh.

5.4.1. Policy and practices of restaurant chains on sustainable products/services, food packaging, and waste management

During the study, our team conducted KII with six well-known restaurant chains in Phnom Penh. The study indicates that these are committed to offering plastic-free materials when viewed in the context of their policies on environmentally friendly goods and services. Two restaurants (Eleven One Kitchen and Java Creative Café) have a clear policy against using plastic to serve customers' food. Even bringing plastic bags to work is prohibited for employees. As one of the restaurant owners stated:

"*NO Plastics becomes one of our business visions. We always raise plastic-related issues and reasons for not using plastics at the restaurant in our staff meetings and training the new staff. We used to hire a foreign trainer to present the staff with the impact of plastic use. The staff will be fined $5 if they bring plastic bags into the restaurant.*"

He also added that he encouraged his suppliers to replace plastic with non-plastic materials for packaging.

One restaurant representative also stated that "*In our restaurant, we also apply non-plastic material rules. Our food/ingredients are homemade and can be kept for only two-three days only. We made little but often. Our goal is to serve healthy food to our customers*."

"*I decided to use these materials because I was involved in improving the environment because of the current deterioration of the environment. I try to make it somewhat positive for the future of the younger generation*".

These restaurants serve their customers with non-plastic materials such as glasses, paper cups, plates, and so on. Although the other three restaurants lack a clear plastic policy, they also demonstrate their commitment to not using plastic materials such as food packaging and plastic straws, particularly for food packaging.

In terms of organic ingredients and inputs, not all restaurants employ organic inputs, such as meat and vegetables, for their dishes. There are two main reasons why they do not use organic ingredients and inputs for their food. First, restaurants are most concerned about the food quality and are less concerned whether the food is organic food (good food, delicious food, and so on). They are less concerned about whether or not the ingredients they use are organic.. Second, organic inputs are scarce and expensive in markets. One of the restaurant representatives mentioned:

"*We require local suppliers to produce vegetables and meat to meet our standard and supply it consistently. However, we do not require that all products are organic. We haven't set this standard yet*."

Another restaurant owner also said that he only bought meat and vegetables available at public markets without thinking about being organic.

When asked about food packaging, every restaurant stated that they do not use plastic bags for takeaway food. In the package, they all use paper bags and bamboo spoons and forks. They all agreed, however, that paper bags are more expensive than plastic bags and must be stored properly. One restaurant representative noted:

"*The cost of using paper bags is very high. We are trying to reduce other expenses for this to move forward to using environmentally friendly packaging*."

The study additionally demonstrates that all restaurants store waste in their own bins or containers. Restaurants typically place all waste in bins for the CINTRI waste company to collect and transport to the dump site. When asked if they separated the waste for recycling or composting, they stated that they only separated it into solid waste and cans or plastic bottles. These cans and plastic bottles can be returned to the suppliers in exchange for rewards. Only one restaurant donates leftover bread to a children's organization, which comes to the shop every day to collect it. One of the difficulties facing restaurants in doing this is a lack of knowledge about waste management and encouragement to separate the waste. According to a restaurant representative, there is no advantage to doing such a thing, and personnel skilled in waste management are needed to carry it out.

5.4.2. Practices of food retailers on sustainable products/services, food packaging, and waste management

The research team carried out KII with twelve food retailers in Phnom Penh. Customers can get breakfast, lunch, and dinner from these restaurants. When asked about the impact of plastic and food waste on the environment, they are all aware of the issues caused by plastic and food waste. Most of them learned it through social media, with a few others learning through TV, education, and community. The vast majority of them are aware that plastic clogs the city's drainage system and contributes to global warming.

In contrast to restaurant chains, most food retailers in Phnom Penh do not prioritize sustainable methods of delivering food to customers. Plastic bags, plastic boxes, plastic cups, plastic spoons and forks, and Styrofoam are commonly used by these food retailers

to serve and pack food for their customers. 11 out of 12 respondents revealed that they use three types of food packaging materials: Styrofoam boxes, plastic bags, and plastic cups. Each respondent generated 1.5 kg of plastic waste per day, consisting of 0.3 kg of Styrofoam boxes, 0.7 kg of plastic bags, and 0.3 kg of plastic cups.

According to food retailers, there are three main reasons why they do not serve and pack their food with environmentally friendly materials. The first and most important reason is that the cost of environmentally friendly materials is too high for them to afford. Second, environmentally friendly material suppliers are limited, and third, customers never request better materials for their food. This could reflect the neglect and/or awareness of the consumers on the plastic's adverse impact on the environment.

