



## Householder Awareness and Perception Regarding Domestic Waste Generated

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### ABSTRACT

**Purpose:** The idea behind this study is to understand the level of awareness and perception towards household waste generation from its daily activity perspective. The waste creates a major problem just in case if it is not recycled. It creates a burden on the environment as well as health hazard to the people surrounding the dump. The waste generated causes economic loss as well as long term environmental damage. Economic progression creates more purchases in terms of binge buying which leads to higher amount of packaging waste as well product usage waste; hence the study.

**Design:** A quantitative study to understand Responsible waste generation a key for sustainability and this study is all about to understand the perception as well as awareness of the waste that every household generates.

**Findings:** The waste needs to be segregated to make better usage of the same for the coming days ahead. A family is the structure of the society and every family needs to be aware and should be conscious of the waste produced and generated.

**Originality:** The paper indicates and reflects the understanding of householder disposal of waste and to conceptualize how best it can be further advanced to reduce the burden on the nature.

**Type of Paper:** Exploratory and Empirical analysis

**Key words:** Household waste, wet and dry waste, dust bins, reduce, reuse, recycle, people, planet and profits, carbon credits, carbon foot print, Types of waste, water, electricity waste, bio waste, SWOC analysis, ABCD analysis.

## 1. INTRODUCTION:

Every product is a result of combinations of raw materials and these raw materials result in to usable products that people use at home. Waste is generated naturally when things are processed and advanced. The process leads waste generation and that creates another issue of recycling the waste. Household waste could be both bio degradable as well as non biodegradable. Bio Degradable waste makes things easier and faster to get mixed with the nature. Householders have things in general that are various stages of degradation in the nature. There are two kinds of waste generated at the house holder level- wet waste and dry waste. The wet waste has its implication and a process based duration to disintegrate in to nature. The overall impact can be felt in the surrounding. Waste can be used for generating bio compost and can be used for back yard farming to become sustainable for domestic consumption. The fact of the matter is agriculture is the base of the economy and for every hose to be sustainable it needs to have kitchen gardens that can make things easier to run the kitchen for daily use.

**TABLE: 1**

THE DETAILS OF THE WASTE GENERATED AND ITS BIO IMPACT ON THE NATURE.

Sno	Type of Waste	Average quantity generated for a 5 member family/ per day/ moth/ year	Perception of Households-Time taken to disintegrate naturally
1	Food waste	500 grams	3- 4 months
2	Semi wet waste	400 grams	3-4 months
3	Plastic waste	100 grams	300 years
4	Wood waste	500 grams	1- 3 years
5	Paper waste	300 grams	5 years
6	Packaging waste	200 grams	5 years
7	Water waste/ detergent waste	10 lts	5 years
8	Glass and bottle waste	150 grams	50 years
9	Sanitary ware/ ceramic waste	10 kg grams	50 years
10	Health care waste	100 grams	10 years
11	Soaps and detergents waste	25 grams	10 years
12	Paints/ Bulbs	100 grams	45 years
13	Rubber, leather footware waste	250 grams	45 years
14	Mobile/ inverter and Automobile battery waste	100 grams to 5 kgs/ per year	50 years
15	Electronic waste/ gadgets waste	10 kgs/ per year	50 years

Source: Compiled by the researchers

## **2. OBJECTIVES:**

The following objectives have been noted to conduct the study and these objectives help us understand better in terms of processes that can be adopted and adapted as a best practice in our society and at homes.

1. To study the awareness and perception of domestic waste ( Multiple response method)
2. To study the awareness and perception of waste recycling (Multiple response method)
3. To study the major factors in waste generation. (Factor analysis)
4. To identify the reasons and problems for waste generation ( Correlation aspects)
5. To suggest measures for better implementation of recycling in households ( Analysis of all the above)

