ANALYSIS OF SOLD WASTE MANAGEMENT

IN THRIKKAKKARA LOCALITY

DISSERTATION SUBMITTED TO MAHATHMAGANDHI

UNIVERSITY, KOTTAYAM

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CERTIFICATE

This is to certify that the project entitled **"ANALYSIS OF SOLID WASTEMANAGEMENT IN THRIKKAKKARA LOCALITY"** is a bonafide work done by **JOSHNA V.S** with **Register No: 180021043812** under the supervision of DR.**PRIYALAKSHMI G** during 2018-21 in partial fulfillment of the requirement for the award of the Bachelor of Science in Zoology of Mahatma Gandhi University, Kottayam.

HEAD OF THE DEPARTMENT
DR. PRIYALAKSHMI G

DECLARATION

I do hereby declare that the work embodied in the dissertation entitled **- ANALYSIS OF SOLID WASTEMANAGEMENT IN THRIKKAKKARA LOCALITY** submitted to Mahatma Gandhi University, Kottayam in partial fulfillment for the award of Bachelor of Science in Zoology is a bonafide dissertation done by me under the supervision of **Dr. Priyalakshmi G,** Head of the Department of Zoology, Bharata Mata College, Thrikkakara and that no part of this work has been submitted for the award of any other Degree/Diploma/Associate-ship/Fellowship or any other similar title to any candidate of any University.

Place: Thrikkakkara **JOSHNA V.S**

Date **:** **180021043812**

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SYNOPSIS

Even though, Kerala has a developed modern society that occupies a prime position compared to the other states of India in all human and social development indices, its solid waste management efforts are not up to the mark. The present study attempts to examine the effectiveness of solid waste management of Thrikkakara municipality in Kerala .Kerala is known for its highly sensitive population and high social awareness. It is a contradiction that, its environmental sanitation level is surprisingly low. In urban areas, as the commitment of people are too low, the efforts of the state Government and Urban Local Bodies for an organized solid waste management system are not hitting the target. It is true that municipalities lack professionalism and commitment in solid waste management. They lack training and are not properly qualified either. Besides, Municipalities in Kerala, which account for about 25% of the total waste generated, are starving for fund and free space for waste treatment and disposal. Hence, municipal solid waste management is really a burning issue in Kerala where, population density is three times the national average. It is a subject which needs immediate attention of the Government, different agencies and group of people because of the potential health threats and environmental damage it can cause. In this context, it is considered appropriate to conduct a study on the problems of existing methods of solid waste management of Thrikkakara municipality in Kerala and to gather suggestions from the general public regarding the waste management practices of their locality.

The general objective of the study was to get an overall idea about the waste management in the selected area of the Thrikkakara municipality. Mainly house hold have samples are taken for the study. The finding of the study show that, in the households which were selected for the study, the occupants are well aware of waste management and also it is found that mostly the municipality failed to implement source segregation, the basic parameter for a successful municipal solid waste management.

Advanced treatment options like, Refused Derived Fuel and Recycling are not used. Most of the people still follow the same primitive open dumping. There is a need to design effective steps for local waste management through reliable waste management system. There are few reliable data on waste composition or waste quantity that is a prerequisite to all waste management planning and there are no suitable alternatives for its improvement. Moreover, soil health needs to be improved by providing the much needed organic matter. In order to control the deteriorating lands, solid waste processing to compost can serve as a valuable organic matter source so this study had also focused on the domestic solid waste conversion into enriched compost and evaluation of their nutritional quality. As everyone is a part of the solid waste generation problem, everyone must also be a part of the solution to proper waste management.

INTRODUCTION

"Wealth from waste "is a modern slogan, the truth of which is realized to some extent in India also. But, the importance of waste management as a technical work and administrative specialization has not received due attention with the result that every town and city is now facing a tremendous problem of collection and disposal of waste.

Solid waste is defined as any material either a solid, liquid or gas that is unwanted, unvalued and /or discarded or discharged by its owner. Solid waste means any trash from wastewater treatment plant and other discarded material including solid, liquid, semi-solid contained gaseous material that mainly arises by human and animal activities. Solid waste management is one of the major problems faced by different cities all over the world. The problem is particularly due to urbanization, industrialization, poor urban planning and lack of adequate resources which contribute to the enormous amount of solid waste generation. This problem has resulted in serious environmental, social and economic complications in the developing countries like India. Population growth and dynamic economic activities in and around the city has resulted in a serious waste management crisis .Domestic, industrial and other wastes, whether they are of low or medium level wastes , they are causing environmental pollution and have become perennial problems for mankind.

