



# **Rubber Slippers and Environmental Effect in KCB School in Bhutan**

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## **Author's contribution**

*The sole author designed, analysed, interpreted and prepared the manuscript.*

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## **ABSTRACT**

This paper reports the findings from the project implemented in one of the center schools in western district in Bhutan to enhance waste management behaviour among the students. It took the case of using rubber slippers which the Bhutan government provides to center school students for free as an object of focus for studying students' awareness about the effect of rubber and plastic waste on health and environment. The baseline data were collected from grade 10 students (N=30) using questionnaire and semi-structured interviews. Based on the baseline findings, intervention activities were formulated and implemented for a month. Posters were distributed and online sessions were conducted. Besides, an alternative to rubber slipper was explored and experimented on 15 participants to draw comparison in terms of cost, comfort and durability. Post-intervention data were collected using the same tools used for baseline data. Data were analyzed employing descriptive analysis by counting frequency for quantitative data and content analysis technique for qualitative data. The project found that students' perspective toward the rubber waste changed after the project intervention. And it can be concluded that this change is a positive sign that rubber slippers could be replaced by alternative footwear which would reduce waste production contributing to the health and environment significantly.

**Keywords:** *Waste management; waste management behaviour; rubber waste.*

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## 1. INTRODUCTION

This project aimed to enhance awareness among the students of KCB School about the hazardous effects of rubber waste on the environment and health. Waste management is already becoming a pressing issue in Bhutan. Tons of waste is produced everyday causing challenges in managing it. The effect of unmanaged waste is revealing already in the form of landfills spilling over the otherwise pristine environment of Bhutan Chakraborty, Murshed & Chakraborty, [1]. If not timely intervention is made, waste is likely to pose unprecedented hazard to the environment and life.

According to Guerrero, Maas and Hogland [2], although waste management is a common phenomenon in the world, the developing countries are the ones which are mostly affected. It is attributed to the poor management capacity and skills of the developing countries to manage waste. The lack of budget and the poor understanding about the conditions necessary for proper waste management were observed as the fundamental challenges developing countries like Bhutan face. For example, Sambyal [3] remarked that "awareness and proper training is yet not implemented in Bhutan and for proper waste management, awareness rising is a pre-requisite." This suggests there is a need for awareness programs being conducted. Allison [4] and Sambyal [3] further warned about the emerging eWaste in the country. Also, they mentioned about unhandled rubber and plastic waste which are non-biodegradable heralding potential effects on the environment, human and wildlife in Bhutan. A survey in 2008, households in urban areas of Bhutan were found to generate on average 0.253 kg/capita/day of solid waste, Phuntsho, Herat, & Yangden, [5]. Thimphu, the capital city of the nation alone produces 40.3 tons of waste per day; of which 12.73% is recorded to be plastic waste National Environment Council (NEC) [6]. At this scale of waste production, the country could be at a great risk in terms of environment depletion and health hazard.

Against the concern, the nation has promulgated National Waste Management strategies in 2019. It has adopted advocacy and education as one of the measures to curb issues related to waste. The overall aim of the strategy is to prevent and minimize the generation of waste at source, and to divert materials to be refused, re-used, recovered, and recycled, in order to minimize the

amount of waste going to the landfill. However, the implementation of waste management initiatives seems to be confronting various challenges such as "institutional barriers, technical, financial, capacity, information, and public support" NEC [6]. Actually, Bhutan has always put the environment at the foreground of the country's priority. The developmental philosophy of Bhutan supports environment preservation and protection and has adopted it as one of the four pillar of Gross National Happiness. And the country's constitution has mandated the country to keep 60% of its total land always under forest cover. Today, Bhutan claims its success in maintaining 72% [6].

