MONITORING REPORT

Solid waste management activities in eight townships in Yangon

The project for building resilience against COVID-19 through WASH and waste management support in urban informal settlements

UN-HABITAT

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EXECUTIVE SUMMARY

As part of the project *"Building resilience against COVID-19 through WASH and waste management support in urban informal settlements"*, the monitoring and evaluation survey was conducted in 23 locations of informal settlements in eight townships in March 2023. The objective was to understand the impact and sustainability of the project interventions in the target areas through comparison of the project beneficiaries and non-beneficiaries and results from three different phases done in different periods.

The questionnaire covered knowledge, attitude and practices related to waste segregation, waste disposal, compost making and reduction of plastic use. Furthermore, the questionnaire explored the beneficiaries' level of satisfaction with the intervention and sought their recommendations to further improve waste management.

Both beneficiaries and non-beneficiaries were selected randomly from the communities concerned and all of them come from different households. Altogether 575 respondents (80% are women), 345 beneficiaries and 230 non-beneficiaries participated in the survey. The study also collected qualitative information from UN-Habitat officials in order to triangulate collected quantitative data based on field observation and communications with stakeholders.

The following summary of key findings show that the project had a great impact on beneficiaries as far as their practice of waste disposal is concerned.

Waste segregation

- Less than **17%** of interviewees comprising both project beneficiaries and non-beneficiaries segregated household waste before the project intervention. However, **95.94%** of beneficiaries are practicing waste segregation after the intervention.
- More than **87%** of all beneficiaries (100% of Phase 1, 96% of Phase 2, and 87% of Phase 3) know well or know some extent on waste segregation.

Compost making

- 78.84% of beneficiaries did not know about compost making before the project but **94.68%** of beneficiaries earned sufficient knowledge to explain about compost making, and **53.33%** of them started individual or community compost making.

Plastic bag use reduction campaign

- **65.51%** of beneficiaries and their family members try to reduce the use of plastic, but only about 11% of non-beneficiaries do so.
- **78.55%** of beneficiaries bring their own reusable bags/ containers to shop but only 40.43% of non-beneficiaries do so.
- More phase 1 beneficiaries try to reduce plastic bag use (**86.67%**) and bring their own reusable bags/ containers to shop (**91.67%**) compared to phase 2 beneficiaries who do so (60.00% and 60.95%) and phase 3 beneficiaries who do so (61.67% and 84.44%).

Satisfaction of the project intervention

- Altogether **28.70%** of the beneficiaries were very satisfied and **71.01%** were somewhat satisfied with the project intervention.
- Among SWM activities under the project, beneficiaries showed their satisfaction especially on regular waste collection (**84.93%**) and proper waste segregation (**71.88%**).

Recommendations

- Top recommendation from the project beneficiaries was provision of more capacity-building trainings, and the second most common recommendation was to install more garbage bins. Altogether 40 – 50% of all phases gave those recommendations.

1. INTRODUCTION

1.1 Background

Yangon Region is undoubtedly the epicenter of the COVID-19 pandemic in Myanmar due to its highest population density. Among the hardest hit by the health and socio-economic impact of the pandemic are the urban poor of Yangon, specifically the estimated 400,000 residents of Yangon's informal settlements.

The COVID-19 pandemic has reminded us once again of the central role that WASH (water, sanitation and hygiene) play in protecting us from diseases. The provision of safe water, sanitation and waste management and hygienic conditions is essential for preventing diseases and protecting human health during all infectious disease outbreaks, including COVID-19.

However, most of the COVID-19 recommendations were almost impossible to implement in informal settlements, where overcrowding, poor housing design and lack of access to water, sanitation and waste management facilities make any form of physical/social distancing and simple interventions such as regular washing of hands and accessing clean drinking water extremely difficult. In addition, most households rely on day-to-day work to meet their living costs and do not have any savings or financial buffer to rely on to pay for basic services such as WASH.

As informal settlements suffer from poverty, inequalities, and chronic infrastructural under-investment, it is vital that residents of informal settlements are equipped and supported to tackle the pandemic effectively so as to help ensure the safety of all residents of the city.

Therefore, it is urgent and essential to help build more resilient water, sanitation, and hygiene systems that will deliver these fundamental services particularly to the neediest– both in the short term for preventive and protective measures as well as in the medium term in improving the living conditions to make them more resilient in the event of future pandemic. Ensuring access to critical WASH services is an essential component of Yangon's battle against COVID-19.

1.2 Project summary

UN-Habitat Myanmar Office has been implementing the project for "Building resilience against COVID-19 through WASH and waste management support in urban informal settlements (BRISC)", with financial support from the Government of Japan since March 2021. It is being carried out in response to the COVID-19 survey to informal settlements in Yangon conducted by UN-Habitat in 2020. The project has the specific objective to contribute to the country's effort to control and cut the transmission of COVID-19 by securing access to and sustaining availability of WASH and solid waste management services in informal settlements including schools which are being attended by children of the residents. It is also reaching out to the most vulnerable households with responsible information with the aim of preventing further expansion of the pandemic at home and in the community. Moreover, the project has been designed to improve the resilience of local communities to organize and work together with each other in ensuring the efficacy of pandemic prevention interventions. UN-Habitat has been implementing the following three inter-related components

in 45 locations, 257 schools, and 42 community health clinics in eight townships, namely, Dagon Seikkan, Dala, Hlaing Thar Yar, Insein, North Okkalapa, Shwe Pyi Thar, South Dagon, and Thanlyin Townships in Yangon with the following objectives:

A) Enhancing access to safe water and improved environmental sanitation in informal settlements

B) Improving solid waste management in informal settlements

C) Improving hygiene awareness and capacity of communities in informal settlements

1.3 Solid waste management activities of the BRISC project

BRISC implemented the component B 'Improving solid waste management in informal settlements' of the project with an implementing partner named Thant Myanmar to initiate the community level waste management work.

The objective of the partnership with the implementing partner was to facilitate solid waste management services at the households within informal settlements because their understanding and participation is vital to achieve long-term SWM activities. The activities carried out under three phases comprised waste audit and knowledge, attitude and practice (KAP) surveys, capacity building trainings on SWM management, initiation and operation of the community-level waste segregation, individual or community compost making, plastic bag use reduction campaign, and livestock feeding with wet waste.

