

## Waste Management Practices: A case study of Phooshar Chiwog

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### Introduction

There is a need for strict and efficient enforcement of waste management. In Bhutan, the different agencies of the government have been initiating many nationwide activities including waste management advocacy. Further, few private entities are also striving to educate and sensitise the general public by initiating cleaning campaigns. However, the impact of these initiatives does not sustain. Therefore, irresponsible waste disposal continues to be an issue at global, national and community levels. Against this backdrop, this case study will attempt to understand the waste management practices in Phooshar Chiwog<sup>1</sup> in the context of knowledge, attitudes and practice (KAP) using as descriptive approach. The sample of this study are the residents of Phooshar Chiwog and the final year students of Norbuling Rigter College. The data for the study was collected from 40 respondents through a structured questionnaire.

### Literature Review

A study on waste management conducted on a 100 mountain refugees showed that most of the waste-related problem in mountain refugees was created by hikers (Lebersorger et al., 2011). It was also seen that proper information and awareness on waste management were lacking among the mountain refugees. Further, the absence of proper waste segregation was also observed.

In another study by Yadav (2015), the author states that the generation of waste has exponentially increased in the last few decades. The increase in waste has not only

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<sup>1</sup>Phooshar Chiwog is located in Doteng Gewog, Paro. It has a population of about 100 people excluding the students and staff of Norbuling Rigter College.

affected human beings but also wildlife and the environment as a whole. He also states that although the developed countries have the most advanced waste management system, yet they produce more waste than the developing and underdeveloped countries. In a similar context, a study conducted on solid waste management in developing countries by Kumar et. al. (2020) states that inadequacy of municipal budget creates a major challenge in solving the problem of waste in developing countries. The study also suggests that waste management education initiatives would enhance proper waste management in the community.

Recognising the threats posed by irresponsible waste management, many principles and models have been created to tackle the problem of waste management around the globe. For example, the Life Cycle Assessment (LCA) technique has been used for managing waste over a decade. The 3R principles which include “Recycle”, “Reuse” and “Reduce” is another widely used method. It is regarded as an effective method of waste management (Christensen et al., 2020; Das et al., 2019). In a similar study conducted by Pardini et al. (2020), the authors discuss new technological advancement in waste management known as the Internet of Things (IoT). The authors state that the future of waste management would be done smartly with IoT. Many industries are investing in creating a user-friendly waste management system that will not only ease the waste management for households, but it will also be environment friendly (Raveesh et al., 2015).

One of the main reasons for increase of waste in a community is the lack of a proper waste management system. For example, the study conducted by Sunil Kumar et al. (2017) points that, in India, the implementation of a proper waste management system is an issue due to lack of experienced engineers and environmental experts. In a similar study conducted in Indonesia, Hidayat et al.(2019) discusses the management of plastic wastes created by big industries. The authors suggest the need for industries in Indonesia to work together to come up with a common strategy for reverse logistics. This strategy will ensure that the plastic waste produced by big industries finds its way back to its place of origin where it can be recycled and reused.

Babaei et al. (2015) conducted a study to evaluate the knowledge, attitude and practice on solid waste management of the people of Abadan. The data was collected through structured questionnaire and Chi-square test was done. The findings of the study highlighted that the people of Abadan had a positive attitude towards solid waste management. However, only few had the knowledge towards managing the solid waste and since they lacked the knowledge in solid waste management, the people did not practice any proper ways of managing solid wastes.

A similar study was conducted by Almasi et al.(2019) on the women of Kermanshah city in Iran. The study was conducted to see if Kermanshahi women follow the principle of reducing, recycling and reusing solid waste. The findings of the study presented that Kermanshahi women only had a satisfactory level of KAP towards solid waste management. The study also discusses the opportunities to use modern technologies like internet and television to enhance and disseminate the knowledge of solid waste management.

Tatlonghari and Jamias (2010) studied knowledge, attitudes and practices of village people of Sta. Rosa City, Laguna, Philippines towards solid waste management. The study used t-test and one way ANOVA. The findings of the study revealed that majority of the respondents had knowledge on solid waste management and that they also

practiced the principle of reducing, recycling and reusing solid waste. A similar study by Owojori et al. (2022) on the students of rural South Africa highlighted that knowledge regarding solid waste management among the students were very low. However, the students had a positive attitude towards learning the solid waste management techniques.

What is clear from the literature review is that generally people carried positive attitude towards waste management and in most cases they also had knowledge of waste management. However, all the studies point to the problem of practice. The issue is with implementation which demands for strategic intervention plans.