In terms of food waste, the study's findings show that most retailers dispose of food waste in a trash bin or a bag for collection by a garbage truck. The average amount of food waste generated after eating was estimated to be 7 kg per day, while the average amount of food scraps and other packaging material generated per retailer was estimated to be 5 kg per day.

6. Estimating Knowledge, Attitude, and Practice score

This section seeks to provide a more in-depth understanding of how KAP relates to a variety of respondent characteristics. Doing so requires to perform the Cronbach validity test, constructing the KAP score, and examine the correlation coefficients between KAP and variable of interest. Prior to constructing the KAP score, it is necessary to ensure the data's validity and consistency. We employed the Crunch Bach alpha test on 27 questions from the survey, which were divided into three major components: Knowledge, Attitude, and Practice (See Appendix for Questions used to construct KAP score).

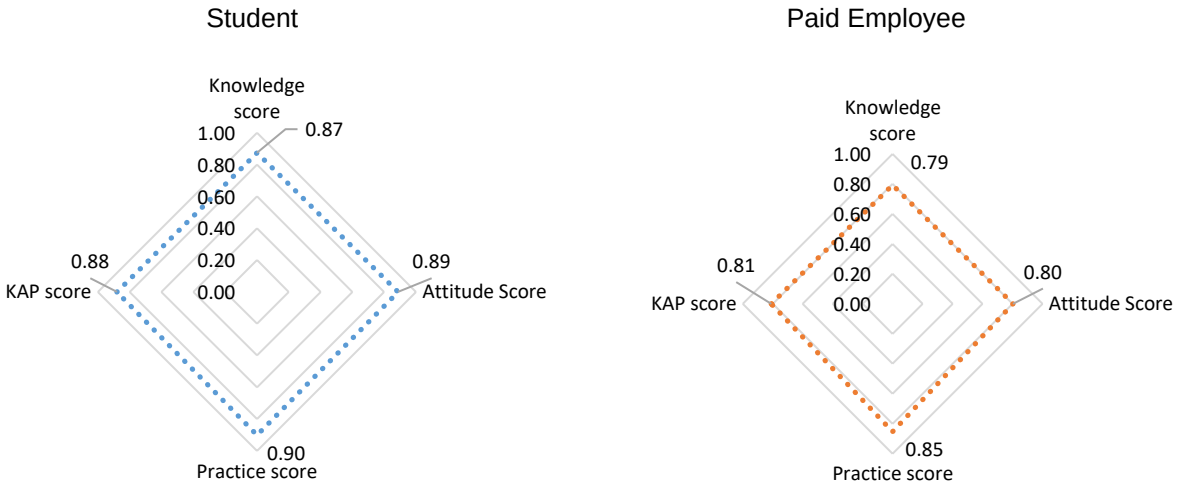
The coefficient of the Crunch Bach alpha test is 0.75, which is an acceptable level, indicating that there is no data violation or inconsistency. In addition, the coefficient values used to calculate the consumer's knowledge score suggest an acceptable value of 0.71. Although the validity of the Attitude (0.51) and Practice (0.53) coefficients is questionable due to the fact that fewer than 10 questions were used, this should not affect our conclusion regarding data consistency, as the overall value of the coefficient is already satisfactory.

Table 3: Cronbach Alphas validity test

KAP Questions	Average inter-item correlation	Number of times in the scale	Reliability coefficient
Knowledge	0.1510	14	0.7134
Attitude	0.1162	8	0.5126
Practice	0.1853	5	0.5320
Overall	**0.1025**	**27**	**0.7551**

To delve deeper into the understanding of sustainable consumption among different groups such as students, employees, self-employed individuals, and genders, we devised the KAP score, which highlights the key knowledge, attitude, and practice components that shed light on sustainable consumption efforts. In addition, the findings emphasize the significance of continuous education and awareness in promoting sustainable practices among different categories of individuals.