## **3.LITERATURE REVIEW:**

Rapid urbanization and higher income levels is one of the key reasons for high waste generation at household level seen in China (**Xiao et al.(2015)**). Similar studies have been done in Butan in terms of Municipal Solid waste generation, in terms of composition and their challenges to minimize as seen in Thailand(**Hiramatsu, A. et al.2009**).Urban solid waste management and its implications are a key waste management(**Ogbonna et al. 2007**). Household waste generation especially in the urban areas should be predictable or forecastable. Fast growing urbanization with system dynamic modeling is the need of the day(**Dyson, B., & Chang, N. B. 2005**). Consumption patterns and household hazardous solid waste generation are related as seen in countries like (**Otoniel, et.al 2008**). Thus predicting models Bayesian models need to be better designed to assess the quantum of waste that is going to be created in a given social block (**Hoang et.al 2017**). Hence these challenges and opportunities can be enormous for all societies across the globe (**Kumar et.al 2017**). India is at a state of growing more computers usage and hence the e- waste is going to be a challenge (**Awasthi et.al.2018**). Municipal waste and the current scenario is to ensure that they are well equipped with equipment to lift load and segregate both in plastic and solid waste management (**Bhattacharya et.al 2018**) (**Bhat et.al.2018**). A circular economy is created due to this process and such practices are seen within energy and waste management industries in India (**Priyadarshini et.al 2020**). sustainable consumption practices in prevailing green practices like reuse and recyle of household waste need to be enhanced as a thought process (**Pandey et.al 2018**). Opportunities and challenges are going to be plenty in India as the population increases so is the waste generation and in its variety form (**Kumar S. et.al 2017**).

the municipal solid waste generation and piling up creates enormous challenges of GHG emission in cities like Bangalore in India. This city generates in thousands of tonnes every week and could be a base for polluting the underwater and the skies (**Ramachandara et.al 2018**). Hence segregating is the key, be it solid waste or e- waste; this should be encouraged at every household level (**Wadehra S et.al 2018**). sanitary waste becomes more complicated as Menstrual hygiene management is a challenge in India due to large growing population (**Sinha et.al 2018**). Menstrual hygiene and waste disposal is critical in cities as these pad get disintegrated and mix with the underwater systems (**Kaur.R et.al 2018**). Therefore in Cities like Bangalore, Pune, Mumbai, Hyderabad creates more challenges coupled with e-waste (**Awasthi A.K.et.al 2018**).Levels of knowledge makes a difference in rural areas too as seen in cities like Lahore in Pakistan, the challenges are same due to lack of awareness towards environment (**Shahzadi, et.al 2018**). The sustainable development goals can be achieved faster if the impact on the environment is brought down both at urban and rural areas (**Pujara et.al 2019**). Therefore disposal of solid waste and solid waste management has to be taught at various levels in the academic circles, this can bring in green marketing practices (**Banerjee et.al 2019**),(**Mayakkannan. R 2019**) Mini plastic shredder machine can be a boon as they could be used to shred all plastic bottles on a daily basis, this can prevent them filling the drainages and other water movements (**Reddy S & Raju T 2018**). Better and simple design of bottle shredder should be made for large scale usage if the same in multiple locations ( **David, A, & Joel,O.O2018**).E-waste recycling and design of shredder machines should enhance crushing of old electronic components, once shredded it could be separated in a better way (**Kumaran.P et.al 2020**). Household to generates chemical waste and the same should be recycled with better technologies for recycling chemical waters generated at home (**Solis M & Silveira S 2020**). Plastic pollution is exceeding in terms of growth beyond predictive estimate efforts, therefore mitigating them is a challenge (**Borrelle.S.B et.al 2020**). Paper packaging waste should lead to a circular economy for the greater good. Indeed India imports large quantities of Newsprint from various nation as its current availability is a challenge, this circular economy practice should further be enhanced (**Kuo.T.C et.al 2021**). Sorting facilities need to have better predicting models and that would lead to deployment of manpower accordingly (**Kleinhans.k et.al 2021**). Corrugated boxes should be converted in to high quality tissue paper and this generates enormous circulation of the economy (**Zambrano.F. et.al 2021**). Post-consumer plastic packing should also be part of the circular economy (**Pincelli.I.P et.al 2021**). Old furniture should be crushed and made into particle boards for creating new furniture (**Izdinsky.J et.al 2020**). These particle board in general are