## Data Analysis and Interpretation

### Respondent Profile

**Table 1.**

Respondent information

	Characteristic	Frequency	Percentage (N=40)
<b>Sex</b>	Male	20	50
	Female	20	50
<b>Age</b>	25 and below	22	55
	26-35	11	27.5
	36-45	3	7.5
	46 and above	4	10
<b>Number of members living in your house</b>	Less than 5	25	62.5
	5 to 7 members	12	30
	7 to 10 members	1	2.5
	More than 10 members	2	5
<b>No of years lived in Phooshar</b>	Less than a year	12	30
	1-2 years	6	15
	3-4 years	10	25
	5-9years	2	5
	More than 9 years	10	25

Source: Survey Questionnaire

Table 1 presents the respondent information of this study. By gender, the study had equal number of male and female respondents (50% each). Most of the respondents are from the age group of 25 years and below followed by the age group of 26 to 35 years. The study also show that most families had less than 5 members followed by 5 to 7 members while 2% of the respondents reported that there are more than 10 members in the family. Interestingly, the newly settled families make up 12 % of the total population. This is followed by 10% of the respondents reporting that they have lived in Phooshar for more than 9 years.

**Table 2.**

Level of education

	Characteristic	Frequency	Percentage (N=40)
	Never schooled	7	17.5
	High School and below	8	20
	Pursuing undergraduate studies	13	32.5
	Postgraduate	12	30

Source: Survey Questionnaire

Most of the respondents (32.5%) are pursuing undergraduate studies while 30% are with a post graduate degree. This percentage of respondents with higher education level is caused by the inclusion of respondents from Norbuling Rigter College.

**Table 3.**

Information on a waste management advocacy programme

Characteristic		Frequency	Percentage (N=40)
Attended advocacy on Waste Management	Yes	15	37.5
	No	25	62.5
No of times attending waste management advocacy (For those who responded Yes)	1 time	3	20
	2 times	3	20
	3 times	5	33.3
	More than 3 times	4	26.7

Source: Survey Questionnaire

Majority of the respondents (62.5%) reported that they did not attend any waste management advocacy programmes. Of those who attended, 33.3% reported attending three times followed by 26.7% of the respondents reporting to have attended more than thrice.

### KAP analysis

The following section presents the findings of KAP analysis.

**Table 4.**

Knowledge on waste management

Particulars	Agree (%)	Neutral (%)	Disagree (%)
We can recycle our waste and convert it into resource.	80	2.5	17.5
Waste is a danger to health and environment.	92	5	3
I know how to segregate waste.	97	3	0
It is important to dispose my waste properly.	87.5	5	7.5
Garbage left unattended in open space is a public health issue.	90	5	5
Improper waste management leads to environmental problem.	92	8	0
People should attend waste management campaigns and program as it can help reduce waste.	85	12.5	25
Use of plastic is banned by the government.	62.5	3	7.5
Avoiding use of items wrapped in plastic reduces waste.	87.5	7.5	5
Re-using plastic bags for shopping is good for reducing waste.	87.5	7.5	5
Plastics are non bio-degradable	90	7.5	2.5
Proper waste management at source can reduce waste and waste management problems in the community.	92.5	5	2.5
Solving waste management issues demand everyone's immediate attention.	95	5	0
Adhering to waste management rules initiated by the Community or Government helps reduce dangers posed by waste.	9	10	0
Putting my waste into garage containers is my responsibility.	95	5	0
I know about waste management principles of reduce, reuse, and recycle.	85	10	5
We should dump waste in designated locations instead of dumping it as per our convenience.	95	2.5	2.5

Source: Survey Questionnaire

Broadly, table 4 shows that people of Phooshar Chiwog have basic knowledge of waste management. They also recognise that waste can be harmful to the people living in the locality and the environment as a whole.

**Table 5.**  
Attitude on waste management

Particulars	Agree (%)	Neutral (%)	Disagree (%)
We must recycle our waste and try to convert it into resource.	77.5	15	7.5
People should be educated on waste as a danger to health and environment.	97.5	2.5	0
It is important to segregate waste at source	87.5	10	2.5
I should dispose my waste properly.	92.5	2.5	5
It is important to advocate that garbage left unattended in open space is a public health issue.	100	0	0
It is important to educate people that improper waste management leads to environmental problem.	90	5	5
It is important for people to attend waste management campaigns and programmes as will help reduce waste.	92.5	7.5	0
I am happy that Government banned the use of plastic.	85	15	0
People must avoid use of items wrapped in plastic.	80	15	5
People must re-use plastic bags for shopping as it is good for reducing waste.	87.5	2.5	10
People must know that plastics are non bio-degradable	92.5	5	2.5
It is important to educate people on proper waste management at source as it reduces waste and waste management problems in the community.	95	5	0
It is important for people to know that solving waste management issues demand everyone's immediate attention.	92.5	7.5	0
People should adhere to waste management rules initiated by the Community or Government.	90	7.5	2.5
Putting waste into garbage containers should be everyone's responsibility.	92.5	5	2.5
I care about waste management principles of reduce, reuse, and recycle.	87.5	5	7.5
I do not feel comfortable to dump waste as per my convenience instead of dumping in designated place.	82.5	10	7.5