Figure 30: Knowledge, attitude, practice, and overall score for students and paid employees



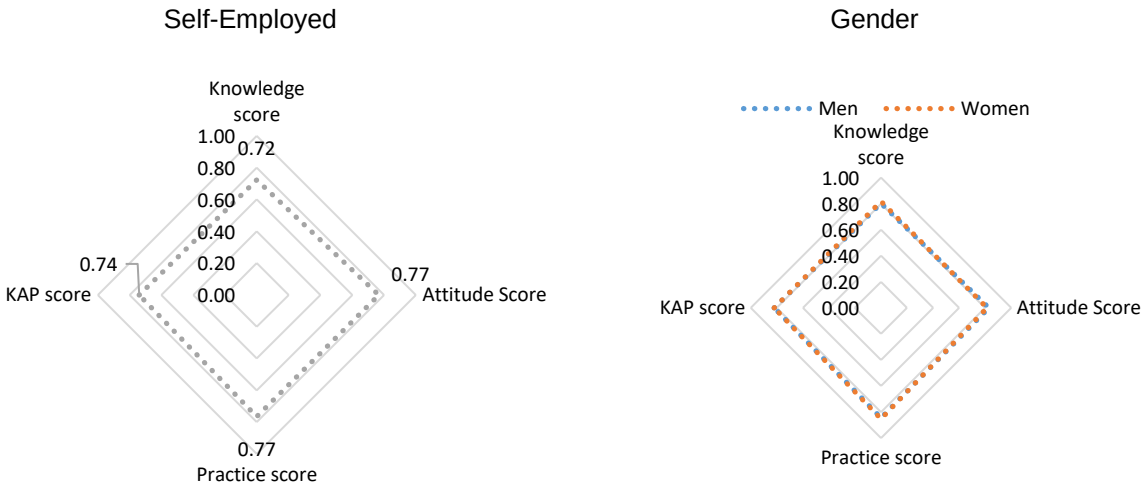
Given the score range between 0 (lowest) to 1 (highest), the student group depicts a high level of knowledge score (0.87) and a positive attitude score (0.89) regarding sustainable and environmentally responsible consumption. In addition, their practice score of 0.90 demonstrates their ability to incorporate sustainable practices into their daily lives. These results indicate that students have a solid understanding of the principles of sustainable living and are actively incorporating them into their actions and decisions. In addition, this indicates that students have a solid understanding of sustainable practices and exhibit positive daily behaviors. The students' high overall KAP score (0.88) shows their commitment to sustainable living.

Compared to students, employees have slightly lower KAP scores than students, with scores of 0.79 for knowledge, 0.80 for attitude, and 0.85 for practice. The overall KAP score for employees, however, is still relatively high at 0.81. These results indicate that employees have a reasonable understanding of sustainable consumption and environmentally friendly products, a positive attitude toward sustainability, and an active commitment to sustainable practices. Although there is room for improvement, employees can serve as change agents in their workplaces by promoting sustainable practices and influencing coworkers.

In contrast, self-employed individuals have lower KAP scores than employees and students. Their overall KAP score is 0.74, with scores of 0.72 for knowledge, 0.77 for attitude, and 0.77 for practice. These results indicate that self-employed individuals have a lower level of sustainable consumption and production knowledge and slightly less positive attitudes. However, their practice score indicates a relatively high level of

sustainable practice implementation. It is essential to provide educational opportunities, training, and resources to self-employed individuals in order to increase their knowledge and attitude toward sustainability and reduce their negative impact on the environment.

Figure 31: Knowledge, attitude, practice, and overall score



When comparing men and women, both groups demonstrate comparable levels of knowledge, with men scoring 0.80 and women scoring 0.82. Men score 0.83 on the attitude scale, while women score 0.81, indicating that both genders have a positive disposition toward sustainable consumption and behavior. The practice scores for men (0.84) and women (0.85) are also relatively high, indicating that both groups engage in environmentally responsible behavior. The overall KAP scores for men (0.82 points) and women (0.82 points) are comparable, indicating that both genders are committed to sustainable consumption and environmental friendly behavior.