eco friendly and disposing them is much easier (**Sanchez-Roldan Z, et al 2020**), when waste furniture is recycle profits are maximized(**Lin C, et al 2020**). This also applies to recycled clothes(**Pandit .P et al 2020**). When recycling is at its peak the evaluation of health systems becomes easier at a larger scale a study of CHSI in india reveals more about it (**Prinja S. et al 2020**). Hence online furniture rental platforms are better and should be encouraged to reduce transportation cost when employees are frequently transferred (**Kapoor A & Vij M 2021**). Clothing industry generates vast amount of waste as seen in at various household levels (**Paras M.K et al 2019**). Textile recycling and textile manufacturing are also impacting the environment due to high demand of varieties of colored clothing (**Leal Filho et.al 2019**). fashion supply chain industries and the textile industries too contribute to household waste generation many fold (**Sandvik I.M & Stubbs.W 2019**). Recycling is the way to greener production and greener opportunities (**Hole G & Hole.A.S 2019**). Recycled materials can lead to easier waste disposal (**Paco A, et al 2012**). Hence brands should encourage Take back initiatives for better segregation at recycling units (**Hvass.k.k & Pederson.E.R.G 2019**) Remanufacturing units should create trade rebates for better and durable cost effective products (**Ray.S. et al 2005**). Consumer return policies should be modified as they need to return once old for better usage by converting it in to new products (**Su.X 2009**).

School is a base for educating children and schools should teach better and efficient methods of menstruation management the same can be carried as a practice in the society at large (**Sivakami M et.al 2019**). Every school and college should have the sanitary waste disposal process or incinerator machines (**Sharika. C et.al 2019**). Biodegrade cellulose sanitary napkins can be a boon to women and should be encouraged for further research, for better and sustainable menstruation (**Sathishkumar G. et.al 2019**)(**Maurya A. & Bhalla.S.G 2020**). Portable sanitary napkin disposal incinerator should be installed in every living society, cups could be an alternative solution for a large population (**Aishwarya.N & Tharani 2019**).

Law and technology collaboration for better solid waste management is a must (**Maji.S 2019**). When better technologies can be deployed then reusable sanitary napkins could be a boon (**Hennegan.J et.al 2017**). Smart city waste management is possible when the process is advanced along with better involvement of people of all ages (**Aithal.P.S 2021**). Routing of vehicles that collect waste with a QR code pasted en-route to all dustbins or wall or gates of residences can reduce the chances of missing out a house in its route (**Han.H & Ponce Cueto E 2015**). Better algorithms to track multi trip vehicles routing can make streets clean as quick as possible (**Babae Tirkolacee E et.al 2019**).

Landfills are a challenge and can create long term environment damage (Yu.X et.al 2020). Biogas generation is the key to sustainable living (Koval.v et.al 2019). All hazardous waste generation should not be dumped in to landfills they need to be neutralized for preventing dangers (Karthikeyan.L. et al 2018). These hazardous waste can be medical waste too (Narayan P et.al 2022). There are many states India which do not comply to the hazardous waste management process and subsequently are also fined by the National Green Tribunal (Devi.K.S et al 2018). Resource recovery and environmental damages needs to be managed by all municipal waste management units (Ahluwalia.I.J & Patel. U 2018). Household waste also needs to be characterized and categorized this ensures easy segregation and advancement of recycle process (Rawat.S & Daverey.A 2018). Health of waste management workers need to be considered for efficiency and they need to be equipped with better working tools (Jayakrishnan T.et al 2013). Solid waste management needs teams like volunteers who are actionable to work with the waste management workers for better and quick disposal (Prajapathi K.K et al 2021). Voluntary support is a must for steering of segregation of waste (Kalyanasundaram et.al 2021). Storing food and preparing for the most difficult days needs preparation and Japanese have a process which can be emulated by others, indeed protecting a house in case of a disaster requires planning and good waste management, preservation management and crisis management (Tabata et al 2018). Integrated solid waste management is a must. Every dumping yard should have an integrated approach for segregation and disintegration of waste in to composte (Somani et.al 2021).