Source: Survey Questionnaire

We can understand from the data provided in Table 5 that the people of Phooshar Chiwog have a positive attitude towards waste management.

**Table 6.**  
Practice on waste management

Particulars	Agree (%)	Neutral (%)	Disagree (%)
I recycle waste and try to convert it into resource.	55	15	30
I dispose waste responsibly to reduce danger to health and environment.	77.5	20	2.5
I segregate waste at source.	87.5	7.5	5
I dispose my waste properly.	90	5	5
I do not leave my garbage unattended in open space since it is a public health issue.	92.5	5	2.5
I attend advocacy on proper waste management to reduce environmental problem.	57.5	20	22.5
I attend waste management campaigns and programmes as it helps in getting knowledge and skills to reduce waste.	52.5	20	27.5
I discourage my family members to use plastic containers.	57.5	30	12.5
I avoid using items wrapped in plastic.	57.5	22.5	20
I re-use plastic bags for shopping as it is good for reducing waste.	82.5	5	12.5
I dispose plastics properly since it is non bio-degradable	85	12.5	2.5
I manage my waste properly at source as it reduces waste and waste management problems in the community.	85	12.5	2.5
I participate in waste management activities as it is everyone's responsibility.	75	15	10
I adhere to waste management rules initiated by the Community or Government.	87.5	12.5	0
I put waste into garage containers responsibly.	90	10	0
I reduce, reuse, and recycle my waste.	60	25	15
I do not dump waste as per my convenience instead of dumping in designated place.	90	7.5	2.5

Source: Survey Questionnaire

Table 6 presents the waste management practice of people of Phooshar Chiwog. The findings show that people of Phooshar Chiwog have issues with good waste management practices. For example, the people in the locality knows that converting waste into resources can reduce the waste problem in Phooshar Chiwog, but only 55% of the total respondent responded that they convert waste into resources. Similarly, people of Phooshar Chiwog have the knowledge of 3Rs but only 60% of the total respondents practice it resulting mainly from lack of any capacity building on how to reduce, reuse and recycle waste.

### **Gap Analysis**

The following step was applied for Gap analysis. For generating aggregate of each KAP domain, strongly agree, and agree options were combined into one scale named agree. Similarly, strongly disagree and disagree options were combined into one option named disagree. The option neutral was kept as it is. The aggregate total of all the 3 options was then divided by the total number of questions in each domain. The aggregated findings on gap between the three KAP domains is presented in table 7.

**Table 7.**  
Gap analysis on KAP

Domains of analysis	Agree	Neutral	Disagree
Knowledge	88.49	7.68	3.83
Attitude	89.56	7.06	3.38
Practice	75.44	14.41	10.15

Source: Author's Calculation

The gap analysis of KAP of waste management in *Phooshar Chiwog* shows that 88.49% of the total respondents agree that they have the knowledge of waste management. As discussed in table 4, most of the respondents agree that waste can be harmful for environment as well as health. Further, residents of Phoosar Chiwog also expressed that they know how to segregate waste and have knowledge of reuse, reduce and recycle. They also agree that reducing waste management from its source can solve the problem for the community. The respondents are also aware that managing waste is a responsibility of every individual.

The study respondents of Phooshar Chiwog also reported positive attitude towards waste management. As presented in table 5, the respondents believe that educating people about waste management will solve waste management problem in the locality. Further, the respondents also recognise that waste management rules formulated by the government are for their own benefit and they should therefore, adhere to it.

Though the people of Phooshar Chiwog have knowledge of waste management and have a positive attitude towards waste management, there is a gap between their knowledge and attitude on one hand and their practice on the other. The study findings reveal that most of the challenges of waste management are related to practice as presented in table 6. For example, the government initiates waste management campaigns and advocacy programmes which help people to gain waste reducing skills. Unfortunately, people hardly take part in such programmes. Another example is related to the time of plastic ban in Bhutan when, according to the respondents of this study, they continued to use plastics and items wrapped in plastic despite the guidelines issued by the government.