However, now waste production is getting out of hand - not only in the places inhabited by humans, but also the pristine forests are affected. Landfills are becoming a common sight which needs immediate remedy. Contributing to it, the government's initiative to provide free provisions such as school dress, shoes and slippers has become an inadvertent source of huge amounts of rubber waste. Students receive two pairs of rubber slippers annually, which are observed to be worn out in four to five months, and with poor sense of waste management, the unusable slippers become rubber waste posing threat both to human health and the environment. While the government's scheme has a positive effect on socio-economic front of the students, the effect from its waste on the environment needs to be studied There is hardly any study conducted on the effect of the rubber slipper waste on the environment. This project, therefore, aimed to undertake a measure to reduce rubber waste by exploring alternatives to the existing rubber slipper supplied to the center school students. Viewing students' awareness about the hazardous effect of rubber waste on health and environment, the project aimed at creating awareness among the students about the effect of rubber waste.

## 2. METHODOLOGY

The project was conducted in KCB School in one of the western districts in Bhutan. The school is in the proximity to the Phuntsholing town where the industrial area of Bhutan lies. Also, the town shares its border with India, and it functions as the largest commercial hub in Bhutan. It is essential to take into consideration the nature of Phuntsholing town, because the living standard and human behaviour has immediate implication to the society where KCB School is located.

Although the municipality of the town works towards managing the mounting domestic waste coupled with the industrial waste, waste management has remained an overwhelming challenge there. KCB as an educational institution, while it should be supporting the town in terms of waste management by creating awareness about the harms from the waste, the school has been rather producing a huge amount of waste from the worn out rubber slippers. The school has 786 students who receive rubber slippers every year and 38 teachers. The researcher made arrangements with the environment club coordinator, a male teacher to assist with any necessary assistance in undertaking the project. The project involved 30 class ten students. For that, the researcher created a closed group on the Face book so that students could follow the project. Similarly, three teachers participated in the project.

## 2.1 The Project

This project aimed to enhance awareness among the students of KCB School about the hazardous effect of rubber waste on the environment and health.

In order to achieve the aim of this study, the researcher, in this project, tested alternative footwear for cost efficiency and low waste production. Also, through posters and messages related to waste and waste associated hazards, the researcher tried creating awareness about waste management. The study expected the students to show perspective and behavioral change in managing their waste.

## 2.2 Project Implementation and Evaluation

The project was implemented in three phases. In the first phase, the necessary preparatory tasks were completed. The participants were identified and data collection tool, the questionnaire was developed, and interview questions were framed. To complete the phase, baseline data was collected and analyzed; it was completed in a week.

Pre-intervention data were collected from 30 class ten students using questionnaire and semi-structured interview. Although, collecting data from different age groups of students would have been preferable to make the sample representative of the student population of the school, due to the closure of schools because of

Covid 19 pandemic, it was impractical to gather data from a large number of students. Therefore, class X students were chosen as the participants. They could be the most reliable sources of information since they were the senior most students of the school. In addition, the records maintained by the health and environment clubs in the school on the amount of non-degradable waste every year were reviewed (See finding section for the result)

In the second phase, intervention to create awareness on the effect of rubber waste to the students was prepared. Besides the poster and messages about waste management and the effects of rubber and plastic waste to the health and environment, *Canvas* shoes, white shoes made up of cloth, were explored and purchased and distributed to the participants as the alternative to the rubber slipper. While in the initial plan, the waste segregation experiment was supposed to be conducted, but due to absence of students in the school currently, it was infeasible. Therefore, rather than the experiment, the researcher sent messages and posters for a week to the students to draw their consciousness towards rubber waste they produced in the school from their worn out slippers.

After three weeks of implementation of intervention, the third phase was executed. In this phase, post intervention data was collected from the participants using the same research tools used for pre-intervention data. The data was analyzed and a report is being prepared.