Figure 32: Knowledge, attitude, practice, and overall KAP score

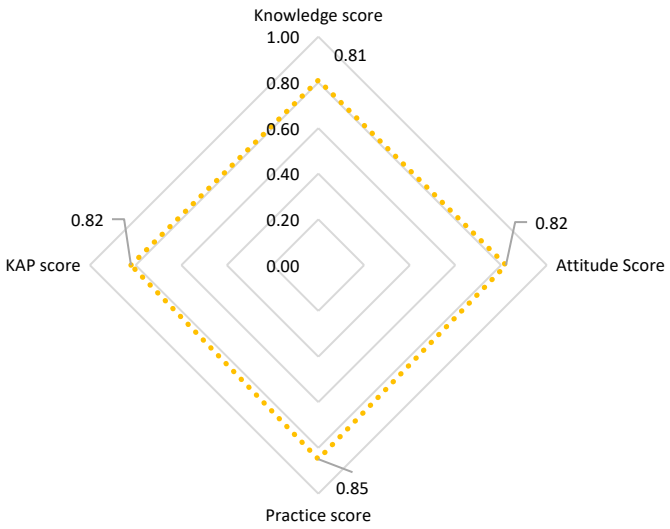


Table 4: Pearson correlation coefficient

	Knowledge	Attitude	Practice	Overall KAP score
Gender (1= Men; 0=Women)	-0.0531	0.0357	-0.0176	-0.0168
Age	**-0.3096***	**-0.2064***	**-0.2345***	**-0.3322***
Household income	0.0316	-0.0077	-0.0521	-0.0248
Household expense	0.0564	-0.0252	-0.0318	-0.0126
Student	**0.3321***	**0.2557***	**0.1750***	**0.3302***
Paid employee	-0.097	-0.0779	0.014	-0.0618
Self-employed	**-0.2608***	**-0.1226***	**-0.1656***	**-0.2433***
Primary Education	**-0.2894***	**-0.2373***	**-0.1361***	**-0.2903***
Lower secondary education	-0.1977*	-0.0683	-0.0992	-0.1576*
High secondary education	-0.0857	-0.0285	0.011	-0.0361
University education	**0.4314***	**0.2469***	**0.2080***	**0.3807***

*Note: * means statistically significant at p-value <0.05.*

***Pearson correlation coefficient interpretation**: (+) positive, (-) negative. Strength of correlation: Low (Coefficient between 0.1-0.3); Moderate (Coefficient between 0.3-0.5); High (Coefficient between 0.5-1.0)*

In addition to KAP estimates for different groups of respondents, we also examined the correlation between variables of interest and knowledge, attitude, and practice and the

overall KAP score. Using the Pearson correlation coefficient, the results indicate that age, being a student, being self-employed, having a primary education, and having a university education are statistically associated with the KAP component at the 5% significance level. For example, the results suggest that there is a negative relationship between age and the KAP components, suggesting that older respondents tend to have less knowledge, attitude, and practice regarding sustainable consumption behavior. This negative association is also observed among self-employed people and those with a primary education. We found, however, that as an individual's level of education increases, there is a positive correlation between knowledge, attitude, and practice and a high KAP score overall. While there is room for improvement for some groups, it is important to recognize and support their efforts to promote sustainability, which vary by age, occupation, and education level.

7. Conclusion and recommendations

This study attempts to explore 1) determine consumers' general grocery shopping behavior, with special regard to sustainable options, 2) understand consumers' knowledge and perceptions of sustainable consumption and production through determining the current level of awareness and perceptions of food consumers in linkage to climate change and environmental degradation 3) identify and suggest ways and mechanisms that could trigger behavioral change among the targeted consumers, so that more sustainable products will be chosen/ purchased (mainly targeting urban consumers).

In order to understand consumer's perception on food consumption choices and environmental impacts, BDLINK (Cambodia) surveyed 360 respondents including university students, employees, and others in Phnom Penh using the Knowledge, Attitude, and Practices (KAP) survey model. In addition, BDLINK (Cambodia) also conducted interviews with 19 key business informants, including restaurant chains, food retailers, and food delivery services.

The study reveals that respondents are more knowledgeable about sustainable consumption and green consumption (70%) than about sustainable products/green products (49%). This knowledge is shared through social media, education, and TV, with social media being the largest knowledge sharing channel and where respondents learned about sustainable consumption. Concerns about climate change and environmental degradation were expressed by more than half of respondents (52%). Food consumption and environmental impact were also highly mentioned, which link to agriculture land use, food processing, and transport of food being the most significant topics. Plastic bags were also mentioned by most respondents that it has an adverse effect on the environment.

The perception on willingness to buy a sustainable alternative was found to be high, with respondents agreeing to buy products made from natural materials, using minimal or recyclable packaging, and locally produced. However, a sub question also showed that 38% of respondents do not have a lot of money to spend, and 20% of respondents buy just enough to not have to waste food, more or less equal between male and female respondents. Attitudes towards food miles were also high, with 72% of respondents avoiding food transported from far, resulting in a large percentage purchasing locally produced food (84% of respondents).

