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ENVIRONMENTAL IMPACTS OF THE USE OF DISPOSABLE CUPS IN CAFETERIA OF IER PU, LAHORE

**University of Punjab, Institute of education and research, Pakistan,
[Mahmoonaashraf1@gmail.com](mailto:mahmoonaashraf1@gmail.com) (mahmoona ashraf,
mahmoonaashraf1@gmail.com)**

Abstract

The study was conducted in cafeteria of Institute of Education and Research Punjab University Lahore. Before disposable cups, shared cups were in use which were replaced by disposable cups because of hygiene. Now a days different types of disposable cups are in use, paper cups, PET (polyethylene terephthalate), Poly coated cups, Polystyrene cups and foam cups. In Department of Institute of education and research Punjab University Lahore (IER, PU,Lahore) 150, 200 foam cups (made from Styrofoam) are in use on daily basis. Styrofoam has health as well as environmental issues. 300 cups are being in used in daily basis, 9000 on monthly and 108,000 on annually basis. Foam cups are made up of Polystyrene which is carcinogenic. In Pakistan landfilling and dumping are better methods where high amount of foam cups reduces the lifespan of dump/landfill sites and are less recyclable. In landfill sites Styrene react under high temperature increasing cost of leachate treatment and reduces gas productivity. Under sunlight photo degradation occur causing powdery form which contaminate soil. Shared cups are costly but it is a onetime investment and more hygienic.

Key words: disposable cups, Styrofoam, photo degradation

1. Introduction:

Use of disposable cups is very common at public places like markets, hospital canteens, and cafeterias of schools, colleges and universities, airports, railways stations etc. The culture of disposable cups was introduced in early twenties century. Before the use disposable cups people used shared cups and glasses at public places. About hundred years back this concept was introduced that shared cups and glasses are not hygienic and causing transfer of disease from one person to the others. After this, people being concerned about their health started the use of

disposable cups. In this century different types of disposable cups were introduced with respect to their use and quality of materials. The common types with respect to their materials are paper, plastic and foam cups. These categories are further subdivided into biodegradable, degradable, compostable, recycles, made from paper, plastic, polystyrene and extended polystyrene. Where there are benefits of using these cups, we must also keep in mind that these are terribly effecting the environment. In order to study the impacts of disposable cups we must know some of the most used types of disposable cups for coffee and tea.

2. Literature Review

Paper Cup A product that is biodegradable can be naturally broken down by microorganisms, such as bacteria or fungi, and absorbed back into the ecosystem. These products are composed primarily of naturally-occurring constituent parts, and are often considered "green" or "eco-friendly" products. **PET** (polyethylene terephthalate) part of the polyester family, it is used to make synthetic fibers as well as food and beverage containers. Products made with PET are lightweight and are proficient at blocking gases, solvents, and moisture. They are also strong and impact-resistant. Products made from PET can also be recycled. **Poly-Coated Cups** Featuring a polymer coating for added insulation, poly-coated cups are great for serving hot or cold beverages alike! These cups may have a single or double poly-coating, with each additional layer offering additional rigidity. These cups come in a wide range of colors and sizes, and many feature tightly rolled rims for worry-free, leak-proof drinking. **Polystyrene** available in solid color and clear options, polystyrene cups are made from a high impact material that is sturdy, shatterproof, and flexible. These cups feature smooth rolled rims and come in a variety of styles, sizes, and shapes to meet your unique needs. **Polystyrene plastic cups**, like most plastic cups, are only designed for use with cold beverages though, so keep that in mind when deciding on the perfect cup. **Foam Cups** a great insulator, foam cups make an ideal option for hot or cold beverages. These cups hold their shape better than paper cups, yet still offer your establishment a low-cost, lightweight vessel.