Solid wastes are organic and inorganic refuse produced by various activities of the society that have lost their value to the first user. In other words, wastes like sewage sludge, garbage, industrial waste, trash, ashes, discarded metal or any solid or semi-solid material are categorized under solid wastes. Generally, classification of solid waste is done on the basis of their sources. Household wastes are classified as municipal waste as hazardous waste. Solid wastes are dumped into municipal waste collection centers and collected by the area municipalities and are further thrown into the landfills and dump. However resource crunch or inefficient infrastructure may lead only a part of waste collection and transportation to the final dumpsites that can cause serious impacts on health and problems to the surrounding

environment. Therefore, effective waste management strategies are inevitable .Moreover; solid waste management has been an important social problem worldwide. In India, it takes the shape of alarming dimension which has to be addressed urgently. In certain parts free disposal facilities have reached their own capacity and local government are facing difficult decisions .Modern civilization has improved standard of living , but all of the amenities that modern life bring us, they also can lead to produce a high quantity of trash that needs to be taken care of us. Thus solid waste management in modern lives reduces disturbance or refuse and is an integral element of modern society. Even if one does not see what goes on at the facilities and plants that are processing and managing disposal of garbage, it still contributes to the well-being of human lives.

Man- made disaster mainly leads to solid waste problem and depends to a great degree on greed and ignorance. Generally, the waste components that are organic can be composted and entities like glass, paper , plastics and metal can be recycled. The important components of solid waste managements are collection , transportation ,processing managing and monitoring of waste materials produced by human activity and the process is mainly carried out to reduce their effect on health and environment Solid waste management differ from resource recovery as it aims to delay the rate of consumption of natural resources and all wastes materials either solid , liquid ,gaseous or radioactive fall within the remit of waste management

The concepts about waste management vary in their usage between countries or regions. The most widely used concepts include that of waste hierarchy referred to as the "3R's" i.e. Reduce, Reuse and Recycle. The 3R's focus to extract maximum practical benefits from products and aim to generate minimum amount of waste. Similarly, concept of 'The polluter pays principle 'can reduce pollution as the polluting party pays for the impact caused to the environment. The waste generator has to pay for appropriate disposal of the unrecoverable material.

Recently, finding new sources of energy and materials is becoming increasingly difficult. There has been a difficulty to locate solid waste disposal sites and cost of disposal is

escalating exponentially. Thus, interest of society in reuse, recycling, and recovery of materials from refuse has grown. Reuse of materials comprises voluntary continued use of a product for a purpose that may not have been originally intended like reuse of coffee cans for holding nails, or the extended use of a product like retreading automobile tires. The reuse of materials results in product that does not return to the industrial sector and remains within the public or consumer sector. Waste recycling is collection product and return of this entity to the industrial sector. This differ from reuse as the materials do not return for remanufacturing like collection of newspapers and aluminum cans by individuals and their collection, eventual return to paper manufacturers or aluminum companies.

The process of recycling needs public participation as they must perform the separation step. Waste recovery is different from waste recycling as the collected waste is a mixed refuse and entities are removed by various processing steps like refuse can be processed by running it under a magnet. The magnet is supposed to remove the steel cans and other ferrous materials. The materials can be sold back to the ferrous metals industry for remanufacturing. Waste recovery of materials is mainly carried out in a materials recovery facility (MRF, pronounced "murphy"). The waste recycling differ from waste recovery as in the latter the user of the product does not perform any separation whereas in the former crucial separation step is done voluntarily by a person who gains very little personal benefit from going to the trouble of waste separation. Thus, waste recycling and recovery are two primary methods of returning waste materials to industry for remanufacturing and subsequent use. The management of solid waste can pose a array of problems as less collection coverage, collection services irregularity, crude open dumping yards, only partial combustion of waste, breeding of flies, pollution of ground water, breeding of vermin, scavenging activities etc. That limits development of effective solid waste management plan. Basically there are two alternatives to prevent the generation of wastes. The first is the application of clean technologies (low waste technologies).Either waste is not generated in this alternative or the volume of wastes is low. The second alternative is producing of recyclable articles. It means articles stay in producing-consuming process for a long time.