## 2.3 Barriers and Enabler

The project had to overcome a number of challenges. Firstly, because the schools were closed in Bhutan due to the Covid 19, the intervention strategy which was to let the student's try on the alternative footwear in the natural setting of school was hindered. Secondly, the plan to place the dust bins around the school campus failed because it was of no use without students in the school. Third, getting the students come online at the same time to discuss the posters and messages about waste management sent to them was difficult because of unstable internet connectivity in some places. However, the biggest challenge that the researcher faced was the change resistant. Similar to what researcher experienced in this project, Chakraborty, Murshed & Chakraborty [1] conducted a study to examine the change

pattern in waste management in Thimphu city, and observed that despite the constant advocacy through medium such as television, news outlets and posters in the towns, waste production has remain the same. Also, it was observed that enforcement of law against littering only increased the defaulter because people unconsciously violated the rule. Nevertheless, almost a year later, there was a significant fall in the number of defaulters. Deciphering from this example, they mentioned that waste management is a human habit and unless it is made into a way of life, the challenge would remain.

Nevertheless, the challenges could be addressed quite effectively so that the outcome of the project need not had to be compromised. And the force behind success to overcome the challenges was the research assistant. He was the main enabler to the success of the project. He assisted in reaching out the sample shoes to the sample students, administered the questionnaires and helped conduct the interviews. He also forwarded the posters and messages for creating awareness to the students.

### **3. DATA ANALYSIS AND FINDINGS**

In order to evaluate the project, it was important to collect pre and post-intervention data. Comparing participants' perception towards waste before and after the intervention offered insight into the effect of the project, and help drawing future implications.

In this section, main results generated from analyzing the survey and interviews with students are presented.

#### **3.1 Participants' Information**

The participants for this project were 30 class x students of KCB who were between the age of 16 to 20. Of 30 students, 14 were male and 16 female. In addition, the researcher also conducted interview with 2 male and 2 female participants from the same sample group.

#### **3.2 Students' General Perspective on the Rubber Slipper**

The baseline data were collected using a questionnaire to examine students' perspective on the use of rubber slippers. Students were asked to rate their agreement from strongly

agree to strongly disagree to the five statements describing their feeling on rubber slippers. The data was analyzed by counting the frequency of occurrence against each statement as shown in Table 2.

The Table 2 shows that generally students share an unsettled perspective about the rubber slippers. While many (n=5 SA and n=12 A) felt the rubber slipper safe, only third (n=10) thought it comfortable. Likewise, although 27 students agreed that rubber slippers last longer than other slippers, only 18 preferred it over other slippers, and only half the number (n=15) liked the rubber slipper.

#### **3.3 Students' Perspective on KCB School's Waste Management System**

Students were asked to rate their statement between the range of 1 to 10. Average of the ratings were computed and analyzed.

The survey in the Table 3 shows that their students' rating differed drastically between pre- and post-intervention data. Overall, students' perspective on schools' waste management effort which was rated good as shown by high average (Ave=6) before intervention significantly fell (Ave=3.4). Also, the average rating for the two statements, no. 1 and no. 4 increased from 4.2 to 7.3 and 5.2 to 8 respectively suggesting that students' perspective about their schools' waste management system changed after the intervention.

#### **3.4 Students' Awareness on Waste Management before and after Intervention**

In order to examine the students' awareness on waste management, students were provided eight closed ended questions. Frequency counts were done to analyze the data as presented in the Table 4.

The finding from the survey as shown in the above table suggests that students' waste management awareness is enhanced moderately. Although all the students mentioned that they attended one awareness program on waste management at least (Statement no. 5), there were a number of cases students showed unawareness and insensitivity on waste management before intervention. For example, only 10 out of 30 students believed the waste from rubber slippers littering around was a big

problem. Likewise, there were only 12 students who felt responsible for a clean environment. However, there were positive changes in their perspective after the intervention. The students who believed the waste from rubber slipper littering around is a problem increased to 26 from 18, and students who felt responsible for a clean environment also increased to 25 from 12. Likewise, students who segregated the biodegradable and non-degradable waste also

**Table 1. Demographic information of the participants**

Variable	category	N=30
Age	Below 15	0
	16 - 20	30
Gender	Male	14
	Female	16
	Others	0