Attitudes towards food buying were also high, with 73% of respondents mentioning price quality balance and environmentally friendly food (33%) being the top considerations. However, many respondents find organic or environmentally friendly food difficult to

access, have high prices, or lack trust. Additionally, 61% of respondents do not care about food labeling, with only 29% occasionally reading it and only 10% looking at it.

The study found that 96% of respondents would change their behavior if they knew a specific food would have a negative impact on the environment. They would buy organic food even if the price is a bit higher than other food (60%), and 54% would eat less. A small proportion of respondents did not want to change their behavior because they are used to it and want to eat what is affordable and available. However, 19% of respondents think that locally produced food is expensive.

The study also found that 94% of respondents are cautious about food packaging, with 46% of respondents using a plastic store bag. However, almost all (98%) are willing to switch to bringing their own reusable bags.

At the business level, restaurants and restaurant chains have policies around not using plastic, but they do not serve customers with plastic materials for food packaging and straws. Some restaurants do not use organic food for their dishes, rather they focus on regular supply and meeting restaurant standards of quality. Restaurants also do not separate organic from inorganic food waste, as they agreed that there is a lack of knowledge around waste management and a lack of staff to carry it out.

Food retailers are aware of issues caused by plastic waste but do not prioritize plastic free food delivery. They still use plastic bags, plastic boxes, plastic cups, plastic spoons and forks, and Styrofoam for serving and packing food. The main reasons for not being plastic free are the high cost of environmentally friendly materials, limited supply, and no demand from customers for plastic-free food packaging or cutlery.

The KAP score is a crucial factor in understanding sustainable consumption behavior. Higher education levels correlate with higher knowledge, attitudes, and practices towards sustainable consumption. Students, employees, and self-employed respondents all have a positive attitude towards sustainable living and incorporating sustainable practices into daily lives. Both men and women score similar level of knowledge, attitude, and practices, and both are committed to environmentally friendly behavior. However, there is a negative relationship between age and KAP components, with older respondents having less knowledge, attitude, and practice regarding sustainable consumption behavior.

The KAP score is a crucial factor in understanding sustainable consumption behavior. Higher education levels correlate with higher knowledge, attitudes, and practices towards sustainable consumption. Students, employees, and self-employed respondents all have a positive attitude towards sustainable living and incorporating sustainable practices into daily lives. Both men and women score similar on knowledge, attitude, and practices, and both are committed to environmentally friendly behavior. However, there is a negative

relationship between age and KAP components, with older respondents having less knowledge, attitude, and practice regarding sustainable consumption behavior.

Recommendations

Understanding what are sustainable products

Increase knowledge of target audiences about relevant products and practices. The knowledge of sustainable/green environment in general seems higher than the knowledge of specific sustainable products. While, the concern about climate change and environmental degradation is relatively high, the link to products that impact on this seems lower. Overwhelmingly consumers show a willingness to recycle, compost, use renewable resources and buy locally produced products. Therefore:

- Informing target audiences about specific characteristics to look for in sustainable products. What are sustainable products (names of suppliers) and how can they be recognized (trustworthy labelling), what should consumers look for and what should they ask for.
- Informing target audiences more clearly about the impact of products and practices on climate change and land degradation in relation to Cambodia. Focus on closer to home.

Triggers to behavior change towards sustainable options

Knowledge of the negative impact

Almost all respondents would change their behavior if they would know that specific food or products had a negative impact on the environment.

- This finding should be used to enhance the information dissemination to consumers to educate them more in depth on sustainability issues. For example, buying organic food products is a sustainable option, but if those products are transported by high emission transport, it is a weak sustainable option. Consumers in Cambodia, particularly higher educated ones, could be made aware of the level of sustainability they are contributing to by buying certain sustainable products, contributing to informed decisions. Also, raising awareness levels regarding sustainability should be linked to sustainable consumption by emphasizing options that are more aligned with natural conservation by purchasing organic product or good agricultural practices (GAP) as they are pesticide and herbicide free.
- Consumers would benefit from knowing, in easy-to-understand terms, what negative impacts they could help to reduce and what they need to do for this, what actions

should they take. Actions to be promoted should be SMART (specific, measurable, achievable, relevant and time bound), showing the impact on sustainability, to encourage ownership of the actions and behavior.

Price

Although knowledge would trigger behavior change, consumers also mentioned that the price of the sustainable product or action plays a major role in whether they would pursue it.