Paper Cup

PET

Poly coated



Polystyrene



Foam Cup

Figure 1: Types of Disposable Cups

Area selected for this study is cafeteria of Institute of education and research Punjab University Lahore (IER PU, Lahore). More than eight hundred students visit the cafeteria of the Department daily and take food, drinks, coffee and tea. Out these eight hundred, 300 to 320 students use to take coffee and tea which served in disposable cups. Ceramic cups (Reusable) are also available but students prefer to be served in disposable cups. According to the manager of the cafeteria

only 5 to 10 students comes whose prefer to use ceramic cups. The cups used in the cafeteria are foam cups. The material used to mad these cups is called Styrofoam. *"Styrofoam" is actually just a brand name.* The white material making up your coffee cup is actually called expanded polystyrene and is very dangerous to the environment.

Polystyrene is a type of plastic. It can be expanded into the foam material that is known as Styrofoam by expanding it with 95% air. It is often used for insulating hot food and beverages. Due to cost effectiveness, no toxicity and high shelf life it is good for business. The Styrofoam downside is, it is not environments friendly and remains in environment for generations. Styrofoam is not biodegradable but it can be chemically broken down into small pieces. These pieces ultimately covers the major portion of landfill. According to Max Roman the phenomenon of breaking down of Styrofoam vary from few years to one million years depending upon the environmental conditions.

3. Methodology

I conducted an interview from the managers of back canteens of IER, there are three canteens which serving black tea, hot coffee, green tea to the students in Styrofoam disposable cups the purpose of the interview to assess amount of disposable cups use in canteens, my interview contains the following some questions:

- How much time have been passed yours in IER canteen?
- Which type of cups do you have in your canteen?
- How many plastic cups you buy daily?
- How many students visit daily in your canteen?
- Which type of cup students prefer most?
- Do you know the impacts of disposable cups on human health and on environment?
- Anyone ever told you about the impacts of disposable cups?

I asked same questions from all managers of canteens everyone is working there around 2 years , and they are serving hot beverages in Styrofoam cups , they told me initially they were have ceramics cups but students didn't like to take beverages in ceramic cups, now they serving hot beverages in disposable cups from last 2 years.

Sr.No	Questions	Answers		
		Canteen#01	Canteen#02	Canteen#03
01	How much time have been passed yours in IER canteen?	≈ 3 Years	≈ 5 Years	≈ 8 Years
02	Which type of cups do you have in your canteen?	Styrofoam cups	Styrofoam cups	Styrofoam cups
03	How many plastic cups you buy daily?	≈110	≈120	≈100
04	How many students visit daily in your canteen who demands for tea or coffee?	≈100	≈100	≈100

05	Which type of cup students prefer most?	Disposable ups	Disposable ups	Disposable ups
06	Do you know the impacts of disposable cups on human health and on environment?	No	No	No
07	Anyone ever told you about the impacts of disposable cups?	No	No	No

4. Result

The average of the data required simply taken from Microsoft excel

Use of cups	Daily	Monthly	Yearly
	300	9000	108,000

As mentioned above about 300 cups are used on daily basis. For a long term calculations more than 9000 in a month and above 108,000 in a year. This is huge amount of cups used in a very small area. From this we can picture what a higher amount it will be if we consider all the institutions or the consumption of foam cups in the whole city. Being a developing country we don't have much resources to tackle such a pollutant. In simple it is a major part of waste disposed every day.

Students are using foam cups and workers serving hot beverages in foam cups, just because they don't have awareness about the impacts of foam cups on health and environment.

5. Discussion

One downside of Styrofoam is health issues. Extended polystyrene (Styrofoam) is combination of polystyrene and air. Polystyrene is derived from styrene which is not friendly to human health. According to National Research Council of USA, styrene classified as carcinogen is found in the tissues of almost every person. Because polystyrene is part of almost all kinds of plastics used for packaging, hot and cold drinks and many others.