1.3.1 Target locations and duration

UN-Habitat identified potential 23 target locations based on various aspects including previous experience of UN-Habitat and an implementing partner working in townships, current access limitation imposed due to political restraint, availability of community volunteers and safety and comfortability of the partner working in the target settlements (**Table 1, Map 1**). The project divided activities in three phases as described below:

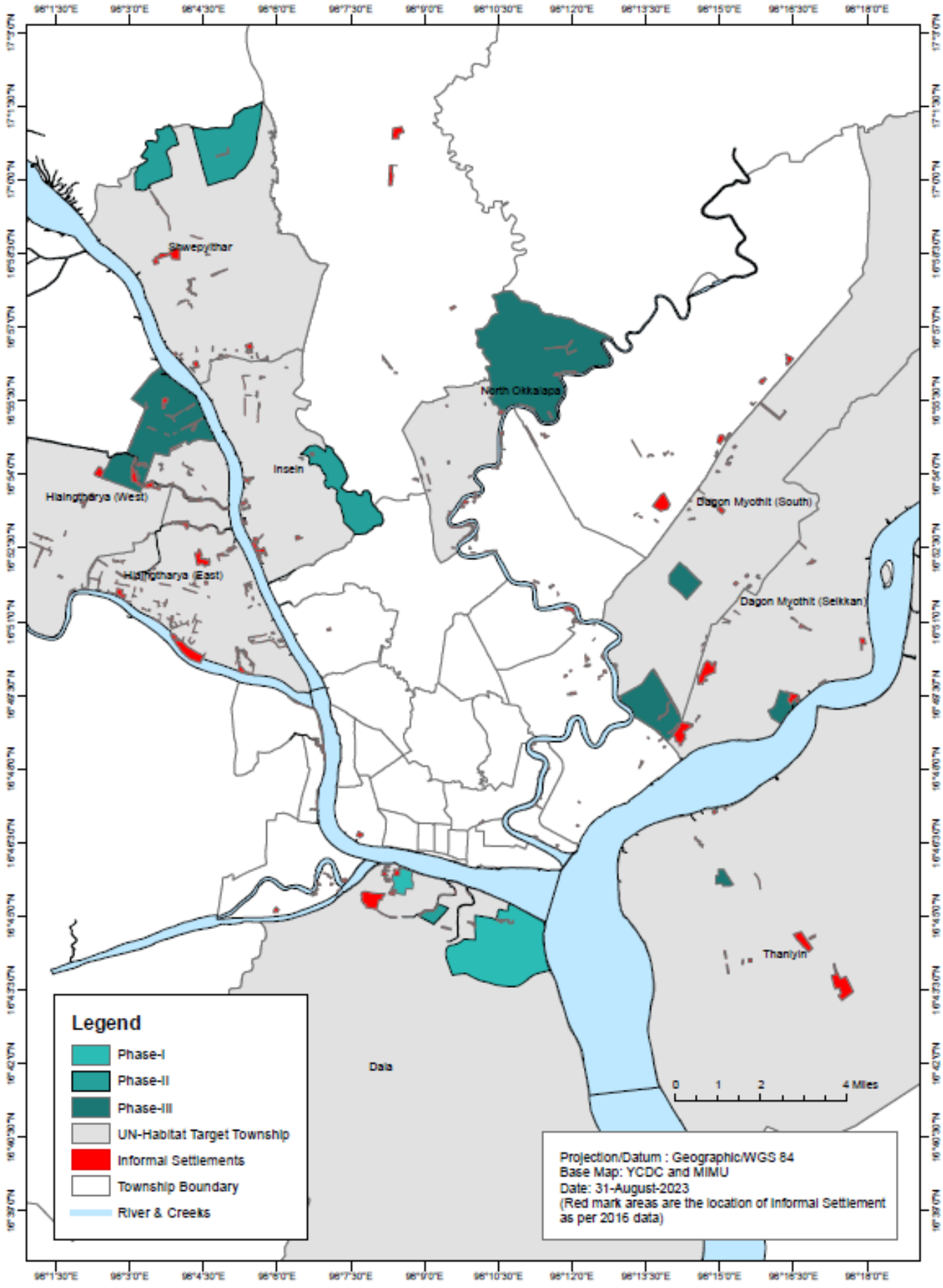
Phase 1: December 2021 to April 2022 (5 months)

Phase 2: May to November 2022 (7 months)

Phase 3: January to March 2023 (3 months)

Table 1 List of target communities and intervention period

Target Townships	Ward	Number of locations	Number of beneficiaries	Intervention period
Dala	Tada Chaung	2	1,200	Phase 1
	Kamakasit	2	700	Phase 1
	Yar Za Thin Gyan	2	1,800	Phase 2
Dagon Seikkan	Ward 93	2	1,200	Phase 3
Hlaing Thar Yar	Aleywargyi	2	700	Phase 3
	Ward 20	1	850	SWM project
Insein	Saw Bwar Gyi Gone	2	300	Phase 2
North Okkalapa	Ward 12	1	175	Phase 3
	Ward 22	1	100	Phase 3
Shwe Pyi Thar	Ward No. 17	2	300	Phase 2
	Ward No. 27	1	300	Phase 2
South Dagon	Ward 54	1	200	Phase 3
	Ward 22	2	600	Phase 3
Thanlyn	Myoma East	2	400	Phase 3
TOTAL		**23**	**88,825**	



Map 1 Target areas of the SWM activities

2. METHODOLOGY

2.1 Background of the monitoring survey

The solid waste management (SWM) activities were implemented in 23 locations in informal settlements of Yangon City, namely Dagon Seikkan, Dala, Hlaing Thar Yar, Insein, North Okkalapa, Shwe Pyi Thar, South Dagon, and Thanlyin Townships. As part of the BRISC Project (22 locations) and the SWM project (1 location), it was implemented by Thant Myanmar, implementing partner, through all three phases.

After the completion of all SWM interventions, the project conducted a monitoring survey in the end of March 2023 to understand the impact and explore the sustainability of the project interventions in the target areas. The impact could be measured by comparing the project beneficiaries and non-beneficiaries of their SWM-related knowledge, attitude and practices in the adjacent areas. In addition, the survey also measures sustainability of interventions through comparison of results from three different phases done in different periods.

This survey interviewed 345 beneficiaries in 23 locations and 230 non-beneficiaries from their adjacent areas where SWM activities have been conducted. In each project location 25 beneficiaries were randomly selected for the interviews. Ten non-beneficiaries belonging to control group were selected randomly from nearby 23 locations where SWM activities were carried out. Residents of those communities have similar social and economic conditions to people from project areas.

2.2 Components of the questionnaire

This survey questionnaire was divided into four sections as follows:

Section A: Socio-economic and demographic profile

Section B: SWM-related knowledge and attitudes of the project beneficiaries and non-beneficiaries.

Section C: SWM-related practice of the project beneficiaries and non-beneficiaries.

Section D: The project beneficiaries' level of satisfaction on the intervention and their recommendations.

2.3 Recruiting respondents, sampling and sample size

Through the use of the following formula for unknown population, and with the suggested sampling size of 575, margins of error would be + or – 4.2 percent. Maximum efforts were made to ensure the survey was completed in one day in each location. The ward administrator and the 100-household leader were informed in advance about the survey. The survey itself was conducted in low profile manner to avoid unnecessary security risks. Every measure was taken to ensure that it attracted least attention from the residents in the conduct of the survey.

$n = z^2 * (p*(1-p))/d^2$

With 95% confidence interval, z = 1.96, population proportion is taken as p =0.5, (1-p) = 0.5 to get the maximum differentials. Margins of error(d) = + or – 4.2%

575 = 1.96*1.96 * 0.5 * 0.5 / d^2

2.4 Informed Consent

When collecting data from residents of the informal settlements, verbal consent is obtained due to high rates of illiteracy. A pre-written statement is read before the interview. The consent statement is translated and read in Myanmar language.

Example of informed consent statement:

> "Good morning/afternoon, Mr/Ms _____. I am ……, a senior mobilizer/community volunteer. I am working for UN-Habitat on a project related to disposal of household waste. The project has been carried out at some locations in eight townships. In this location, the project was either implemented in the past, or is being implemented now or has not been implemented. We are doing a survey among some households to find out what you know, think, and feel about segregation of household waste, its proper disposal, reduction of plastic use and compost-making. We also want to know how you practice them. The interview will take about 20 minutes. All the information you provide will remain strictly confidential and your answers and your personal information will not be associated with your responses in the survey report. There are no right or wrong answers, so please do not feel pressured to give a specific response and do not feel shy if you do not know the answer to a question. Do you have any questions for me?
>
> Before I begin, do you agree to participate in the survey? (Only proceed if the participant agrees).
>
> Thank you."