- It is essential to reduce price asymmetry regarding the price of sustainable products by emphasizing to consumers the link between labeling and certification information and price. This could help consumers in making informed decisions by considering the environmental impact of their purchases and the price disparities between products.
- Businesses that support environmental friendliness should think about discounted prices for green alternatives, and this must be done collectively. Customers who bring their own shopping bags, for instance, would receive a discount, a discount coupon, or other environmentally friendly incentives.
- It is also beneficial to encourage consumers to purchase locally produced, affordably priced food.
- Additional research is required to improve understanding of the relationship between sustainable consumption and the willingness and capacity to pay for sustainable products.
- Subsidies and incentives at the national and subnational policy levels can be a viable alternative when utilizing price as a mechanism to promote sustainable consumption. However, this can be difficult as the question of who will bear the cost arises.

Price – quality balance

The price -quality balance is the main consideration of respondents in Phnom Penh, (similar to the majority of the rest of the world), when choosing a more sustainable product or not.

- Suppliers need to make sure the right price -quality balance is reached for consumers.
- Regulators could support this by levying taxes on unsustainable products, making them more expensive for the consumer.

Information channels

Channels through which audiences already receive or pickup information:

- Social media is the most mentioned channel, hence a good channel. This channel could be used to present sustainable products to consumers. Influencers (trustworthy people or NGOs) might help with positioning sustainable products.
- TV is mentioned by consumers who stay at home, TVs are also available in most food retailers, and information and calls to action would reach a large audience. The messages should combine information on sustainable products and practices and how these actions and practices lead to sustainability.
- Based on the findings, students tend to have a higher degree of understanding of SCP than other consumer categories, such as the general consumers and employees. Therefore, they have the potential to play a significant role in advocating for and disseminating sustainable consumption and production (SCP) to a wider range of potential audiences, such as peers, classmates, teachers, family and relatives, and the wider community. In addition, empowering students to share and disseminate SCP can be an optimal approach, as they are typically well-versed in cutting-edge technology and social media. They can use social media to share information, which enables them to engage with a wide audience and amplify their message effectively. Also, they are the bridge to close the knowledge gap between generations, especially with elders and their family members, such as their parents. Therefore, it is important to consider empowering them to advocate and share knowledge regarding SCP and climate change, as they can be the front for sustainable actions.

Lesser developed channels but with potential for immediate action:

- Workplaces - awareness raising about sustainable consumption and products in the workplace is limited at present. However, an example was given of one of the food chains which prohibits plastics to be brought in to the workplace. Information or training session about these 'role model workplaces, their practices and reasons why' could be used to increase awareness among other food retailers and food chains. More role model workplaces could be added to the awareness raising tools.
- Educational institutes as main information providers were mentioned by university and vocational training students. Training modules should be made available for all education institutions, including primary/secondary schools, engagement of parents could be very beneficial as well.

In general: as consumers showed an understanding of the issues at hand, but they did not seem to be fully aware of products that would fit their 'want to buy sustainable' attitude. This needs to be addressed through an increased information sharing (marketing) drive.

- Food retailers mentioned that there was no demand, from consumers, for them to be more sustainable, this should be a major priority in a call for action for sustainable product messaging; for consumers to demand sustainable actions and products from retailers.
- In other countries consumers expect regulators to play a stronger role when it comes to increasing health and sustainability in food retail. In many countries consumers encourage government intervention to actively promote healthy and more sustainably-sourced foods, and discourage unhealthy unsustainably-sourced options by, for example, applying higher taxes to these products or by regulating packaging (for example cigarette package messaging).

Specific topics

Plastic bags and plastic food packaging

Most consumers are aware and concerned about the impact of plastic bags on the environment. It is a very visible problem in Cambodia and a main discussion topic worldwide. It is not known whether the concern is mainly about the plastic waste in the environment or also about the use of fossil fuels for the production.

Almost all consumers are cautious about food packaging, however half still use plastic store bags, and more than half use it sometimes. Plastic consumption (as well as styrofoam) is deeply ingrained in Cambodia's daily life, with around 10 million plastic bags used daily in Phnom Penh alone[10].

The interviewed food chains, either have 'plastic free' policies in place, or are using none or less plastic as a practice. Some food chains even forbid plastic in the workplace.

Food retailers on the other hand are not plastic free, reasons are the high cost, the limited supply of plastic free alternatives and the lack of consumer demand.