The other downside of Styrofoam is environmental impacts because of non-biodegradability and less ability to recycling. As mentioned above about 300 cups are used on daily basis. For a long term calculations more than 9000 in a month and above 108,000 in a year. This is huge amount of cups used in a very small area. From this we can picture what a higher amount it will be if we consider all the institutions or the consumption of foam cups in the whole city. Being a developing country we don't have much resources to tackle such a pollutant. In simple it is a major part of waste disposed every day. Having 50kg/m^3 (0.05g/cm^3) is also not a good indicator to the disposal process. Since the disposal of waste is not a single phase process, it comprises of collection, transfer and disposal. At every stage less density is problematic. Less density means more volume with less mass. Hence less density causes reduction on capacity of waste collection container/bins and transfer truck. After collection waste is transfer to the disposal station. In a country like Pakistan due to economic problems, dumping or landfill are the only best suited processes for waste disposal. In both of these processes density matters a lot. Less density results in reducing the life of dump/landfill site. High amount of disposable foam cups in waste results in low life span of dump/landfill site.

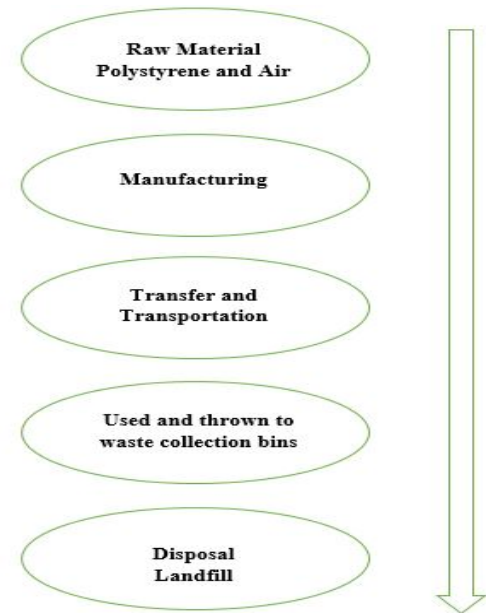


Figure 2: Life cycle of Disposable Cups

Waste is considered an asset which contributing a lot to the economic culture. In our system many people consider the collection of waste is a bright business because of recyclables present in the solid waste. Foam cups are recyclable but the process of recycling of cups is much costly and complicated which is not good for people in this business. Recycling of foam is also not considerable even in the developed countries like UK. According to a report of THE INDEPENDENT their only three recycling facilities for foam cups. Yearly 2.5 billion disposable cups are used in UK, out of these less than one percent are recycled.

Even after the disposal the story does not end. Two long term outcomes from landfill site are leachates and Gas Production. Landfill site is closed by placing a thick layer of soil. The temperature of waste keeps on increasing under biological processes occurring under the layer of soil. Styrene in the foam cups becomes reactive under the higher temperature, leachate which is already highly contaminated becomes more dangerous. It also increases the cost of leachates treatment. Gas from the biological process of the waste is also a source of energy. Larger amount of foam cups also reduce the gas production ability of the waste. Styrofoam (foam cup) is also sensitive before sunlight. When is exposed to sunlight continuously for months photo degradation can occur which converts it to the powder form. This powder form may affect the fertility of land.

Foam cups are light weight which also makes its use more negative for the environments. Due to light weight wind can easily carried them away from the disposal system causing littering of

street and clogging of sewerage systems. During travels and picnics throwing of the cups may affect the marine life.

From economic perspective both disposable and reusable cups can be analyzed as follow

Type	Useful life	Average price	hygienic	Washing cost	Disposal cost
Disposable	1 time	7.5	No	No	Much More
Reusable	>60 times	85	Yes	Yes	Not considerable

According to above perimeters we can see the reusable cup is much better than disposable cup. There is only price not justifiable for a single time use. But for more than one time use reusable cups are even more economical than disposable cups. From this we can say that is much better to use reusable cups than disposable cups. Life time use of reusable cups is less influencing the environmental profile (T.N.Ligthart, A.M.M.Ansems, 2007).