3. FINDINGS

3.1 Comparison of beneficiaries and non-beneficiaries

3.1.1 Socio-economic and demographic profile

Figure 1 shows that interviewees were altogether 575 persons including 471 females from the age of 18 to 80 years old (the mean age of the interviewees is 42). Almost 80 percent (78.96%) of the interviewees are married. In terms of their profession, almost half of respondents are housewives/ househusbands (45.55%) while a little over a quarter are self-employed (26.39%) and 17.48% of the respondents are part-time employees. Only 38 respondents (6.39%) are full-time employees. Very small proportions of interviewees belong to retirees/ pensioners (2.52%), those looking for a job (1.34%), and students (0.34%).

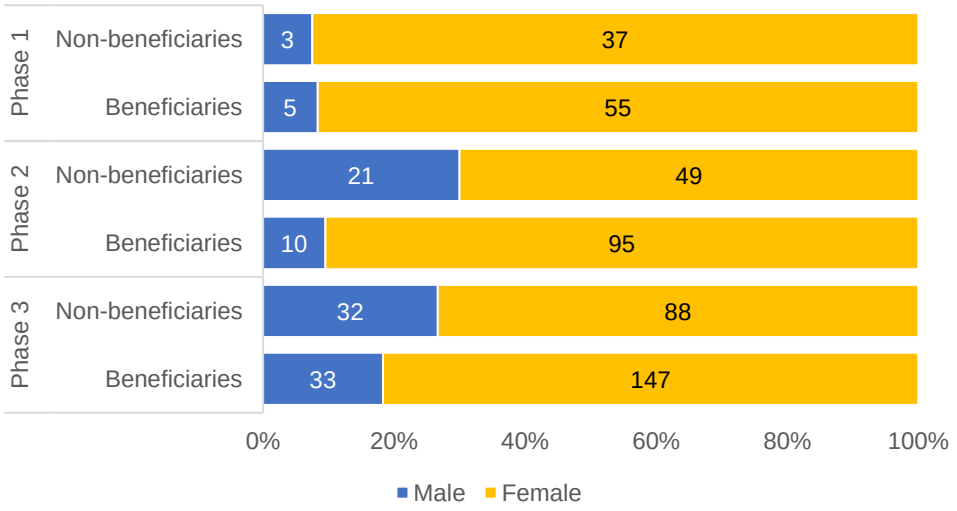


Figure 1 Respondents, disaggregated by gender, from different project intervention phases

3.1.2 Waste segregation

Figure 2 indicates a positive impact of project intervention because almost all beneficiaries (98.55%) are aware of the importance of waste segregation at source, even though only three quarters (74.35%) of non-beneficiaries are aware about it. In addition, more than 90% of beneficiaries know well or know some extent about waste segregation, but only about 37% (5.65% and 30.87%) of non-beneficiaries has the same knowledge level (**Figure 3**).

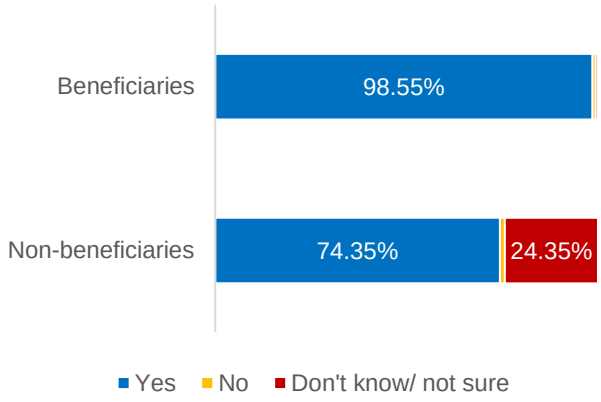


Figure 2 Awareness of the importance of waste segregation at source

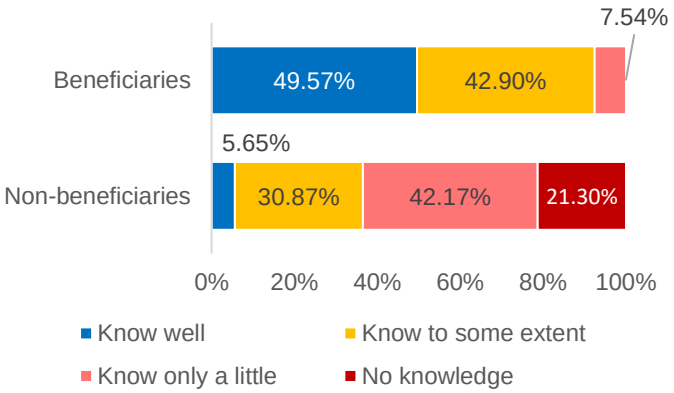


Figure 3 Knowledge level on waste segregation

Table 2 shows that less than 17% of interviewees including both project beneficiaries and non-beneficiaries segregated household waste before the project intervention. However, the project intervention increased waste segregation up to 95.94% of beneficiaries and also influenced neighbouring communities to increase 10% compared to pre-intervention time. The table also indicates that most of households practicing waste segregation expressed their willingness to continue waste segregation after the project intervention.

Table 2 Waste segregation before and willingness to continue

		Yes	No
Practice of segregation before the intervention	Beneficiaries	16.23%	83.77%
	Non-beneficiaries	13.04%	86.96%
Practice of segregation after the intervention	Beneficiaries	95.94%	4.06%
	Non-beneficiaries	23.48%	72.17%
Willingness to continuous waste segregation	Beneficiaries	95.36%	4.64%
	Non-beneficiaries	25.65%	74.35%

Three main reasons both beneficiaries and non-beneficiaries gave for segregating their household waste were (1) to keep the household and community clean, (2) to avoid odour, and (3) to reduce pests and rodents in the surroundings. By contrast, main reasons for no waste segregation are (1) many people are disposing of garbage discriminately, (2) wastes are combined anyway once collected, and (3) it is time consuming/troublesome to segregate waste.

On the question of separation of glass, plastics and e-waste from household waste, the greatest difference of proportion is found between beneficiaries and non-beneficiaries as regards plastic waste. More than two-thirds of beneficiaries (67.25%) while 13.48% of non-beneficiaries segregated plastics in their disposal of household waste (**Figure 4**).

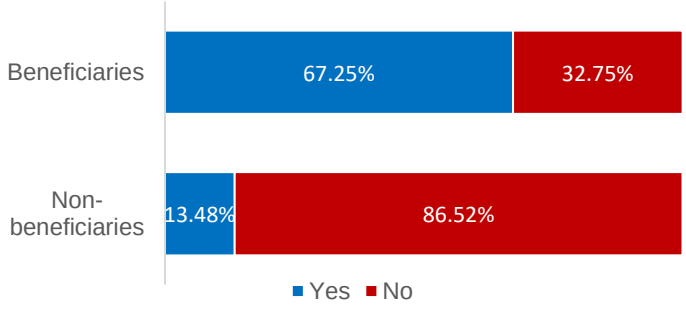


Figure 4 Segregation of plastic waste for disposal

3.1.3 Household waste collection

The project selected waste collectors as the focal point and they have been collecting household waste of beneficiaries twice a week in the target communities. Therefore, 92.75% of beneficiaries dispose of their household waste through individual waste collectors (**Figure 5**). Based on the regular waste collection of dry waste, more household disposes dry waste including plastic waste than wet waste (**Figure 6**).