Internet of things dustbins should have sensors hence machine learning for making and reading the type of dust is possible by smart dustbins (Dubey et.al 2020). This would lead to smart garbage management system (Sohag et.al 2020). Smart garbage management system would avoid mixing at home level itself (Shi X et.al 2020) Internet of things should integrate city waste management with domestic dustbins (Sharma.M et.al 2020).

Burning is a challenge, be it agri waste or domestic waste (Chaudhary.P et.al 2021), solid waste management and e waste trends have to be studied city wise in India for a central integration of the waste management process. A cloud based data management system can prevent major pandemics (Kumar A. et al 2020), (Arya.S & Kumar S 2020). Smart garbage collection and eco friendly systems should encompass all residential housing societies with smart bins (Mishra A & Kumar Ray A 2020). Smart Garbage collection is needed for creating an eco friendly environment (Naresh R et al 2020),(Dubey S. et al 2020) Block

chain technologies should enhance maximum reduce, reuse, recycle, release of gas or refuse concepts for betterment(**Chaurasia.V.K et al 2020**).

Kitchen gardens can create dietary supplements better backyard kitchens should be encouraged. Kitchen garden kits should be sold and this can create food security. Small kits to grow own vegetable can reduce kitchen waste a lot (Singh P et.al 2020) can bring in dietary supplements (**Wajpeyi S. et al 2020**), Nutrition can make all the difference in terms of shortage that could be supplemented from a kitchen garden (**Suri S 2020**). Roof top gardens, biodiversity, floating rooftop gardens, can create additional income as well as nutrition in many city areas. Nutrition is a challenge and freshness coupled with better space management can create self sufficiency( Shubha K, et al 2020) and rain water harvesting can make a huge difference in terms of watering these plants (**Datta S 2020**),Rural area can make a difference as space is not a constraint (**Rana G.K et al 2021**).

Households can generate additional incomes through biogas as well as sale of vegetable ( **Narayan K et al 2020**), bio gas can be an add on input to many households if waste is converted to gas(**Paolinni V et al 2018**). Gas hydrates have a potential energy generations ( **Nair.V.C et.al 2018**). Social factors can reduce the household waste accordingly (**Bishnoi M. et.al 2020**). Households too are generating e- waste like mobile phones, gadgets, electronic devices and many more all can be better managed by AI; which should notify when and whom to give the waste (**Shreyas madhav et.al. 2022**). Singapore household waste management systems are unique and can be adopted for India too (**Zhou.J et al 2022**). Food waste and segregation should be a behavior that people should adopt and adapt (**Adelodun et al 2021**),( **Wang X et al 2022**).

Rapid urbanization and semi urban places are catching up with cities and groundwater should be protected for better health (**Gugulothu et.al 2022**), (**Harriss-white B. 2017**). Hence prediction of household is a must, not only of cities but also rural areas to be encompassed (**Kumar A, & Samadder S.R 2017**).

Sustainable growth is the key in rural areas as this reduces most of waste generations (**Yadav A. et al 2017**)Startups should be aware and trained for better planet, profits and people(**Singh.S.et al 2019**) Corporate India has a role to play in terms of contributing profits and allocating for CSR mandatory 2% towards the planet (**Prikkh M 2019**),(**Kumari A & Bandyopadhyay 2018**). Green initiative and CSR is a must (**Kaur S 2017**) (**Mansi M et.al**



2017). Education is a must for sustainable development, sharing economy and caring economy by caring and sharing environment is a must.

**4. RESEARCH AGENDA:** To know whether they are aware of the total waste generation from their respective home. What is their perception of waste generation towards themselves as well as their neighbours and the surrounding areas of their living.

#### **5. RESEARCH METHODOLOGY:**

Exploratory and Descriptive research are the major two research designs used in this study. The study identified the wastage and recycling of households belonging to Mangalore Taluk. The data was collected through a well-structured questionnaire method from rural, semi-urban and urban area households of Mangalore taluk.