- Consumers could possibly be encouraged to demand plastic free food packaging, especially as they indicated that they are willing to change practices. It might be a topic for a campaign. It is concrete, several stakeholders could be involved and it would stimulate policies around one-time plastic usage to be put in place.

[10] https://www.undp.org/cambodia/projects/combating-plastic-pollution-cambodia, visited 25 July 2023

- Consumers themselves are however slow to change their using plastic store bag and using plastic food packaging habits. On their own the change might not happen fast enough, cross sector coordination should be encouraged to address the pervasive plastic bag and plastic food packaging issue; a cross sector approach to develop viable plastic alternatives that are not too highly priced could encourage food retailers to change practices as well.
- Regulators could play a more significant role, for example: In Africa eleven countries (Tanzania, Kenya, Mali, Cameroon, Uganda, Ethiopia, Malawi, Morocco, South Africa, Rwanda and Botswana) have strict policies on use of single-use plastic. They are either completely banned (and retailers could be fined when using them) or the government levies a very high tax on them.

Food waste and other waste

Consumers mention they think about food waste when purchasing food, although many have money concerns and do not buy too much food, so not a lot of food waste.

Food chains do not separate food waste. Cans and bottles are separately offered to the supplier for recycling, a payment is received for this. The rest of the waste is not separated and offered to CINTRI as is and all seems to be dumped into a landfill. Food chains mentioned a lack of knowledge on waste disposal.

Food retailers are concerned about food waste, they do not separate organic from inorganic waste either. They only offer cans and bottles separately to recyclers.

- Waste separation into organic and nonorganic waste seems to be a priority, to reduce the amount of organic food waste in the landfill site (cutting methane production and potentially producing biogas or organic fertilizer). Organic waste is a resource and should be treated as such and there are a number of examples of solutions to be found in neighboring countries (see UNDP report link here). There is also an example of a hotel chain (in Siem reap) producing their own biogas from hotel food waste and garden scraps.

Food miles

Consumers mention transport CO_2 emissions (and food miles) as a concern and buy locally produced food due to this.

- While an interesting finding, the negative impact from CO2 emissions might be more of an issue in the case products are transported by air. Buying locally is not always more relevant for CO2 emissions locally. Information about food miles and its relevance for Cambodia could be studied and information could be shared with

consumers, to eliminate false assumptions, and to create a better understanding among consumers to what they contribute.

- Consumers might also assume that locally produced food is cleaner and healthier (less pesticide usage in Cambodia) compared to neighboring countries. This would also be a message for clarification with the general public.
- Deciding which impacts are most important in relation to food miles is inevitably subjective[11], but consumers should be capacitated to make their own informed decisions.

Organic food and produce

The overwhelming majority of consumers mention that they would buy organic or environmentally friendly food. However, they mention a number of challenges, such as

a). Difficult to access,

b). High price,

c). Not available at all,

d). No trust in the product message or the label

Food chains and food retailers hardly use organic food. They mention that suppliers have challenges with regular supply and the produce is expensive and scarce in the market (similar to what consumers mention).

- If organic food is to be promoted as a sustainable food option, these four considerations need to be addressed. While the high price is a challenge (not only in Cambodia), the other three considerations could be addressed through bringing suppliers, regulators, marketing and labelling stakeholders together, possibly through PPPs to bundle efforts to make organic produce available and establish a regular supply to food chains and food retailers at a reasonable price.

Food labelling

Most consumers mention that they do not read food labelling.

- Food labelling is supposed to be a great help to diversify products and make it clear which products are sustainable and green. However, labels could be made easier to

[11] https://www.ecoandbeyond.co/articles/food-miles-sustainability/ visited 25 July 2023

read for consumers. 'Green, organic, fair trade and sustainability standards' are numerous and from different origins, and even in countries where consumers are more trained in reading labels, it is too much for the consumer.

- Labelling and standards should apply to all selling locations, including wet markets.