The project focused on collection of dry and plastic waste because it encouraged households to utilize wet waste for compost making. However, some waste pickers collect wet waste of 15.65% of the beneficiaries and more than half of non-beneficiaries (53.48%).

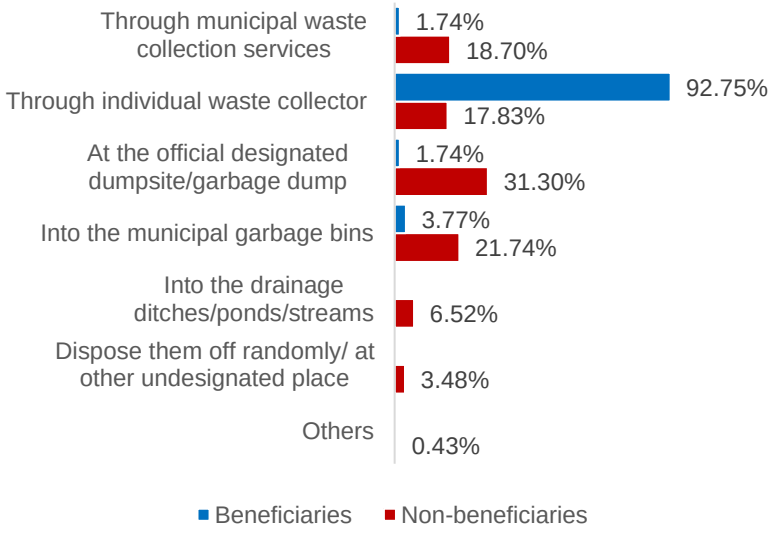


Figure 5 Disposal of household waste

On the other hand, only 38.70% of non-beneficiaries know the existence of waste collectors in each target community including nominated and existing collectors prior to the project. By contrast, **Figure 5** shows that majority of non-beneficiaries representing nearly one third go to an official designated transfer stations/waste storage facilities.

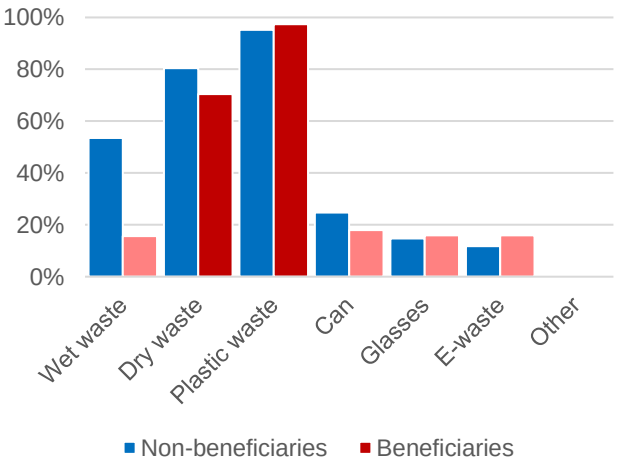


Figure 6 Types of waste being collected

Figure 7 also shows that 96.23% of beneficiaries have willingness to pay for household waste collection, while only 70.43% of non-beneficiaries have willingness to pay.

The project also has had a great success in ensuring that communities covered by it dispose of their household waste properly. 82.32% of beneficiaries always segregate waste properly before being disposed for the waste collection, while 17.83% of non-beneficiaries practise that behaviour **(Figure 8)**. More than 70% of non-beneficiaries rarely (24.78%) or never (47.39%) segregate waste before disposal.

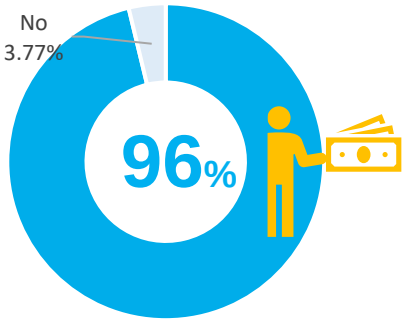


Figure 7 Beneficiaries' willingness to pay for household waste collection

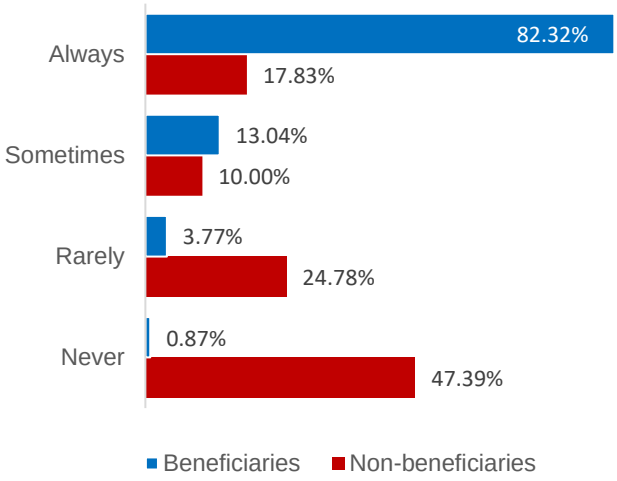


Figure 8 Frequency of proper waste segregation before waste collection

3.1.4 Compost making

The survey exposed the impact of project interventions to improve knowledge on compost making by using household waste. Before the project intervention, 78.84% of beneficiaries and 83.04% of non-beneficiaries did not know about compost making with household wet (biodegradable) waste. However, **Figure 9** indicates that many beneficiaries had their capacity built on compost making through the project interventions. Specifically, more than half (51.01%) of beneficiaries, compared to a very small percentage (2.61%) of non-beneficiaries know well about compost-making. Among the non-beneficiaries more than half (56.52%) know only a little and 25.65% does not know anything about waste segregation.

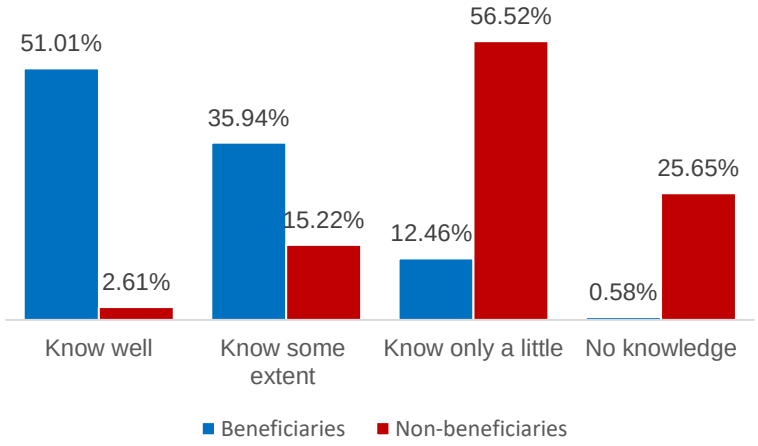


Figure 9 Knowledge level on compost making by using wet waste

The data also shows that more than 90 percent (94.68%) of beneficiaries totalling 285 could explain the process and necessary materials to make compost.