Mangalore is a taluk of Dakshina Kannada District in the state of Karnataka. In this Taluk, the Total Population size is 9,94,602, and 2,16,300 households are located. The study was done with a pilot study followed by the main study. A Pilot study was used to find out the reliability of the questionnaire. The study will be validated after calculating Cronbach's alpha and the reliability of the questionnaire was found to be **0.836**. The sample size was determined by Taro Yamane's formula (**Yamane,1967**)

$$n = \frac{N}{1 + N(e)^2}$$

Where,

n= Number of Sample Size

N= Population Size

e=Level of Precision

According to the statistical formula, with a 95% confidence level and 10% precision the sample size will be calculated as follows:

$$n = \frac{2,16,300}{1 + 2,16,300 (0.1)^2}$$

$$n = 100$$

The researcher distributed 120 questionnaires to the household. In that researcher collected 112 questionnaires with proper information. The analysis was done for the primary data. The main tool was descriptive statistics. For Comparing the data Correlation test was under taken and finally factor analysis was done to reduce the questions into some factors. The conceptual Model for understanding the awareness and perception of household waste generation by a householder is mentioned below.

#### **6. THE CONCEPTUAL GRAPHICAL MODEL:**

The model has been designed keeping the following points in mind: Income, area and type of house is linked and connected to purchase. If an individual does not have income he or she will not be in a position to purchase and consume in a big way. The total varieties of household waste generated are: wet/food waste, plastic and chemical wastes, it also includes paint and paint brushes too. Paper, packing material, old clothes, old furniture and sanitary waste as well as sanitary ware waste are few of the major wastes that are generated. This waste is disposed of in the following manner: municipal vehicle, landfills, burning, scrap dealer, self-recycling.