8. Appendix

Link to Key Informant interview:

Chain restaurants and delivery services: KII_WWF (humanitarianresponse.info)

Food retailers: WWF_KII_Retailer QQ (humanitarianresponse.info)

Link to Consumer survey: WWF_QQ_Consumer (humanitarianresponse.info)

Table 5: Knowledge, Attitude, and Practices

Knowledge	Scales
Q.1. Have you heard the term sustainable products/green products before?	Yes=49.44% No= 50.28% Not sure=0.28%
Q.3. Have you ever received any specific education or training related to environmental and sustainable education?	Yes=36.94% No=62.5% Not sure= 0.56%
Q.4. Have you heard the term 'sustainable consumption/green consumption' before?	Yes, Women & Men - 70% No, Women & Men - 30%
Q.7. How much do you know about the environmental impact of the products you buy or use?	Fully aware=12.5% Know about most significant impact=36.67% Know little=48.61% Know nothing=2.22%
Q.8. How much you are concerned about climate change or environmental degradation?	Very concerned=52.22% Somehow Concerned=33.33% Little concerned=12.5% Not concerned at all=1.94%
Q.9. Are you aware that your food consumption could impact the environment and climate change?	Yes=83.89% No=16.11%

Q.11. Do you think your food choice could affect the environment?	Strongly agree=27.78% Agree=63.61% Not agree=8.06% Don't Know=0.56%
Q.12. Do you think that food waste could have an adverse impact on the environment?	Strongly agree=54.72% Agree=41.39% Not agree=3.89%
Q.13. Do you think your consumption activities (i.e., purchasing and use of food, clothing, housing, and others,) have an impact on the environment?	Yes=88.61% No=11.11% Not sure=0.28%
Q.14. Do you think that plastic waste from food packaging could affect the environment and climate change?	Strongly Agree=69.72% Agree=29.17% Not agree=0.56% Don't know=0.56%
Q.15. How much are you aware of the adverse impact of plastic bags on the environment?	Fully aware=15.56% Know about most significant impact=45% Know little=38.61% Know nothing=0.83%
Q.16. How much are you concerned about the impact of plastic bags on the environment?	Very concerned=56.94% Somehow concern=32.78% Little concerned=9.44% Not concerned at all=0.83%
Q.17. if it is made from natural materials or a renewable resource (e.g. biodegradable)	2=Yes=97.22% 0=No =1.67% Don't know=1.11%
Q.18. if it uses minimal or recyclable/compostable/biodegradable packaging.	1=Yes=96.11% 0=No=3.06% Don't know=0.83%

Attitude	Scales
Q.20. When purchasing food, I always think about its impact on the environment	Strongly agree =34.72% Agree=56.39% Not agree=8.89%
Q.24. I avoid food that has been transported from far away, because of the 'food miles' (transport CO2 emissions)	Strongly agree=27.78% Agree=43.89% Not agree=26.94% Don't know=1.39%
Q.25. I always buy locally produced food as it has less impact on the environment due to transport.	Strongly agree= 34.17% Agree=50% Not agree=15.83%
Q.28. If price, quality, and availability were the same, would you choose environmentally friendly or organic food?	Yes=98.33% No=0.83% Not Sure=0.83%
Q29. When buying packed food, do you look at the food labeling and what it says about the environment/climate change	Yes, always=10% Only Sometimes=29.17% No, I don't care about it=60.83%
Q.30. If you knew that a specific food has a negative impact on the environment (like rice produced with a lot of pesticides or fruit cultivation that uses a lot of water), but the price is a bit higher, will you change your behavior regarding	Strongly agree=33.61% Agree=61.94% Not agree=4.44%
Q.33. Do you agree with this statement? "I am always cautious with the packaging of the food I purchase.	Strongly agree=47.22% Agree=46.94% Not agree=5.83%
Q.38. If you know the impact of plastic bags on the environment, will you change your behavior about the use plastic bags?	Strongly agree=28.33% Agree=67.5% Not agree=4.17%

Practice	Scales

Q.34. Do you use plastic bags from grocery stores or restaurants?	Yes, always=45.56% Yes, sometimes=54.44%
Q.41. Recycle or compost waste.	Sustainable option=7.5% Save Money=9.72% Both=81.67% Don't know=1.11%
Q.42. Limit the use of single-use plastic.	Sustainable option=21.39% Save money=7.78% Both=70.28% Don't know=0.56%
Q.43. Buy more locally produced food.	Sustainable option=8.89% Save money=17.5% Both=72.78% Don't know=0.83%
Q.44. Chosen food/drink that have environmentally sustainable practices.	Sustainable option=14.17% Save money=9.72% Both=75.28% Don't know=0.83%
Q.45. Reduce consumption of meat / animal products	Sustainable option=12.22% Save money=28.61% Both=57.78% Don't know=1.39%