Through project activities to introduce compost making by using wet waste, more than 66% of beneficiaries make compost individually or with neighbours (**Figure 10**). They are motivated to make compost because of getting organic fertilizer and supporting the waste collectors to do their work easier. On the other hand, the major reason for beneficiaries and non-beneficiaries do not practise compost making was limited open space for compost bins.

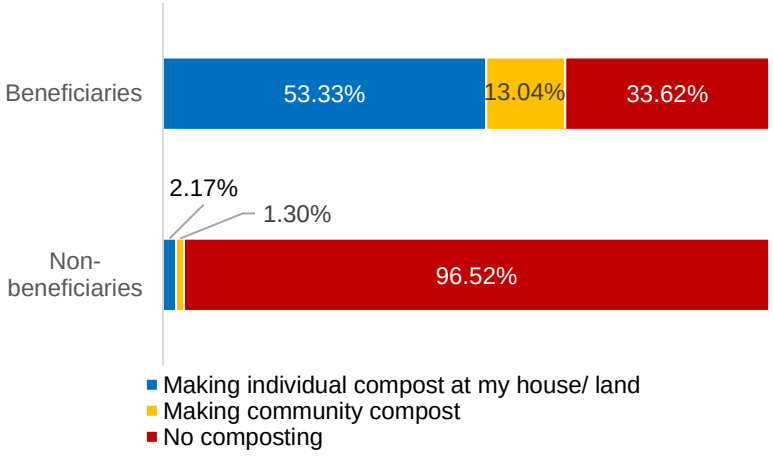


Figure 10 Current compost making status

3.1.5 Plastic bag reduction campaign

The project initiated the plastic bag reduction campaign in the target communities in order to enhance awareness of people on the issue through discount mechanisms. During the project period, participating shops offer 50 kyat discount for every purchase to customers who do not ask for plastic bags.[1] Plastic bag reduction was also advocated through the posters of Bring Your Own Bags/ Containers.

Much greater proportion (77.97%) of beneficiaries know the shops taking part in the plastic reduction campaign compared to less than one-fourth (23.04%) of non-beneficiaries.

Nearly two-thirds (65.51%) of beneficiaries while only about one-tenth (10.87%) of non-beneficiaries and their family members try to reduce the use of plastics. There is also a great difference between beneficiaries and non-beneficiaries who plan to reduce plastic bags continuously. Altogether 67.25% of beneficiaries and 12.17% of non-beneficiaries said so (**Table 3**).

The data shows that almost twice the percentage of beneficiaries bring their own reusable bag/containers to shop (beneficiaries 78.55%, non-beneficiaries 40.43%) because they want to help reduction of plastic in their community. On the other hand, the main reasons for not bringing reusable bags/ or containers are that

[1] Participating shops are reimbursed for the discounts given to customers plus their commission fee.

(1) shops give plastic bags for free and they are cheap, (2) it's a hassle to bring one, (3) plastic bags are cheap, and they are given for free at shops.

Table 3 Practice and willingness to reduce plastic bag use at household level

		Yes	No
Practice of family members to reduce plastic bag use	Beneficiaries	65.51%	34.49%
	Non-beneficiaries	10.87%	89.13%
Willingness of family members to reduce plastic bag use continuously	Beneficiaries	67.25%	32.75%
	Non-beneficiaries	12.17%	87.83%

3.2 Comparison of three groups of beneficiaries from Phase 1 to Phase 3

This section summarizes monitoring survey results of three different phases implemented in different timing. When the survey was conducted, nearly a year had passed after the completion of phase 1, four months since the completion of phase 2, and less than a month of phase 3.

3.2.1 Waste segregation

The findings show that more than 98% of beneficiaries covered by all phases believe they need to segregate biodegradable and non-biodegradable waste.

Although more than 87% of all beneficiaries know well or know some extent on waste segregation, knowledge level on waste segregation is different among beneficiaries of three phases. Nearly triple in percentage of phase 2 (75.24%) beneficiaries know well compared to that of phase 1 (26.67%) (**Figure 11**). However, it was also mentioned that some beneficiaries from phase 2 (3.81%) and phase 3 (12.22%) know only a little about waste segregation, even though they or their household members may have attended a capacity building training.

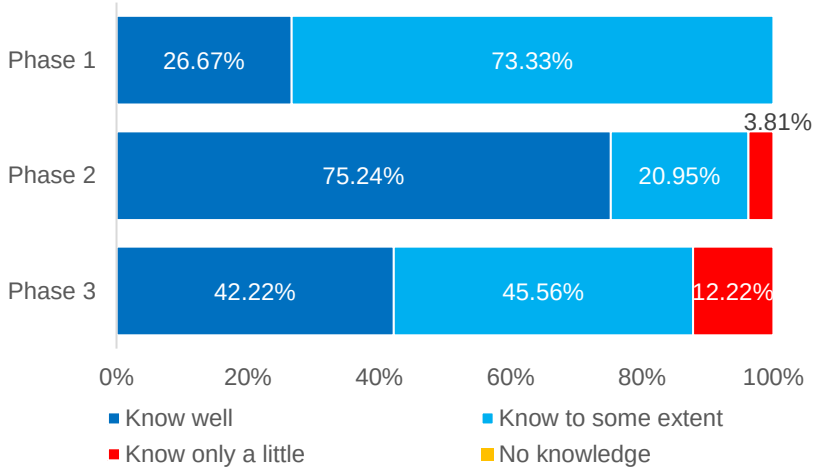


Figure 11 Knowledge level on waste segregation

Based on the fact that most of the beneficiaries did not segregate household waste before the intervention, knowledge gained on waste segregation proves the effectiveness of the project intervention on people's waste disposal behaviour. **Table 4** also shows that all beneficiaries from phase 1 and phase 2 and more than 90 percent of beneficiaries from phase 3 are willing to segregate their household waste continuously.

Table 4 Practice of waste segregation before and after the launch of the intervention

	Phase 1	Phase 2	Phase 3
Practice of segregation before the intervention	3.33 %	17.14%	20.00%
Willingness to continuous waste segregation	100.00%	100.00%	91.11%

However, although the project provided capacity building sessions in the project communities, 7.78% of beneficiaries from phase 3 do not segregate household waste at source (**Figure 12**). Major reasons for no segregation are link to their perception that many people are disposing of garbage indiscriminately (57.14%), the wastes are combined anyway once collected (21.43%), and it is time consuming/troublesome to segregate waste (14.29%).

In terms of segregation of three types of recyclables (glasses, plastic and e-waste), percentages vary among beneficiaries of different phases. Higher percentages of beneficiaries from phase 2 segregate two types of recyclables, namely plastic waste and glass, compared to those from other phases (**Figure 13**). By contrast, beneficiaries from phase1 have less tendency to segregate glasses, but they represent the highest percentage in separating e-waste.

Interestingly, phase 2 beneficiaries have higher segregation practice of recyclables, but they have less frequency to sell these wastes (**Figure 14**). A higher percentage of phase 2 beneficiaries (27.62%) always sell recyclables while some of them represent the highest proportion (21.90%) who never sell recyclables. The two most common reasons given by beneficiaries of different phases for not selling recyclables more often are: their households do not produce many recyclable and it takes some time to get reasonable amount of money from selling recyclables.