Comparison of specific indicators of knowledge, attitude and practice highlights the gap. For instance, in the knowledge domain, 80% of the respondents expressed that "we can recycle our waste and convert it into resources". In the attitude domain, 77.5% of the respondents expressed that "we must recycle our waste and try to convert it into resources". Unfortunately, in the practice domain, only 55% of the respondents reported "I recycle waste and try to convert it into resources".

Similarly, in the practice domain, analysis revealed that only 57.5% of the total respondents encourage their family members to avoid plastic bags. Similarly, under the practice domain only 57.5% of the respondents expressed that they avoid use of items wrapped in plastic.

Although people know how to reuse, reduce and recycle, people hardly do so because they do not know how to convert waste into resources. This can be seen in the practice domain "I reduce, reuse, and recycle my waste" where only 60% of the total respondents agreed that they follow the principle of 3Rs. This is mainly because the

people of Phooshar Chiwog do not have the necessary skills to practice 3Rs. Comparison of all the indicators of KAP show that while people have a fairly good knowledge of waste management and carry a positive attitude towards waste management, practice is poor.

**Table 8.**  
General waste management information

Assessment indicators	Yes	No
Do you segregate waste?	77.5%	22.5%
The waste disposal method is a problem in the community.	70.0%	30.0%
There is a waste management centre in my community.	42.5%	57.5%
People in my community dispose of their waste properly.	52.5%	47.5%
With the increase in population and changing consumption habits and patterns, the amount of waste we generate is increasing in the community.	100.0%	0.0%
Do you store your waste?	87.5%	12.5%
Is there any public disposal facility near your community?	65.0%	35.0%
Waste is a concern in Phooshar Chiwog	66.7%	33.3%

Source: Survey Questionnaire

The findings of one indicator presented in table 8 is similar to the findings of Yadav (2015) where 100% of the respondents reported that they know the source of waste which is co-related to increase in population and changing consumption habits and patterns. 87.5% of the respondents reported that they store their waste. However, the areas of concern are absence of waste management center in the community, absence of public disposal facility and 47.5% of the respondents expressing that the community members do not dispose their waste properly. Another area of concern is that majority (66.7%) of the respondents voiced that waste is a concern in Phooshar Chiwog. Further, 70% of the respondents believe that there is a problem of proper waste management in the locality. Respondents also shared during interviews that the waste disposal centre in Doteng Gewog is far from Phooshar Chiwog and there is no municipal vehicle available to dispose their waste. This finding alignes with the study findings of Kumar et al., (2020) as they state that due to improper services provided by the municipal organisation of the locality, there is a problem with waste management. This demands intervention programmes and plans to enhance waste management.

**Table 9.**  
Most common facility used for storing waste

Items	Percentage
Basket	10.0%
Plastic Bags	27.5%
Tin/Can	2.5%
Sack	22.5%
Cartoon	15.0%
Bucket	17.5%
Dust bin	2.5%
Bottles	2.5%



Source: Survey Questionnaire

Data presented in table 9 show that respondents use a wide range of facilities to store their waste. The most popular facility used for waste storage is plastic bags (27.5%) followed by bucket (17.5%) and cartoon boxes (15%). While not a popular practice, people also use tins/cans, dust bins and even bottles to store their waste.

**Table 10.**

Person managing family/household waste

Person managing family/household waste	Percentage
Father	7.5%
Mother	60.0%
Brothers	2.5%
Sisters	2.5%
All the family member	10.0%
Children	5.0%
Myself	12.5%

Source: Survey Questionnaire

Table 10 show that most of the household waste is managed by the mother of the family (60%) while only 10% takes waste management as a shared responsibility of all the members of the family. This finding clearly indicates that most of the family members do not bother about waste management. This will have a negative impact on waste management in the community. Thus, it is important to initiate advocacy programmes on waste management knowledge and skills.

**Table 11.**

Two most produced waste

Two most produced waste	Percentage
Plastic items	95%
Food waste	52.5%

Source: Survey Questionnaire

The respondents reported that plastic items (95%) and food waste (52.2%) are two wastes produced in high quantity in Phooshar Chowog. This indicates that people do not have necessary knowledge and skills or they lack awareness on 3Rs which calls for frequent and regular awareness and sensitisation programmes in the community on waste management.

