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Household Participation in Domestic Waste Disposal and Recycling in Select Areas of Salcete Taluka

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ABSTRACT

The total waste generated across the municipal areas in the state is approximately 190 tonnes per day as per a Goa state pollution control board report on Municipal Solid Waste. Processing waste through conversion of parts or all of the waste into other useful material or to recover the original raw matter isrecycling which with changing lifestyles there is demand for packaged products. There is no authentic data available on the waste generation and its disposal in the 189 village panchayats of Goa. This study aims at understanding the pivotal role of recycle and the willingness of people to recycle, methods of household garbage storage and disposal and concern about solid waste management.

Key words: *SWM, Recycle, garbage storage and disposal*

INTRODUCTION

The waste the world generates has become an area of concern for the world and defined as a substance or object discarded by its owner after use.[1]Production of consumer products generates waste (Tammemagi 1999) and this ineffective or irresponsible disposal of this waste pollutes

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the environment and pose a public health risk and no space in existing landfills.[2] Urban society regularly generates waste leading to considerable increase in the volume of waste generated from several sources[3]. Depending on factors like local population density, economic prosperity, time of year, housing type and whether there is a local waste minimization initiative such as home composting would be waste in any given area.[4] A higher organic content in domestic waste was found in developing countries [5] There is no organized collection of household waste collection (Mbande, 2003). Storage disposal practices collection inappropriately handling waste, pose public health and environmental risks. In densely populated urban centers numerous municipalities are incapable of providing even the most basic services (Rabinovitch, 1997). The process of recovering and reusing waste products from household use, manufacturing, agriculture, and business and thereby reducing their environment burden is recycling[6]. Materials like glass, metal, paper, and even refrigerators that are collected, separated and processed back into raw materials, and made into new products called "Recyclables" [7]. It is collecting waste material after the end of its useful life and repossessing it for reuse in the same or different products (Frank & Brownstone 1992:259). There are still residual wastes arising from households.[8]Separating waste into organic waste, plastic, glass, tin cans and paper is necessary for recycling [9]. Recyclable materials are collected in various ways like collection program, or by local governmental agency private haulers under contract; businesses back-hauling; independent recyclers pickup of source-separated recyclables, material recovery or drop-off facility.[10]Recycling has economic and job creation impacts.[11];reduces raw material costs and dependence reduction on foreign resources saves on expenditure on imports in developing countries.[12]; provides clean environment, safe disposal of hazardous materials, great awareness of unnecessary packaging ;use and re-use of materials.[13]

OBJECTIVES AND LIMITATIONS

Objectives

1. To understand the importance of recycle and find out the level of involvement of people towards recycling their waste.
2. To understand willingness of people to participate in recycles.
3. To know methods of household garbage storage and disposal and concern about solid waste management.

LIMITATIONS

1. The study covers only 100 households.
2. The study is limited only to Salcete -Taluka.

REVIEW OF LITERATURE

Berglund (2006) conducted a study on "Recycling household waste" where people who perceive sorting at source and individuals with weaker moral reasons for undertaking recycling activities tend to have a higher willingness to pay for waste sorting. Black (1995) studied the concept of "Recycling" and states that with the time, money, and energy spent collecting and processing recycled goods, the price of recycling is much higher than discarding waste into landfills or incinerators. Caplan et al(2002) studied the concept of "Recycles" as household's demographic characteristics do influence households' preferences over waste management alternatives.Chertow and Lombardi., (2005) studied recycling of waste as not limited to closed-loop systems, but also involved open-loop recycling, down-cycling, and industrial symbiosis. The Open-loop recycling occurs where recycled material is used to make a new, different product, often with a loss of material quality. Cooper (1998)found recycling programs are cost inefficient and have negative environmental effects. Chintan (2009) studied "Recycling process" which varies between developed and developing nations. Eunomia (2008) - Conducted a study on "recycling of waste plastic", which gives us an alternative to recycling plastics and conversion of plastics to synthetic diesel. Jenkins et al. (2003)studied "waste recycling" and said that policy-makers and planners need more information on the way in which the quantities of specific materials recycled and disposed affects the recyclingprograms. Kim (2002) studied recycling products which offer many benefits thereby displacing new material usage, reducing waste generated and the costs associated with disposal. Medina (2005) studied waste which has been separated at source raises the productivity and incomes of waste pickers by freeing them from having to walk several miles a day in search of materials. CIWMB (1995)states that manufacturers can recycle their own scrap materials and consumers can recycle cans and bottles, commercial firms can recycle shipping cardboard and unsold food.Richardson et al., (1974) conducted a study of "Household waste management" and analyzed the seasonal household solid waste generation and an economic analysis

of the composition of households solid wastes. UNEP (2007) studied recycling as any reprocessing of material in a production process that diverts it from the waste stream, except reuse as fuel.