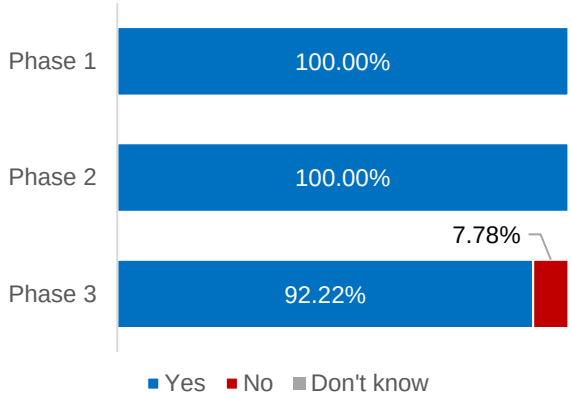


Figure 12 Segregation of household waste

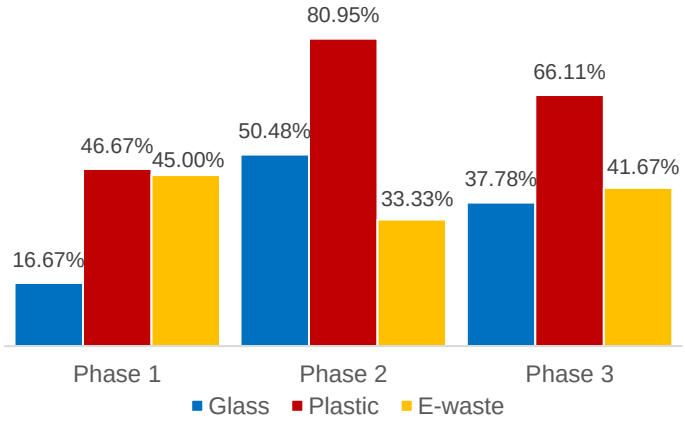


Figure 13 Segregation of dry waste

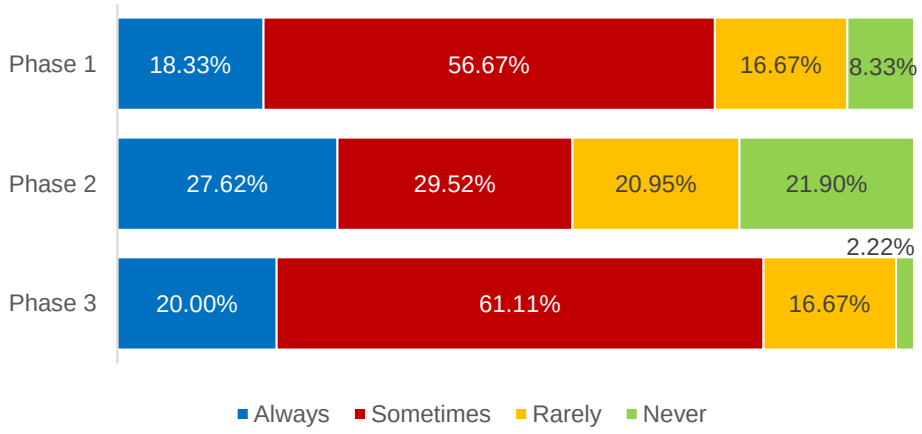


Figure 14 Frequency of selling recyclables (glasses, plastic, e-waste waste)

3.2.2 Waste collection

The project intervention identified waste collectors in each community and tasked them to collect household dry waste including plastic twice a week. Therefore, waste collectors collect all dry waste including plastic waste in all project target communities. In addition to dry waste and plastic waste, waste collectors covered by phase 2 and phase 3 collect wet waste as well. However, the findings clarified that waste collection in phase 1 target communities does not cover wet waste (**Table 5**).

Table 5 Types of waste collectors collects

	Phase 1	Phase 2	Phase 3
Wet waste	1.67%	18.10%	18.89%
Dry waste	65.00%	84.76%	63.89%
Plastic waste	100.00%	95.24%	97.78%
Can	1.67%	24.76%	19.44%
Glasses	0.00%	17.14%	20.56%
E-waste	0.00%	21.90%	17.78%
Other	0.00%	0.00%	0.00%

For regular household waste collection, beneficiaries were required to pay a small fee for household waste collection. Prices vary depending on communities. **Table 6** shows that more than 80 percent of phase 2 and phase 3 are paying for regular waste collection. Beneficiaries from phase 1 paid 1,635 kyat per month on average and their counterparts from phase 2 and phase 3 paid far less with 773 kyat and 1,097 kyat respectively. The findings also reveal that households who are required to pay higher prices tend to have fewer households in the communities concerned paying for solid waste collection services. Those who are paying for the service from phase 1 account for far less with more than 60%.

Table 6 Cost range for household waste collection and payment practice

	Phase 1	Phase 2	Phase 3
Minimum monthly payment for waste collection	800	300	300
Maximum monthly payment for waste collection	2,400	2,000	2,000
Average monthly payment for waste collection	1,635	773	1,097
Percentage of household paying for solid waste collection	61.67%	86.67%	80.00%

3.2.3 Compost making

More than 70% of beneficiaries have not heard about compost making by using household wet (biodegradable) waste before the project intervention. Most of the beneficiaries gained knowledge on compost making through the project. Among the beneficiaries, those covered by phase 2 have the highest percentage (79.05%) who know well about compost making but smaller proportions of beneficiaries from phase 1 (31.67%) and phase 2 (41.11%) knew well about compost making. (**Figure 15**). Following the launch of the project, more than 90% of beneficiaries under phase 1 and phase 2 know well or know some extent about compost making compared to 80.00% of beneficiaries under phase 3.

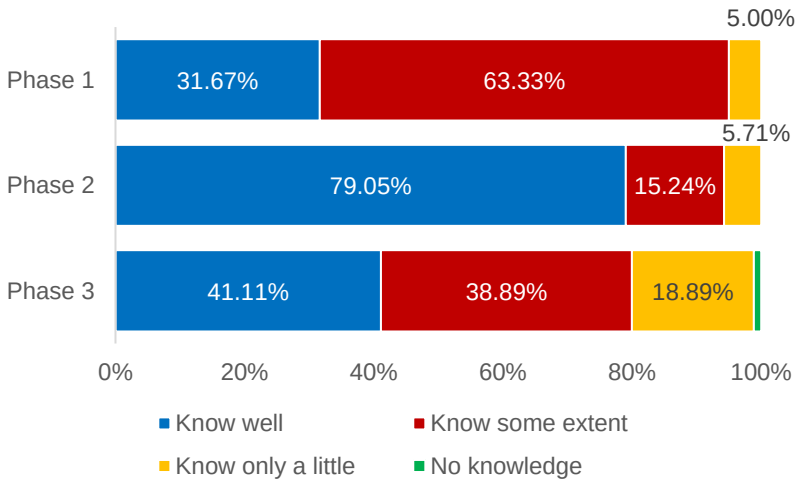


Figure 15 Knowledge level on compost making

However, it should be noted that more than 90% beneficiaries from all phases stated that they can explain the process and necessary materials to make compost. Learning from this, those who said that they know some extent might have been humble about their level of knowledge on compost making.