There are several ways to recycle biodegradable organic wastes i.e., selective collection and composting of bio wastes (households wastes) and green wastes, production of biogas, selectivecollection and recycling of paper, thermic treatment and energetic recovery, e.g. pyrolysis, incineration etc. (Zoltan Orson 2008). Nowadays, waste management has become a critical urban planning and governance issue as people cannot live without generating wastes. It has become a subject of debate in academic, political and economic concerns nationally and internationally. Increase in population, industrialization, urbanization and rising standards of living are factors responsible to increase the quantity, variety and complexity of wastes (Wright, J. R. 1983).

However, due to advancement of critical debate on achieving sustainability there have been some relevant reforms in the policy, but this has not been in line with the volumes of wastes incorporated into the physical environment. These entities enter physical environment resulting in disease breakouts and pose high risk to environment and are a nuisance to general public (Tesoro C. 2000).

Table 1 - Common sources: waste generation

Name	Content	Source
Rubbish	Cloth, leather and markets refuse rags	Market and stores etc.
Garbage	Contents from cooking food and domestic work	Hotels and households etc.
Special waste	Waste that are hazardous	Industry and hospitals
Bulk wastes	Gyres, large auto parts etc.	Service stations
Street refuses	Dirt and dust	Litter and street sweeping
Ashes	Residue form	Fire

Waste management has grown to be a huge problem requiring vigorous implementation of all the steps. Three kinds of operations – minimizing waste, degradation of the waste and transformation into useful products – have to go on constantly without respite.

AIM

To conduct a survey on household waste management in a particular area (Thrikkakkara)

OBJECTIVES

- To have a glimpse into the methods used for the treatment of solid waste in the houses
- To understand the ways of removing the wastes from the houses by conducting the survey.
- Questionnaire distribution
- To offer fruitful suggestions for improving the existing system of solid waste management.
- To introduce new ideas for the recycling of household wastes

REVIEW OF LITERATURE

Solid Waste Management (SWM) has become one of the major matter in environmental issues (Mazzanti & Zoboli, 2008). This is particularly true to urban areas where population is rapidly growing and amount of waste generated is increasing like never before (Kathirava & Mohd Yunus , 2008) Current earth's population is 6.8 billion and it is estimated that almost half of this population lives in urban areas (Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2009). Waste generation increase proportionally to this population number and income, creating the needs of effective management (Mazzanti & Zoboli, 2008). Urbanization and industrialization leads to new lifestyles and behavior which also affects waste composition from mainly organic to synthetic material that last longer such as plastics and other packaging material (Idris et al., 2004). E-waste that barely existed before was generated as much as 20-50 metric tons a year (UNEP, 2006).

The management of waste become complex and the facilities provided cannot cope with the increasing demand and needs. Therefore, best approach need to be implemented immediately while considering environmental, social and economic aspects (Aye & Widjaya, 2006). The drivers of sustainable waste management were clarified by Agamuthu et al. (2009), which include human, economic, institutional and environment aspect. The study suggests that each driving group should be considered in local context as managing solid waste for a particular society may differ from the others. For example, waste managers in Africa need to tackle some issues including, lack of data, insignificant financial resources, vast different of amount and waste types between urban and rural area, lack of technical and human resources, low level of awareness and cultural aversion towards waste (Couth & Trois, 2010). On the other hand, problems faced among Asian countries differ with two distinct groups; developed and developing countries.

While some of the countries are having specific national policy on solid waste management, some others experience problems such as increasing urban population, scarcity of land, services coverage area, inadequate resources and technology, and so on (Shedder, 2009).

The differences in managing solid waste not only vary between countries but also among areas in the same country. For instance, while Istanbul are having big improvement in their solid waste management with the establishment of transfer stations, sanitary landfills and methane recovery system, it does not reduce the problem in the Black Sea coast in Turkey. This is caused by the complex topography, weak administrative structures and the low local's income (Berkun et al., 2005).