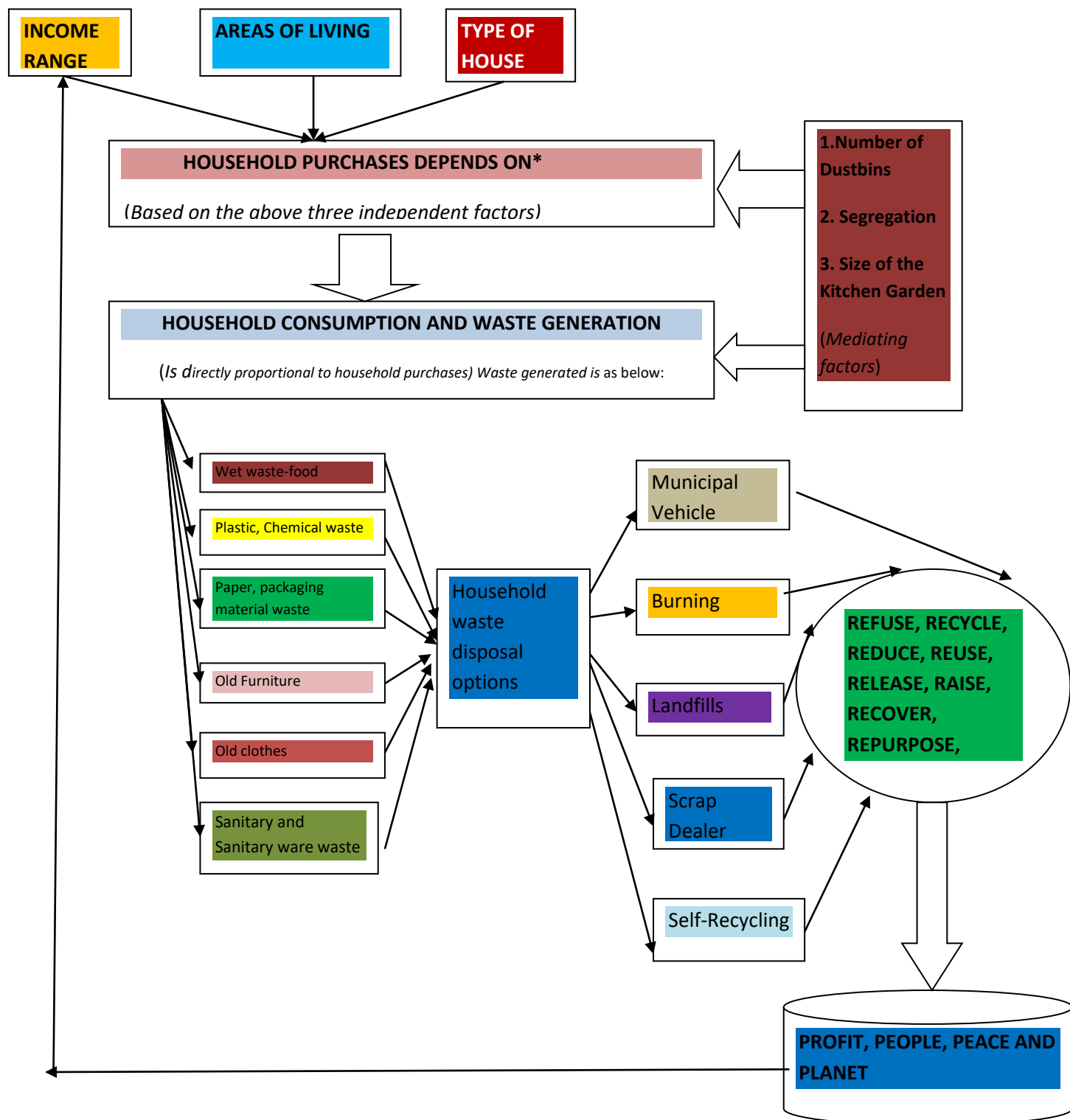


Fig No: 1 Conceptual model of householder waste generation awareness and process

## 7. RESEARCH TOOLS:

A Structured questionnaire, coupled with online focus group interview and statistical tools like SPSS is used for conducting the research. These tools are engaged to collect data and analyze data both quantitative and qualitative observations through zoom app. The interviews

are recorded via the Zoom app to understand the feelings and their perceptions. Number of times the respondents have nodded their heads and accepted, number of times they have not accepted to things that are done in terms of disposal of household waste was noted by the researchers.

## 8.DATA COLLECTION AND ANALYSIS:

**Table No: 8.1**

### HOUSE HOLD WASTE DISPOSAL OPTIONS FREQUENCIES

WASTE DISPOSAL METHOD	No. of Responses	Percent
Municipal vehicle	85	42.1%
Burning	28	13.9%
Selling	48	23.8%
Landfills	9	4.5%
Recycling	14	6.9%
Composting	18	8.9%
Total	202	100.0%

Source: Primary Data

**Table No: 8.2**

### HOUSEHOLD TYPES OF WASTE GENERATED

TYPE OF WASTE	No. of Responses	Percentage
Wet waste	87	25.2%
Plastic waste	84	24.3%
Paper waste	72	20.9%
Old furniture	11	3.2%
Old clothes	26	7.5%
Sanitary	65	18.8%
Total	345	100.0%

Source: Primary Data

**Table No: 8.3**

**HOUSEHOLD WASTE CURRENTLY SENT FOR RECYCLING**

Recycling Products	No. of Responses	Percent
Paper	66	28.4%
Plastic	74	31.9%
Wood furniture	17	7.3%
Old clothes	29	12.5%
Wet waste	46	19.8%
Total	232	100.0%

Source: Primary Data

**Table No: 8.4**

**FACTOR ANALYSIS**

Component Matrix		
	Component	
	1	2
TOTAL WASTE GENERATED	.633	-.159
INCOME OF HOUSE HOLDER	.916	.083
TYPE OF HOUSE	.886	.077
AREA OF STAY	.187	.761
NUMBER OF DUSTBIN	.262	-.708

Source: Primary Data

\*Extraction Method: Principal Component Analysis.

**Interpretation of Factor Analysis:** The above analysis indicates that income is one of the major factor in generating higher waste. The more the income the more the waste generation;

in general the type of house also reflects the income and better the house and better the stay the more amount of waste is generated. Hence the major factor that leads to waste generation is more expenditure due to more income.