THEORETICAL PERSPECTIVES

"Waste generally refers to all unwanted and economically unusable materials that result from human activities, discarded purposefully or accidentally into the environment (UNEP, 1994; Gerrans, 1994; Van Bukering et al., 1999:30). Getting rid of domestic waste through sorting, collecting, transporting and disposal in designated locations for treatment, recycling or re-use would be "Domestic waste disposal" (Miller, 2002: 518-519).These activities largely focus on resource recovery, which includes all the activities entailed in waste segregation, collection and processing, which are carried out taking into consideration economic viability of the material that is being recovered, e.g. for re-use and recycling (Beede and Bloom,1995; Van Beukering et al, 1999).

VARIOUS TYPES OF RECYCLING

(a) Glass recyclingis turningwasteglassinto usable products which also makes up a large component of household wastedue to its weight and density. The use of recycled glass helps save energy, reducing energy consumption, and reduces the volume of waste sent tolandfill.[14]

(b) Plastic recyclingis the process of recovering scrap or wasteplasticand reprocessing the material into useful products, sometimes completely different in form from their original state. Plastics are also recycled during the manufacturing process of plastic goods such aspolyethylenefilm and bags.[15]

(c) Textile recyclingis the method of reusing or reprocessing used clothing, fibrous material and clothing scraps from the manufacturing process which are found mainly in discarded clothing, although other sources include furniture, carpets, tires, footwear, and nondurable goods such as sheets and towels[16].

(d) Paper recycling process includes mixing used paper with water and chemicals to break it down and made into new recycled paper. The same fibers can be recycled around seven times.[17]

ADVANTAGES OF RECYCLING

(a) Recycling helps toward sustainable livingby people thinking about their consumption impact and reduce the waste created,reduces impact on climate change, overall it reduces climate emissions, as recycling a material generally uses far less energy than manufacturing from virgin materials.[18].helps in lowering the cost of manufacturing new products and saves cash which lowers the cost of waste collection and sorting as a cost-effective disposal option. Usually fewer government subsidies than land filling or incineration are required. Recycling saves energy reduces raw material extraction and combats climate change. The vast majority of studies have found that recycling rubbish is better for the environment rather than incinerating or land filling it.[19]Recycling reduces the need for raw materials such as metals, forests and oil which would need to be refined and processed to create products, requiring vast amounts of energy and the use of polluting chemicals further causing the destruction of habitats.[20]

DISPOSAL OF HOUSEHOLD WASTE IN GOA

The best way to dispose of house hold waste (HHWs) is to use them for their intended use, but use safe options if you must dispose of them. Many sanitation authorities have permanent collection locations or collection events for HHWs. Individuals voluntarily contribute to carrying their household waste to bins placed in public places. (Kudat, 1988). Recycle was started in because of the need for proper waste management services take care of the growing garbage problem, things in Goa have only got worse. Recycles team of 15 members works through the year to help residents manage waste in about 7000 homes in Goa. Diversion of 90% of their waste from going to landfill or open burning dumps is underway. Every day, unsorted dry waste arrives in large bags at recycling headquarters at the Margao Industrial Estate. Expert sorters do manual sorting of trash. They manually go through 10,000 to 15,000 kgs of waste each month, picking through valuable recyclables and re-bagging it into over twenty different categories that have each a recyclable value. Of the total waste less than 10% is non-recyclable. To recyclers recyclable waste is then sent and the non-recyclable waste is used in Cement Kilns as a fuel source.[21]

DATA ANALYSIS

The study was undertaken using both primary and secondary sources of data which were used for collecting the required information. The primary data was collected from a structured questionnaire that was administered of 100 respondents, who were randomly selected from various places in Salcete Taluka like Fatorda, Navelim, Colva, Chinchinim and Cuncolim. The data for quantitative research are measurable through questionnaire, administered to respondents and can be interpreted by means of tables. This study is largely quantitative and it utilizes data that is collected through household interviews using questionnaire designed for the purpose of the study. Secondary data was collected from portable documents, literature reviews, e-books.

Table-5.1

Area of jurisdiction	Rural	Urban	Semi-urban	Total
Fatorda	10	10	0	**20**
Colva	10	0	10	**20**
Navelim	10	10	0	**20**
Cuncolim	16	0	4	**20**
Chinchinim	10	6	4	**20**
Total	**56**	**26**	**18**	**100**

Source: Primary data

Respondents were approached more in the rural area that comprises of 56%, 26% of the respondents that were surveyed came from the urban area and a minority that comprises of 18% was from the semi-urban area. The survey was conducted surveying ten flats and ten houses in each locality so in total fifty flats and fifty houses were surveyed thereby covering 100 respondents.