**Table 2. Students' perspective on the rubber slippers**

Statements	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree
Rubber slipper is safe at all time (in rain or sun)	5	12	6	7	0
Rubber slipper last longer than other slippers	20	7	3	0	0
I would choose rubber slipper over others slipper	7	11	6	4	2
I like wearing the rubber slipper school provides	3	12	7	3	5
The rubber slipper is comfortable to wear	4	6	4	9	7

**Table 3. Students' pre and post intervention rating on schools' effort on waste management**

Sl. no	Statement	Before	After
1	I think school should stop providing rubber slippers to the students	4.2	7.3
2	I think my school is doing enough in managing its waste	6	3.5
3	I think school should conduct awareness program on waste management more frequently	5.4	7.1
4	I think footwear made of other material than rubber would be more environmental friendly	5.2	8

**Table 4. Students' awareness on waste disposal behaviour before and after intervention**

Statements	Before		After	
	Yes	No	Yes	No
1. It is okay to dispose all kinds of waste in one pit	22	8	29	1
2. Worn out slipper littering around is a big problem	10	18	26	4
3. We need to have separate waste pit for degradable and non-degradable waste	16	14	27	3
4. We can burn rubber waste along with other wastes	21	9	7	23
5. I have attended at least one awareness program on waste management	30	0	30	0
6. I segregate the waste into degradable and non-degradable before disposal	20	10	26	4
7. I am equally responsible to others for clean environment	12	18	25	5
8. I think burning rubber and plastic waste cause more pollution to air we breathe	22	8	30	0

increased from 16 to 27. So generally, it can be construed that intervention strategies positively impacted the students.

### **3.5 Perspective on the Alternative Footwear**

Canvas shoes which cost Bhutanese ngultrum 300 per pair, which is almost equal to the rubber slipper which cost ngultrum 280, was bought considering its lesser effect on the environment and also more comfort in wearing. It was distributed to 15 students considering the accessibility to them since students are away from the school at the time of the project. To get a sense of its advantage, researcher interviewed 4 students through Facebook messenger. Data were analyzed applying content analysis techniques.

The interview suggests that students prefer shoes over slippers. All four interviewees agreed that it is more comfortable to wear shoes than slippers. However, their reasons were more to do with comfort than their knowledge about the rubber slipper's effect on the environment. For example, one of the interviewee argued that in summer rubber slippers would be more comfortable because it would be the rainy season. Also, he added that even the shoes will become waste after they become unusable.

## **4. INFORMING LITERATURE AND THE PROJECT FINDINGS**

Issue related to waste is one of the gravest challenges most countries are facing today Wilson, Rodic, Cowing, Costas, Whiteman, Scheinberg [7]. In fact the world woke up to the reality of problems with waste ever since the end of World War II. Countries like Germany and Japan started focusing on economic development starting the end of the war till 1985. The focus was too intense that they overlooked the aspects such as social and environmental sustainability almost completely Schreurs [8]. Economic development was therefore coupled with social and environmental challenges such as mounting solid waste production, affecting the health of society and humans. This suggests that the waste problem is not an issue that arises from waste itself, but from multi-dimensions of the society. The culture, lifestyle and social factor play a huge role in the emergence of the waste problem, so, it will take into account this factor also to solve the problem.

Waste management issue is today an issue in Bhutan as well. And it can be attributed to the rapid development Bhutan is going through. In 2012, The International Monetary Fund (IMF) stated that Bhutan is the fourth fastest growing economy in the world Ministry of Education, [9]. And since 1980s urbanization has been rapid, and where only 5% of Bhutan's population was to be estimated to be living in urban, even by 1994 Bhutan had 15% and in 2005, 30.8% of its population living in urban areas. And shifts in the lifestyle and social culture along with expansion of space have suffused the pristine nature with settlement and waste together. According to the National Environment Commission's (NEC) [6] report 'Bhutan State of Environment, 2016,' with rapid socio-economic development, increasing population and urbanization, the country is seeing an increase in the amount of solid waste generated. It is a common sight that landfills are overflowing in all the cities.