**Table 12.**

Most common methods of disposing waste

Most common methods of disposing waste	Percentage
Burn the waste somewhere near the house	32.5%
Dump the waste outside the house	2.5%
Bury it somewhere near the house	5.0%
Dispose it in the community dumpyard	40.0%
Put in dustbin	17.5%
Garbage truck/vehicle	2.5%

Source: Survey Questionnaire

Table 12 shows that majority of the people are making use of community dumpyard. Qualitative data showed that people who have vehicles take initiative to collect waste from their neighbours and dump in the community dumpyard. However, a large section of the respondents (32.5%) reported that they burn their waste near their house which

causes air pollution in the community.

**Table 13.**

Frequency of disposing waste

Frequency of disposing waste	Percentage
Everyday	10.0%
Once every two days	12.5%
Once every three days	25.0%
Once a week	42.5%
Once a Month	2.5%
Once a two week	2.5%
Twice a week	2.5%
Whenever Full	2.5%

Source: Survey Questionnaire

42.5% of the respondents reported that they dispose their household waste on a weekly basis followed by 25% who disposes once every three days. 10% have also reported that they dispose everyday. We can conclude that in general, the majority of the study respondents dispose their waste on a timely basis.

**Table 14.**

Time of disposing waste

Time of disposing waste	Percentage
No definite time	55%
Between 6 am to 6 pm	40%
After 6 pm	5%

Source: Survey Questionnaire

Table 14 shows that the majority of respondents (55%) do not have a definite time to dispose their waste. On the other hand, 40% of the respondents dispose their waste between 6 am to 6 pm.

**Table 15.**

Distance to waste disposal site

Distance to waste disposal site	Percentage
Less than 5 minutes	3.3%
6 to 10 minutes	20.0%
11 to 15 minutes	53.3%
More than 15 minutes	23.3%

Source: Survey Questionnaire

Majority of the respondents (53.3%) reported that it takes them 11 to 15 minutes to reach the waste disposal site. 23.3% of the respondents said that it takes them more than 15 minutes to reach the waste disposal site which is substantial. Only 3.3% of the respondents reported that it takes them less than 5 minutes to reach the waste disposal site. This indicates the need to take public waste disposal site closer to the community to facilitate effective waste management in the community.

**Table 16.**

Habit of disposing waste

Habit of disposing waste	Percentage
Dispose of properly in a designated place	38.5%
Dispose around the disposal facility	51.3%
Dispose without segregation	10.3%

Source: Survey Questionnaire

A matter of concern is that 51.3% of the respondents reported that they dispose their waste around the disposal facility irresponsibly while 10.3% dispose without segregation. Only 38.5% dispose properly in designated places. This demands for waste disposal sensitisation.

**Table 17.**

Response when seeing waste in your neighbourhood

Response when seeing waste in your neighbourhood	Percentage
Pick to dispose properly	76.9%
Initiate cleaning campaign	10.3%
Ignore	12.8%

Source: Survey Questionnaire

A matter of encouragement is that most of the respondents (76.9%) practice the habit of picking up waste when they see waste in the neighbourhood and dispose in the proper place when they see the waste in their neighbourhood while 10.3% initiate cleaning campaigns. There are also people (12.8%) who ignore even when they see waste in the neighbourhood which is concerning and calls for intervention plans.

### **Conclusion and recommendation**

An important conclusion of this study is that there is a gap between good waste management knowledge and attitude on one hand and poor practice on the other. The study vividly showed that majority of the respondents have knowledge on waste management and a positive attitude towards it. They know that waste is harmful for the environment and health. They also have knowledge on waste segregation and 3Rs and recognize that reducing waste at source can solve the problem for the community (reuse, reduce and recycle) However, people do not put into practice their waste management knowledge and positive attitude towards waste management such as picking up waste when they see it and disposing it at a designated place.

The study also revealed generation of waste is an outcome of increase in population in Phooshar Chiwog as a result of establishment of Norbuling Rigter College. Unfortunately, Phooshar community does not have a waste disposal centre to cater to the increasing population which is the main cause of irresponsible waste disposal in the community.

The study finding also showed the need for proper waste management facility and system in Phooshar Chiwog. The present waste management system is not effective resulting from the distance of the waste disposal facility from Phooshar Chiwog and absence of conveyance to take waste to the designated place.

Another important conclusion that can be drawn from this study is the need to enforce waste management regulations strictly and effectively so that the gap between good knowledge and attitude on one hand and poor waste management practices on the other is addressed.

Thus, the study findings showed the need for frequent advocacy programmes on waste management and the need to build a proper dumping facility. To infuse good waste management practices, there is need to enforce waste management regulations

strictly and effectively by the Doteng Gewog and Paro Dzongkhag Adminsitartion.

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