Table-5.2

Gender	Male		Female	
	Flat	House	Flat	House
Fatorda	5	5	5	5

Gender	Male		Female	
Colva	5	6	5	4
Navelim	2	2	8	8
Cuncolim	4	3	6	7
Chinchinim	1	4	9	6
Surveyed	**17**	**20**	**33**	**30**

Source: Primary data

A majority of respondents said no, that they do not recycle their waste and a minority said yes. It was noticed that 3 out 20 males and 10 out 30 females recycle their waste who live in houses and 4 out 17 men and4 out 33 women recycle their waste who live in flats. In a nutshell 7 out of 37 men and14 out of 64 women recycle their waste.

Table 5.3: Willingness to Recycle

	^1	^2	^3	^4	^5	Total
Recycling	12	39	18	24	7	100
Willing to separate material for collection	10	72	3	14	1	100
Willingness to pay for pickup for recycling materials	7	67	9	14	3	100
Willingness to return plastic bottles to stores	6	65	9	19	1	100
Ready to pay extra money to purchase recyclable products	7	45	5	40	3	100
Total	42	288	44	111	15	700

Source: Primary data
(^1=greatly interested, ^2=Yes, ^3=No opinion, ^ 4=No, ^5=Not interested)

Table-5.4

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	0	4	0	0	1	3.00691728

ANOVA						
Columns	9838	4	2459.5	26.19973369	7.52137E-07	3.00691728
Error	1502	16	93.875			
Total	11340	24				

Source: Primary data

Overall 41% said yes, 16% said no, 6% said no opinion, 6% said greatly interested and 2% greatly not interested.

Table-5.5

Methods of waste disposal	F	C	N	Cu	Ch	
Closed containers	16	9	15	10	7	57
Open containers	0	5	1	2	3	11
Plastic bags	4	5	4	8	9	30
Pile in yards	0	1	0	0	1	2
Overall total	20	20	20	20	20	100

Source: Primary data

Table-5.6

	Closed containers	*Open containers*	*Plastic bags*	*Pile in yards*
Closed containers	1	--	--	--
Open containers	0.822	1		
Plastic bags	0.929406076	0.911993364	1	
Pile in yards	0.69830181	0.942908071	0.83116584	1

Source: Primary data

The correlation between pile in yard and open containers is 0.942, which implies that most people throw their pile in open containers. 88% of the data explains that respondents throw their pile in yards in open containers.The "r" between plastic bags and closed containers is 0.93; which implies that most people throw their plastic bags in closed containers. In all the cases "r" is high.

Table-5.7

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	272.4444444	2	136.2222222	5.783018868	0.02143622	4.102821015
Columns	349.1111111	5	69.82222222	2.964150943	0.067595262	3.32583453
Error	235.5555556	10	23.55555556			
Total	857.1111111	17				

Source: Primary data

Table-5.8

	Burn	Bury	Dump in yard	Dump on roads	Public garbage bins	recycle	reuse	CT	Sell	NA	total
YT	31	5	6	0	11	0	0	4	0	43	100
P/C	37	0	2	0	39	4	5	0	8	5	100
Plastic	17	0	0	0	52	3	5	0	17	6	100
Metals	0	0	0	0	21	5	0	0	55	19	100
Glass	0	0	5	0	48	2	1	0	24	20	100
Textile	15	0	0	0	22	1	18	0	34	10	100
Wood	44	0	0	0	16	0	0	0	7	33	100
Overall total	144	5	13	0	209	15	29	4	145	136	700

(*1= Burn, *2= Bury, *3= Dump in yard, *4= Dump on roads, *5= Public Garbage bins, *6= recycle, *7= reuse, *8=compost, *9= Sell, *10= Not applicable)

Table-5.9

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows		6	0	0	1	1

ANOVA						
Columns	272.4444444	9	892.2857143	6.752702811	2.026E-06	2.271988662
Error	349.1111111	54	132.1375661			2.058520148
Total	235.5555556	69				
Total	857.1111111	79				

Source: Primary data

There is no difference in the method of household garbage disposal and surveying the area of jurisdiction. There is difference in segregation of waste material, majority of respondents comprising of 57% segregate in closed containers, 30% in segregate in plastic bags 11% segregate in open containers and a minority of 2% throw it in their yard.

Table 5.10: Concern about solid waste management

Issue for concern	Very Con	Concerned	No Opinion	Not Con	NotInt
Health risk related to burning garbage	26	63	5	4	3
Illegal dumps polluting water bodies	46	42	7	4	1
Services provided by garbage truck	23	51	20	4	3
Illegal dumping	44	47	5	4	0
Total	139	203	37	16	7

Source: Primary data

In an overall 35% said very concerned, 51% said concerned 4% said no opinion, and 2% said not interested when asked about their concern of solid waste.The data is segregated between concernsand not interested in "concern solid waste management"it was observed that the "r" between the concern level was very high positive correlation (0.95) and the correlation between not interested and not concerned is 0.875. The "r"shows the concern level is more than those who are not interested.