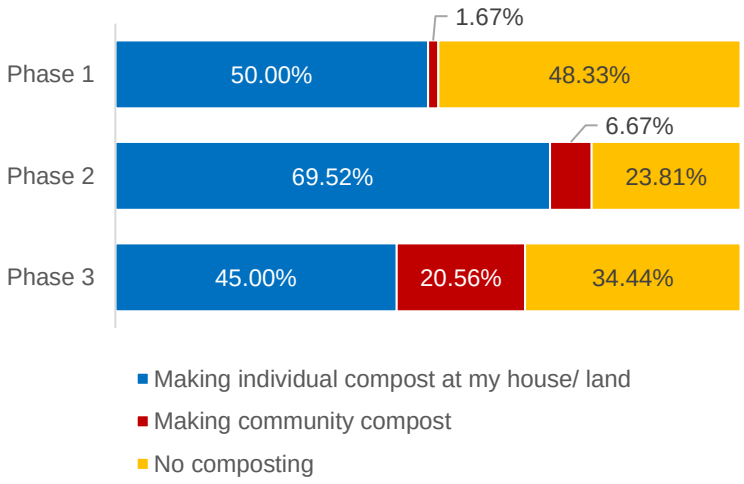


Figure 16 Practice of compost making by using wet waste (C11)

Knowledge level on compost making is interrelated with practice. For example, phase 2 beneficiaries have the highest percentage of understanding (79.05%) who know well and 15.24% who know some extent as described earlier in **Figure 15**. phase 2 beneficiaries' practice of individual or communal compost making represents the highest percentage of 76.19% (**Figure 16**). Beneficiaries from phase 3 who have a smaller proportion of knowledge on compost making (41.11% who know well and 38.89% who know some extent) practice less (65.56%). Beneficiaries from all phases stated having limited open space for compost bins as the main challenge for not making compost. A less common reason is that compost making takes a long time to harvest.

Communities covered by phase 3 have more community compost practice than individual compost making because the project implementing partner promoted more community composting by aiming at sustainable wet waste inputs and compost making by waste collectors.

3.2.4 Plastic bag reduction campaign

Phase 1 beneficiaries have the highest percentage (86.67%) try to reduce the use of plastic bags with their family (**Table 7**). A total of 60.00% from phase 2 and 61.67% from phase 3 said the same. There is some consistency between beneficiaries who try to reduce the use of plastic bags and those who planning to reduce plastic bag use continuously.

Table 7 Attitude on plastic bag use reduction

	Phase 1	Phase 2	Phase 3
Practice of individual and their family members to reduce plastic bag use	86.67%	60.00%	61.67%
Willingness of individual and their family members to reduce plastic bag use continuously	86.67%	59.05%	65.56%

All beneficiaries from phase 1 and almost all beneficiaries from phase 2 and phase 3 always or sometimes use plastic bags (**Table 8**). However, it should be noted that nearly half of phase 2 beneficiaries (49.52%) always use plastic bags compared to those of phase 1 (31.67%) and phase 3 (31.11%) respectively. It can be the reason why the smallest proportion of phase 2 beneficiaries (60.95%) bring their own reusable bags and containers to shop. Interviewees also answered that the two main reasons for them not to bring their own bag and containers were due to the fact that plastic bags are cheap, and the shops give them for free as mentioned earlier.

Table 8 Frequency of plastic bag use and bringing own bag/containers

		Phase 1	Phase 2	Phase 3
Frequency of plastic bag use	Always use plastic bags	31.67%	49.52%	31.11%
	Use plastic bag sometimes	68.33%	47.62%	66.11%
	Rarely use plastic bags	0.00%	2.86%	2.78%
Bring own reusable bags / containers to shop		91.67%	60.95%	84.44%

On the other hand, higher percentages of beneficiaries from phase 1 and phase 3 use plastic bags "sometimes" and bring their own reusable bags and containers when they go shopping.

Based on the data showing respondents' awareness of the shops participating in the plastic bag reduction campaign (**Figure 17)**, more beneficiaries from phase 1 and phase 3 know the shops participating in the plastic bag reduction campaign. In other words, more beneficiaries recognize the shops which offer a discount if the customers do not take plastic bags from the shops when they buy products or services.

Although phase 1 activities completed a few months before other phases were implemented, their beneficiaries still make up the highest percentage who stated to bring their own reusable bags and containers (Table 8).

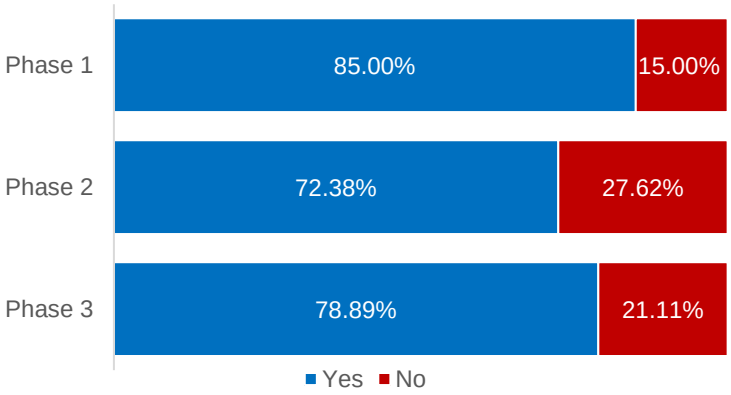


Figure 17 Awareness of the shops participating in the plastic bag reduction campaign

3.3 Evaluation of the project intervention

3.3.1 Overall satisfaction and satisfied activities

In the end of the SWM-related project intervention in 22 locations, almost 99% of the beneficiaries responded "very satisfied" (28.70%) or "somewhat satisfied (71.01%)". Besides, 97.39% of beneficiaries believe their respective community has become cleaner and (**Figure 18**).

Among the SWM activities, the great majority of beneficiaries find satisfaction with regular waste collection (84.93%) and proper waste segregation (71.88%) (**Figure 19**). Over 40 percent of beneficiaries expressed their satisfaction with the project components of compost making (46.09%) and plastic bag use reduction (44.64%). Almost a quarter of the beneficiaries (24.93%) were happy with the activity on feeding livestock and pets using food waste.[2]

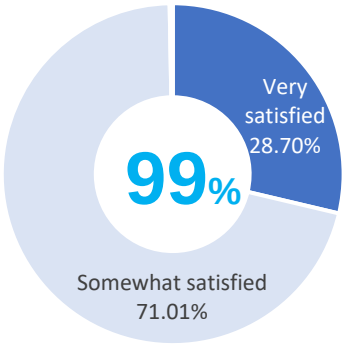


Figure 18 Level of satisfaction with waste collection and disposal

3.3.2 Satisfaction for each phase

Two most satisfied SWM activities were proper waste segregation and regular waste collection in all three groups. Similar proportions of beneficiaries covered by all three phases also evaluated plastic bag use reduction as the third most satisfied activity.

Based on their high satisfaction, all groups have the highest intention to continue regular waste collection and proper waste segregation (**Figure 19**).