6. Conclusions

Since the benefits of using foam are not as much as we have face there negative impacts on human health and environments. Impacts of foam cups starts from there use till there break down. It cannot be recycled. Foam cups are also not degradable easily. Use of reusable or paper cup can overcome many problems causing by using foam cups. Figure 3 is the summery of the whole study which show why are we using disposable cups and what impacts we are facing.

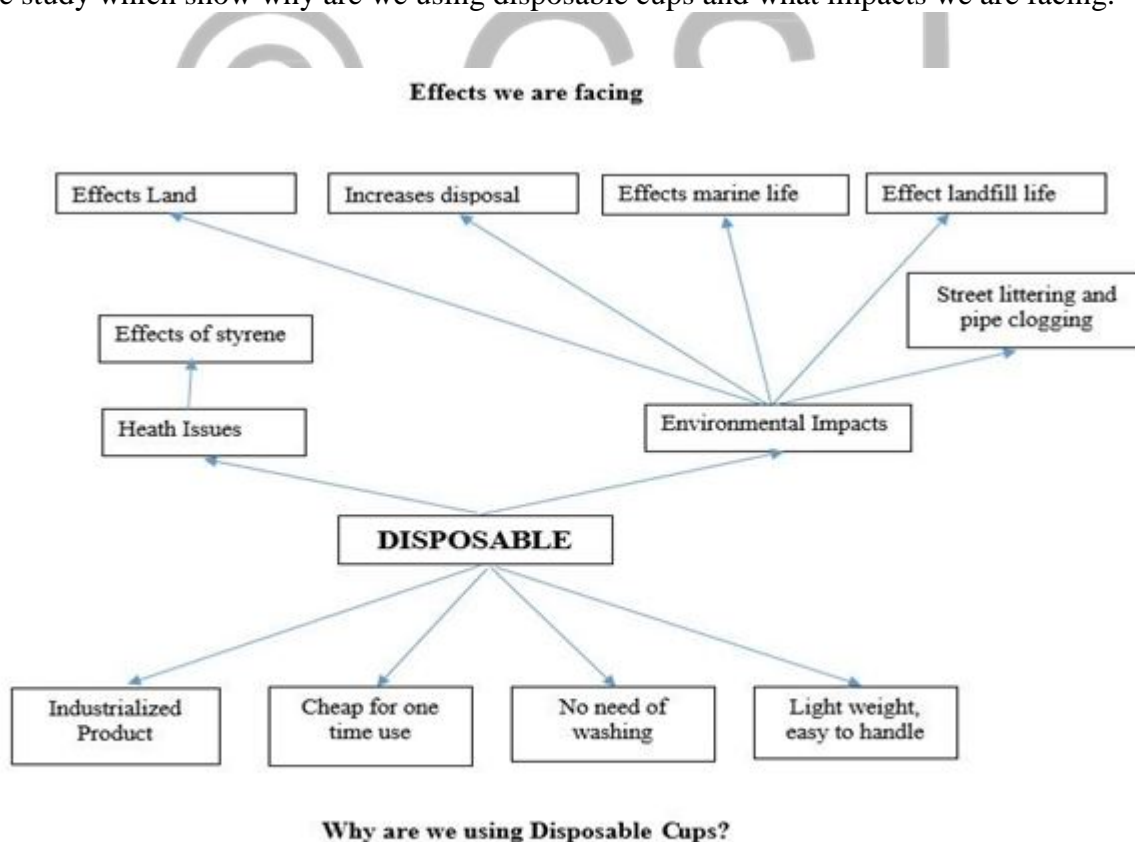


Figure 3: Problem Tree Diagram

7. Recommendations

- Use of these types of materials must be prohibited because of their health and environmental impacts.
- Use of ceramic or paper cups should be promoted.
- Use of reusable cups is more economical than disposable cups.
- Reusable (ceramic) are more hygienic than disposable cups.
- Use of disposable cups can be reduced by giving some discount to the customers on taking coffee or tea in reusable cups and more to those having their own cups.

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