Table-5.11

	Health risk related to burning garbage	Illegal dumps polluting water	Services provided by garbage truck	Illegal dumping
Health risk related to burning garbage	1			
Illegal dumps polluting water	0.82536398	1		
Services provided by garbage truck	0.945363796	0.779886694	1	
Illegal dumping	0.882515368	0.993448736	0.827053822	1

Source: Primary data

Table-5.12

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	0.2	3	0.066666667	0.000962927	0.999956233	3.490294819
Columns	7470.8	4	1867.7	26.97688974	6.4292E-06	3.259166727
Error	830.8	12	69.23333333			
Total	8301.8	19				

Source: Primary data

Health risk related to burning garbage 26% said that they are very concerned, 63% said that they are just concerned, 5% said no opinion, 4% said not concerned and 3% said not interested, when they were asked about illegal dumps polluting water bodies 46% said that they are very concerned 42% said that they are just concerned, 7% said no opinion, 4% said not concerned and 1% said not interested, when they were asked about they said services provided by garbage truck 23% said that they are very concerned 51% said that they are just concerned, 20% said no opinion, 4% said not concerned and 3% said not interested and when asked about illegal dumping 44% said that

they are very concerned 47% said that they are just concerned, 5% said no opinion, and 4% said not concerned. The correlation in issue of solid waste management with reference to issue of concern is high positive correlation management the highest "r" is service provide by garbage trucks is 0.946.

Table 5.13: Frequency of recycling

Waste Recycle	Area under study					
	Fartorda	Colva	Navelim	Cuncolim	Chinchinim	Total
Once a week	0	0	0	0	0	0
Once in two weeks	1	2	2	0	1	6
Once in a month	3	3	1	2	0	9
Several times a week	1	1	0	0	0	2
Daily	2	2	1	0	0	5
Never	13	12	16	18	19	78

Source: Primary data

Table-5.14

ANOVA						
Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Rows	912.6667	5	182.5333	70.20513	5.4495E-12	2.71089
Columns	1.14E-13	4	2.84E-14	1.09E-14	1	2.866081
Error	52	20	2.6			
Total	964.6667	29				

Source: Primary data

78% do not recycle, 9% recycle once in a month, 6% once in two weeks, 5% recycle daily and 2% recycle their waste several times a week. There is a difference in waste recycle period it is observed that most responded do not and never recycle their waste. There is

no difference in surveying the respondents in the given location with reference to waste recycling. It was observed that respondents in the south of Salcete are less bothered about waste management while in the north of Salcete, waste management in a burning issue. In Colva, respondents said that waste management is a critical issue as there is no garbage collection facility provided by the municipality in their locality and added saying that they are even willing to pay more house tax as long as waste is controlled. Opinion of residents as to what recycling waste isoverall 48% respondents said that they have no opinion, 30% said easy, 20% said difficult, 1% said impossible and 1% said very easy. Most respondents living in houses get rid of their waste by burning their garbage including plastic. Many respondents said that they do not recycle, reuse, compost or make wealth out waste products but if given a chance they are willing to do so. Respondents having low educational qualification that is below S.S.C reuse and recycle more than the higher educated people. Most of the households separate their waste into Wet and Dry waste

CONCLUSION

In the north of Salcete that is Fatorda and Colva the respondents were well aware of solid waste management the respondents living in the houses or flats were willing to even increase their house tax in south of Salcete, Cuncolim and Chininim the respondents were not aware of SWM they didn't know the difference between recycle and reuse. The level of waste generates makes no difference in flats and houses Inform citizens about source separation and recycling, and the needs of waste workers,Promote recycling in household. Waste management is a rising issue all over Goa, there should be more public bins provided by the concerned authority, out of which there should be one for the society and one for the general public in each locality. Government should take up schemes in providing eco-friendly products at reasonable prices for shopping purposes such as jute bags, paper bags etc. which will decrease the use of plastic bags, and monitoring that nobody litters. People should be given Environmental Education to develop understanding of the need for further source separation to improve the potential for composting and awareness regarding reuse and recycle. Increase the number of materials collected and introduces separate weekly food waste collections. Authorities must provide proper waste segregation means like facility of collection of wet and dry waste.

Advocate key areas for waste reduction at the manufacturing level (e.g., reduction of plastic packaging; coding of plastics to improve recycling).Awareness that most of the garbage generated in the household should be recycled and reused. Few of villages have been able to start some waste management initiatives. But municipal bodies in Goa are struggling to managewaste.[41]

NOTES

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