**Table No: 8.5**

**CORRELATION**

		TOTALWASTE GENERATED	AREA OF STAY
TOTAL WASTE GENERATED	Pearson Correlation	1	.030
	Sig. (2-tailed)		.756
	N	112	112
AREA OF STAY	Pearson Correlation	.030	1
	Sig. (2-tailed)	.756	
	N	112	112

Source: Primary Data

**Interpretation of Correlation:-**

There is a high correlation between total waste generated to the area of the stay. Higher the area higher the waste generation as urban and semi urban areas are considered as code 2 and code 3 while using spss. Hence the area of stay especially semi urban and urban is generating more waste currently. It also means slowly the rural areas also will catchup in the maximization of waste generation.

**Table No: 8.6****ONEWAY ANOVA**

Particulars	F	Sig.
Waste generated	4.655	.002
Area	.487	.745
Type of house	1.303	.274

Source: Primary Data

**Interpretation of Analysis of Covariance:-**

Area and type of Area is showing significance as .754 and type of house .274 which is significant at the 0.05 level. Thus the conclusion is that the income and place of stay does have an effect on waste generation of a house hold.

**9. OBSERVATIONS:**

It has been observed that higher the income higher the waste generation. The semi urban locations are catching up with the quantum of city waste generation. It is important to be noted that better waste management should be incorporated both in rural and semi urban areas for avoiding of break out of a dangerous pandemics in the near future. With a population of 140 crores we need to be more alert in terms of making things better. Environment plays a major role in developing our future generations; hence sustainability is the key.

## **10.ABCD ANALYSIS:**

**10.1 Advantageous:** This study helps us to be well prepared for any challenges that we are bound to face in the near future. The perception of people towards waste management has to be modified and this study has made strides towards these dimensions

**10.2 Benefits:** Preparing, educating, upgrading with AI tools is a must. the study gives us and idea of making an economic viability from waste. The benefit of doing this research is to understand how future problems can be eliminated and overcome.

**10.3 Constraints:** Since the study through enormous challenges these should be redefined to make a better living. Meeting people and house wives was a constraint as they were not ready to share there waste disposal methods. They were reluctant to undertake these questions and answers were obtained through persuasion and motivation to reply

**10.4 Disadvantageous:**The same does not incorporate hospitals and hotels or other service sectors that are similar to households. The waste disposal method needs to incorporate waste management workers too, which was not possible in this study, hence the true picture is still a bit blurred than what actual could be.

## **11.LIMITATIONS OF THE STUDY:**

The study on limits to households and not organizations these can be taken up in the future studies as environmental issues, climate changes and agri challenges are not studied in this research. This research did not encompass, waste management companies like M/s Anthony Waste, which operates in major locations in Karnataka; does not include, institutions, industrial and other major polluting industries.

## **12.FUTURE SCOPE OF THE STUDY:**

Future studies can be based on this to understand the modify rectify the environment at a global scale. Green house emission, global warming, waste management and refuse to use thought process can be studied. Release and storage of Methane gas is a must for future uses. Every house needs to have a vermin composte bin and this helps the entire society to be clean and sustainable; lot of studies can be done to preserve nature and environment for a better living. Future studies also can be done in areas of fuel, food and fertilizer which is the key to an economic growth. Countries depend on others for these three sources. How to become independent on these three areas are to be studied.



### 13. SUGGESTIONS:

All dustbins should become smart dustbins. Each dustbin should alert the user if a wrong item is put in it. Every house to be trained to make things happen as per sustainability development process for better follow of things. All students should be trained to maintain both oral and menstrual hygiene at school level. The law should also strictly be implemented for the goodness of every citizen. Roads, pavements and walkways should be clean and neat. Few more variety of dustbins to be created and installed in prominent places in various cities, bottle crushers to installed in every street corner and it should be a business generator model.

### 14. CONCLUSIONS:

Overall the study guides us insights to make a better living. A sustainable behavior is a Must. Householder is the base and training is a must at block levels in the society. The society has to change for the globe to change and people to change.

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