Integrated Sustainable Waste Management (ISWM) system was then introduced in 1995 to improve earlier system that neglect unique characteristics of a given society, economy and environment (van de Klundert, 1999). For example, European countries had applied various system assessment tools and engineering models to create sustainable communities, manage resources efficiently, tapping innovation potential of the economy, ensuring prosperity, environmental protection and social cohesion in their SWM system (Pires et al., 2011). Asian countries had also given attention in building the national legal 12 frameworks, managing institutional, technology, operational and financial aspects, and creating public awareness and participation (Shekdar, 2009).

The waste management system should be dynamic and continuous based on new insights and experiences (van de Klundert, 1999). For example, continuous assessment of current policy and regulatory framework of New Zealand indicated the lack of policies coordination, hazardous waste management, consistency, incentives and markets for recycled material, and cleaner production effort (Boyle, 2000). Thus, the improvement in policy is needed while it will also benefit the country. As an example, based from EU25 group, it was found that the generation of waste is increasing and is expected to continue for many years ahead. After the implementation of the new EU's policy in waste recovery and incineration, the amount of waste landfilled has been decreasing slowly (Mazzanti & Zoboli, 2008.

However, based from the data from developed countries, the actual amount of waste been landfilled is actually decreasing as more waste are incinerated, composted or recycled. Looking at the positive angle, Lomborg (1998) believed that area needed is sufficient to cater the total amount of waste generated by the world, but the problem is the location since nobody wants to

stay near landfills. He also reported that air from incinerators and groundwater near landfills today are cleaner and safer. Therefore , solid waste generation can be considered more of a political or social issue than others (Lombog, 1998 .A lot of literature has discussed current practices, challenges and future solutions on waste management such as those for India (Hazra & Goel, 2009), Portugal (Magrinho et al., 13 2006), Canada (Wagner & Arnold, 2008) and Malaysia (Agamuthu et al., 2009). These studies allow comparison to adopt the best practice wherever applicable Information on waste generation is important to determine the most suitable waste disposal options. Improper waste disposal may cause pollution. The main purpose in implementing best practice for solid waste management is to prevent pollution. Pollution is a threat toHuman and other living organism (Morra et al., 2009; Liu & Morton, 1998). It may also damage the eco system and disrupt the natural cycle and climate on earth. There are many disposal options available to suit the nature of waste and a country's preference and interest.

. Economics and environmental aspects of waste disposal option are always the main issue in choosing the right technology (Aye & Widjaya, 2006; Daskalopoulos et al., 1997). Developed Asian countries such as Japan, South Korea and Singapore are on their way to eliminate landfilling while some other Asian countries still have problems with open dumping (Agamuthu & Fauziah, 2010; Shekdar, 2009; Bai & Sutanto, 2002).

Despite the development of many waste disposal option, landfills remain the most prominent system applied worldwide (Shedder, 2009; hamer,). Although a lot of improvement had been possible in the landfilling system and the regulation on the type of waste that can be treated at landfill is stringent, most of landfills operated remain .

Firdausi, G .2016, Management of Urban Solid Waste Pollution in Developing Countries. The current study reviews the data on the quantity of mu-nicipal solid waste generation, its physico-chemical characteristics, collection and disposal system .Niyaz Ahmad Khan,2015, Perspectives of Transport and Disposal of Municipal Solid Waste in Srinagar City. This paper is to present a Case study on mu-nicipal solid waste transport and disposal in the city of Srinagar in Jammu and Kashmir in India and its practice as lessons learnt. Yadav Ishwar Chandra, 2017, Studies on Munici-pal Solid Waste Management in Mysore City- A case study. The present study was taken

to find out the problems and prospects of Municipal solid waste in Mysore city. A detailed investigation was made regarding the methods of practices associated with sources, quantity generated collection, trans-portation, storage, treatment and disposal of Mu-nicipal solid waste in Mysore city. André CanalMarques, 2017, A review of the recycling of non-metallic fractions of printed circuit boards, In the present paper, a literature review of the recycling of on-metallic fractions (NMFs) has been carried out, showing different studies and guidelines regarding this type of recycling, emphasizing that this type of waste still lacks for further application.