Indeed, Bhutan has responded to the problem and put sound mechanisms such as banning import of second-hand cars, scrap materials for reprocessing and reuse, and ban on use of plastic bags. In 2009, the Waste Prevention and Management Act of Bhutan, 2009 was framed to provide a policy framework for solid waste management in Bhutan. However, its implementation still remained unfulfilling. One of the reasons for not being able to implement the policy effectively could be because it does not address the social factors adequately, which are inevitable to overcome the waste management concern. For example, a study conducted by Allison [4] lamented that the current waste management's policies fail to acknowledge the values and practices inherent in a lived religion that contributes to cultural understandings of waste. Buddhism, the dominant religion throughout much of the country, profoundly shapes local beliefs and practices. Local environmental imaginaries and cultural concerns about ritual pollution have confusion with technocratic management protocols, leading to confusion and incompletely implemented policies. (p.425)

In this case, the socio-ecological sustainability education plays an important role in bridging the gap between the social factor and natural factors that could uphold the life of the environment going for the future generation as well. So, this project looked into the effect of rubber slipper waste and how it could be curbed by promoting awareness in the students about the harm of

rubber waste on health and environment. The project found that alternative footwear in the schools could reduce the waste production significantly, and students have a positive perspective towards alternative choice. Also, the findings of the study suggest that advocacy and education on waste management needs to be augmented.

#### **4.1 Evaluation and Success Indicator**

According to Weiss [10] evaluation is the systematic assessment of the operation and/or the outcomes of a program or policy, compared to a set of explicit or implicit standards, as a means of contributing to the improvement of the program or policy. The definition suggests that evaluation is a process that enhances the quality and purpose of the project. So, in determining whether the aim of the project is fulfilled or not, the project was regularly evaluated. In doing so, it is said that from planning, and continuing with execution and evaluation, projects should involve not only the social element, but they also have to be environmentally consistent Godschalk [11] and provide "sound environmental management practices" Dam [12]. Likewise, Riemer and Meyer [13] also emphasized on setting sustainability expectations while evaluating a project. Drawing insight from this literature, the fulfillment of the project was determined by the students' perceptual change, or shift, from the rubber slipper to other foot wear. Also, the project could be considered successful since students' awareness and consciousness towards the effect of waste on health and environment indicated augmentation, which could be viewed through the aforementioned comparison between pre and post-intervention data.

#### **5. CONCLUSION**

Project was deemed necessary in view of rising concern over waste management in Bhutan. It is implemented in KCB in Bhutan with around 786 students since it is a center school. The waste from worn out rubber slippers have been contributing to the already overwhelming amount of plastic and rubber waste which have high environmental and health implications. So, while acknowledging the government's initiative in offering provision to the students for free, which helps maintain socio-psychological equality among the students, rubber slippers seem to be causing health and environment harm more than its benefit. However, it is necessary to investigate through systematic process of project

implementation to see the effect of rubber slipper waste on the environment. Therefore, the project was planned with diligence, and conditions were set for successful implementation.

The project found that students' perspective toward the rubber waste changed after the project intervention. And it can be concluded that this change is a positive sign that rubber slipper could be replaced by alternative footwear which would reduce waste production contributing to the health and environment significantly.

#### **6. RECOMMENDATION**

From the project, it is learned that there are sound policies on waste management in Bhutan. However, it is in the implementation process that the country has to enhance. It could be because policies do not adequately incorporate the socio-cultural aspect of the society in addressing the waste issue. And looking through the lens of socio-ecological education, it is imperative that social culture and human behavior that forms social norms and standards be considered as an important aspect of the policies related to waste management.

In the context of use of rubber slippers in the school, the findings of this project suggest that the government could safely replace it with canvas shoes without much risk of cost escalation.

Also, the findings of the project suggest that schools create more platforms where students get knowledge and awareness about the potential harm the waste could cause on health and environment.

#### **CONSENT AND ETHICAL APPROVAL**

As per the international standard or university standard, ethical approval & participant's written consent has been collected and preserved by the researcher.

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## COMPETING INTERESTS

Author has declared that no competing interests exist.

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