Less than half beneficiaries from all phases have intention to continue compost making, plastic bag use

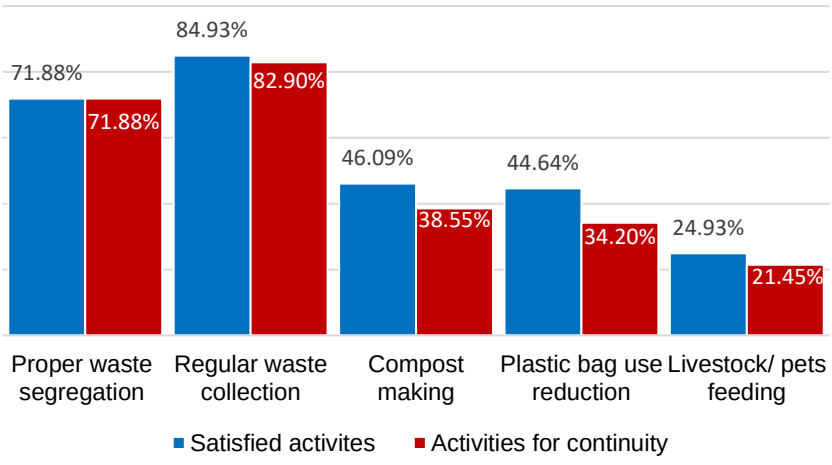


Figure 19 Satisfaction of the project intervention and activities to continue by household/ community level

[2] There was no livestock breeding activity during phase 1 because it was started in phase 2. The work is expanded during phase 3 to include fish breeding.

reduction, and livestock/ pets feeding. Unless people can find means to sell or make use of their compost or the shops are subsidized for taking part in the plastic use reduction project, compost making and the plastic bag use reduction campaign are less likely to sustain in the target communities.

3.3.2 Recommendations to further improve waste management in the community

When the survey asked beneficiaries' recommendations to further improve waste management in their community, more than 60% of them recommended providing more capacity building training (**Table 9**). A total of 60.56% of phase 3 beneficiaries recommended longer period of intervention (Fewer percentages of phase 1 (43.33%) and 3 (47.62%) mentioned it). Half of phase 1 and phase 3 beneficiaries and 40.95% of phase 2 beneficiaries recommended installing garbage bins in their communities. In phase 2 coverage communities, 35.24% of beneficiaries also recommended to provide more awareness sessions to persuade neighbours to segregate and manage their waste properly.

Table 9 Recommendations for future SWM interventions

	Phase 1	Phase 2	Phase 3
Longer period of support from UN-Habitat and implementing partner	43.33%	47.62%	60.56%
More capacity building trainings	80.00%	66.67%	64.44%
Instalment of more garbage bins	50.00%	40.95%	50.00%
Creation of garbage collection point near to the community	6.67%	24.76%	12.22%
More frequent regular waste collection	0.00%	11.43%	4.44%
Organize more community clean-up activities	18.33%	26.67%	25.56%
More awareness sessions to persuade neighbours to segregate and manage waste properly	5.00%	35.24%	10.56%
Increase the frequency of household waste collection	0.00%	7.62%	0.56%

4. LESSONS LEARNED

The following are Lessons Learned obtained from the SWM interventions in informal settlements in Yangon:

- Establishment of community-level SWM system should be long-term to ensure sustainability after the project interventions because behaviour change and understanding of benefit, especially compost harvesting, takes long time.
- Six target communities under phase 1 and phase 2 stopped SWM activities after the project intervention[3] because of leaving of nominated waste collectors with pushcart, less commitment of local shops for plastic bag reduction campaign, and lack of enforcement on the people to separate their household waste properly. Due to insufficient management, some push carts were totally damaged while others were sold off by waste collectors, and some waste collectors have run away. Therefore, for the community leaders and community volunteers, nominated waste collectors, and local authorities to have greater commitment and sense of ownership requires more incentives and motivation to work as a community SWM committee to oversee SWM activities in their community. The development of SWM community action plan with community leaders at the beginning of the project intervention may create commitment and a sense of ownership in the community.
- It is important to select suitable focal persons including waste collectors in the target areas to ensure sufficient monetary or in-kind incentives are given to them to continue their assigned SWM activities, especially regular household waste collection. In addition, the suitable management system of assets including waste collection pushcarts should be discussed among the nominated waste collectors, community representatives, and project implementers by considering the project duration as well as the existing community structure.
- Focal governmental institution (i.e., the Urban Environmental Conservation and Cleansing Department (UECCD)) shall be mobilised to ensure wastes are transported from the community collection sites to the municipal dump sites throughout the project intervention. Their participation will help ensure the sustainability of the project.
- Review of each intervention and reflection of lessons learned for each intervention launched are important. For example, the quality of the intervention became better in the latter phases of the project, specifically phase 2 and phase 3 because staff of the implementing partner gained more experience from implementation and improved the activities and approaches. They build up capacity on providing training and gain more knowledge on a variety of livestock breeding.
- One of the recommendations from the beneficiaries was the provision of more garbage bins. However, material of garbage bin should be carefully selected that they are non-plastic but also are made from durable and sustainable materials. For example, garbage bins made from bamboo and fishing net could be easily damaged, but the use of plastic garbage bins contradict the principle of promoting plastic use reduction.

[3] UN-Habitat remobilized the communities and the communities are restarted and preparing to restart the SWM activities in their communities as of July 2023.

5. CONCLUSION AND RECOMMENDATIONS

The survey was conducted in 23 project locations and an equal number of adjacent areas. In addition, it was done at a location where the improved solid waste management practice was implemented.

The findings show that the project interventions had a great impact on 23 target communities. Altogether 99% of beneficiaries responded that they were very or somewhat satisfied with the project intervention and said the project changed the behaviour of beneficiaries in their household waste management. A great proportion of people from project areas have come to practise waste segregation, compost making, and plastic bag use reduction. Some non-beneficiaries from adjacent areas are also benefited from the project indirectly and they were practising SWM activities. Respondents perceive that the practices of people to segregate their household waste and dispose it off regularly are likely to continue as high proportions of beneficiaries have expressed their satisfaction with them. They believe that these two components of the project directly benefit their households and their communities. Although the project increased number of compost making practitioners, it has less impact than the above two for reasons such as their having limited spaces and it takes some time to reap benefits from the work. Thanks to the project, six fold of the project beneficiaries try to reduce plastic bag use compared to non-beneficiaries. Almost twice proportion of beneficiaries bring their own reusable bags/ containers to shop compared to non-beneficiaries.

The monitoring survey result indicates sustainability of the project interventions because most of target communities continuously practise SWM activities after a year (phase 3) and four months (phase 2). For example, knowledge level (know well and know some extent) on waste segregation of phase 1 (100%) and phase 2 (96.19%) of beneficiaries are higher than that of phase 3 (87.78%). Another example is when it comes to household waste segregation,100% of phase 1 and 2 beneficiaries but 92.22% of phase 3 beneficiaries continue the practice.

Although beneficiaries may continue to have knowledge about SWM, more activities to ensure managerial measures could have been enforced because six communities out of 23 communities stopped some of the SWM activities after the project intervention due to several reasons, such as leaving of nominated waste collectors with pushcart, less commitment of local shops for plastic bag reduction campaign, and lack of enforcement on the people to separate their household waste properly.

Remobilization of six communities will take additional time and will need human resources to restart the SWM activities on the ground. Therefore, future SWM activities are recommended to have a longer period of implementation with more capacity building trainings conducted to enhance knowledge of beneficiaries and to provide incentives for activities (i.e. compost harvesting). In addition, the cost of waste collection may influence the percentage of households who are able to contribute to maintain the service and therefore to the sustainability of waste collection practices in the communities. The setting of waste collection fee should hence be decided carefully based on economic capacity of the target beneficiaries and suitable income for the waste collectors. Other possible mitigation measures could be preparation of the SWM action plan, clear description of roles and responsibilities of focal persons, and decision on management of SWM-related properties (i.e. push cart) at the beginning of interventions through discussions and consultations with community leaders, community volunteers, and local authorities.

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