Caroline Person, 2016, Predicting recycling efficiency – Multiple regressionmodeling of the racy-cling rates of Tetra Pak´s beverage cartons. In this paper they investigate these "predictors" influencing recycling efficiency and build models using multiple regression analysis with the aim of explaining as much as possible of the inbetween countries variation of recycling rates

Javeriya Siddiqui and Govind Pandey, 2017, A Review of Plastic Waste Management Strategies. This paper discusses prospects of plastic waste man-agement schemes. Various schemes are being implemented to mitigate the impacts of plastic waste in India. Recycling is one such scheme for waste man-agement of plastic products. Katarzyna Cheba, 2018. Methods of forecasting changes in municipal waste production in case of cities. In this study, the influ-ence of the various socio-economic factors on themunicipal waste production has been tested. This paper presents the results of modeling and forecast-ing the municipal waste generation changes in cities.

Ebenezer Owusu-Sekyere, 2016 Forecasting andPlanning for Solid Waste Generation in the Kumasi Metropolitan Area of Ghana: An ARIMA Time Se-ries Approach. This study used monthly solid waste generation data from 2010 to 2015 that was obtainedfrom the solid waste department of the Kumasi Met-ropolitan Assembly. Manoj Kumar Tiwari, 2015,Prediction of Industrial Solid Waste with ANFISModel and its comparison with ANN Model- A Case Study of

Durg-Bhilai Twin City India. In Thispaper they made an attempt to estimate the quantityof Industrial solid waste (ISW) that can be generatedin the Durg-Bhilai Twin city (DBTC), C.G, Indiafrom 2010 to 2026.

Sanjay Rode, 2017 Publicprivate partnership insolid waste management in municipalcorporationsof Mumbai metropolitan region. In this paper theyhave used Ordinary Least Square (OLS) regressionto examine correlation of the solid waste generationin the municipal corporations in Mumbai metropoli-In this paper theyhave used Ordinary Least Square (OLS) regressionto examine correlation of the solid waste generationin the municipal corporations in Mumbai metropolitan region.

Kerala has adopted a different approach of decentralized system of waste management without deviating from the provisions in the Solid Waste Management Rules 2016 . Clause 15 (v) of SWM Rules –under Duties & responsibilities of local authorities says preference shall be given to decentralized processing to minimize transportation cost and environmental impacts The possibility of identifying most suitable modern technology for big cities is also being taken up to manage the overflow waste . Source level segregation and treatment of biodegradable waste is promoted at Source level (Household/Institutional/Community Level). The biodegradable fraction is treated at the source level through composting and bio methanation (Biogas plants). Devices of various capacities distributed to households to manage kitchen wastes.

Steps have been initiated to implement by-laws as per SWM Rules 2016 by Grama Panchyats, Municipalities and Municipal Corporations. As per G.O (Rt) No. 2511/2017/LSGD dated 22.07.2017 Government has issued strict instructions to ensure at source management of waste (segregation, storage, processing of biodegradable and non-biodegradable waste) at critical institutions like hotels, clubs, marriage halls, malls, retail shops, cinema halls, textile shops, catering units, food serving destinations vegetable markets, fruit stalls, fish stalls, meat stalls, canteens etc. Current Strategy of the State Legal interventions The D&O licensing system has been linked up with the availability of facility for waste management. The provisions in related sections under Kerala Municipality Act 1994 is once again reinforced for penalizing those who violate the rules.

Green protocol is being strictly promoted in Government offices and institutions and the Government have also issued an order in this regard (G.O.(Rt)No.3214/2017/LSGD,dt 5.10.2017).

Trivandrum Municipal Corporation (TMC), in the year 2000 established an aerobic composting plant at Vilappilsala to treat the Municipal Solid Waste (MSW) generated in the city. The plant, built under BOT scheme, claimed to have a capacity to treat 300 tonnes of MSW per day. The operator used to claim compensation for short-supply of MSW by the TMC. The operator, instead of treating the entire MSW received in the plant, was dumping a considerable portion within the compound. The plant did not have any environmental management system to abate the pollution due to huge quantity of leachate, mitigate the adverse impacts of the open dump, manage the plastics and other non-biodegradables, and landfill the discards safely and such other issues. A technical committee later found that the plant had a capacity to treat only 150 tons of biodegradable waste per day. The increasing pollution load, nuisance to the neighboring population, poor operation and maintenance forced the local people to agitate against the plant. Though the TMC took over the plant, it was too late to bring back the operation to a convincing environmental safeguard level and ultimately the plant was closed in 201Known as ‘Venice of the East, the Alappuzha town, characterized by 2 big and 104 small canals, on the banks of Vembanad Lake is regarded as a tourist paradise.

The closure of the centralized waste management and dumping facility at Sarvodayapuram in 2012 necessitated an alternative as the city was generating around 60 ton of Municipal Solid Waste (MSW) per day. Under the leadership of the Member of Legislative Assembly from Alappuzha, a campaign namely "Clean home- Clean City" was launched to take up the challenge of managing the MSW without any infrastructure support. With the help of Suchitwa Mission, 3000 domestic biogas plants and 2800 pipe compost units were installed first and its use ensured. Subsequently, 18 units of 220 aerobic bins, known as Thumboormoozhi model' were installed and its operation and maintenance supported. The non-biodegradables around 14 tons per day is regularly transferred to 10 mini and one centralized Material Recovery Facility (MRF), installed adjacent to the aerobic units. Further, more aerobic bins are installed and action taken to promote Source treatment at least at 50 per cent of the households. The sanitary workers of the Municipality, Kudumbasree Service Team, and School Watson Clubs play major roles in

sustaining the system. With the success of Thumboormozhi model of composting, it is now being replicated elsewhere in the State. The model has been mentioned on the website of the United Nations Environment Programme.

Mahima&Lavanya (2016) in their study found that the size of the household is directly related to the quantity of waste generated in the household. Majority of the respondents opined that recycling is the best way of reducing solid waste followed by reuse and reduce respectively.The study pointed out that absence of recycling unit, inefficiency of labour, no segregation of waste at source, effect of inefficient recycling, unclean waste dumping, absence of primary collection and lack of financial resources are the problems of solid waste management. Dhanalakshmi (2014) paper suggested that it is possible for Household Waste Management to be effective in reducing waste disposal problem in some high density housing, where the waste disposal problems are dominant. High quality studies are needed to prove this and to estimate the size of effect. Safe waste management practices can be promoted that require little investment from households.

Harikrishnan (2014) his study is based on the solid waste management and it compares the solid waste management system of two states Kerala and Tamil Nadu. This study analyzed the centralized and decentralized treatment plants in these two states. This details the difficulties and suggestions for improvement regarding the solid waste management. The study was conducted among the authorities of different cities of Kerala and Tamil Nadu. This article would provide the readers knowledge about the present solid waste management system in these states and their comparison. Subramoniam & Suresh (2015) in their study analyzed the waste disposal at the community located in the Alappad Panchayat in Kollam district of Kerala. The scope of this study within the community is assessed based upon following a three-fold approach. Firstly the awareness of community on the waste production within this community is examined. Secondly, the disposal method or model is evaluated and compared within this community. Thirdly, the Waste Disposal of the members of the community is gauged. The study was conducted upon a thin section of the society belonging to a specific ethnographic framework with the focus upon twenty participants. The results of this study can be extrapolated to project the overall effect Waste Management or Waste disposal in coastal villages throughout the entire nation of India

METHODOLOGY

Procedure

The aim of the present project was to find the household waste management in a particular locality. The area selected was near LST Convent Thrikkakara. Self-reporting survey questionnaire was designed. The questionnaire made with Google form. The questionnaire of a total 29 questions. The questionnaire is divided into five parts. The first part is about the personal details of the participants like age and family .The second part is about household waste generation and disposal . In this part the questions asks about different types of waste and also asks their opinion about the disposal of waste in their area if it is littering and look bad or effects on human health and environment . The third portion of the questionnaire is about the garbage collection service in their area and how often they use the collection service , which collection service do they use public , private or any other , do they collect the waste separately etc ,or if any one dumb their waste alongside the garbage bins instead of putting it inside the bin .And also asks them to identify some of the main problems with the current solid waste management system is the waste is lying around , bad odor rat ,flies etc or no any other problem. The fourth part of the questionnaire is about whether they suffer from any diseases due to the in proper waste management system in their locality . Last and fifth part of the questionnaire is about recycling the waste The question is asked do they reuse and recycle any of the waste . Do they have any idea about composting of waste . Since there are many ways to reuse our household waste .Composting can reduce household waste generation by 30 percent. Composting is also beneficial for plants growth as it provide many essential nutrients for them and it can be also used as fertilizer . It is believed that a family of 4 can easily reduce their waste from 1000 kg to less than 100kg every year if they adopt segregation and composting .

The survey questionnaire

‘Analysis of solid waste management in the Thrikkakkara locality’

1- Personal details

1. Age of the respondent

- 30- 40
- 40 -50
- Below 30
- 50 and above

2. Type of family

- Joint family
- Nuclear family

3. Size of family

- Small(1-4
- Medium (4-6)
- Large (6 to above)

4. In your opinion which of these is a priority concern about waste in the area

- Littering and looks bad
- Effect on human health
- Effect on environment
- Other

5. Where do you dispose your generated waste?

Nearby container

- Open spaces
- Near home
- Other

6. Do you separate different types of waste at your home?

- Yes
- No
- May be

7. Would you do so if you are told by your collection service provider ?

- Yes
- No
- May be

8. Are there any large bins in your area?

- Yes
- No
- May be

9. Do you have regular garbage collection in your area?

- Yes
- No
- May be

10. If yes, do you use it?

- Yes
- No
- May be

11. How often do you use the collection service?

- Daily
- Monthly
- Never

12. Which collection service do you use?

- Public
- Private
- None
- Other:

13. How much do they charge per month?

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14. Are you satisfied with your current waste collection service?
    - Yes
    - No
15. What is the main reason for your level of satisfaction/dissatisfaction?
    - Costs
    - Unreliability
    - Improper collection
    - Reliable
16. If yes, why in your opinion people behave like this?
    - Difficult to put waste inside the bin due to waste and litter spread around the bin
    - Stray animals (dog, mouse, birds)
    - Any other reason
17. Do people dump their waste alongside the garbage bins instead of putting it inside?
    - Yes
    - No
    - Maybe
18. Do you reuse or recycle any of the waste?
    - Yes
    - No
    - Maybe
19. Identify some of the main problems with current solid management system
    - Waste lying around
    - Odor
    - Flies and rats
    - No problem
20. Has anyone in your household suffered from any of these listed diseases during last month?
    - Diarrhea
    - Dysentery
    - Dengue
    - Typhoid
    - Skin diseases
    - No

21. Are you willing to separate collected waste like plastic, paper, metals etc. into separate bags for collection purposes?
    - Yes
    - No

22. Do you compost your waste?

- Yes
- No
- Maybe

23. Do you have idea how composting helps you to reduce waste?

- Yes
- No

24. If Yes, Give reason

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25. Do you have garden?

- Yes
- No

26. Are you interested in organic kitchen gardening?

- Yes
- No

27. If yes, give reason

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28. Do you feel it will improve your economic condition?

- Yes
- No

29. What are the main causes of environmental degradation in Kochi?

A face to face survey is impossible in the current situation so I decided to conduct an online survey. The questionnaire link was distributed among a number of neighbors nearby LST convent Thrikkakkara. The distribution was done through social media platform like What Sapp and G – mail.. The questionnaire was shared through social media on 15th January 2021and started getting responses on the very first day. And the number Of responses became 60 on 20th February 2021 and then the questionnaire link was closed. Survey questionnaire

https://docs.google.com/forms/d/14UNbfSJGYYWzZfn3JnCXeD1d7HTAnth3ibWLZwnQlE0/edit

DATA ANALYSIS

Data analysis was started after getting all the 60 responses. With the help of Google sheets responses were analyzed and prepared charts , graphs etc. For the analysis of the data , percentage analysis was used as the statistical technique.

First, descriptive statistics were compiled to to describe participant's personal details (e.g., age, family). Then the opinion of the participant about waste disposal is analyzed to know did they are aware of the consequences of improper waste management on environment and their health. After that garbage collection service is analyzed whether they have proper waste collecting method in their area , and how often they use the collection service once in a week or month etc. are analyzed, after that is there is any health problem due to the improper waste management is also analyzed. And the knowledge of waste composting is analyzed. Then analyzed their answer whether they are aware about the proper waste management system

RESULTS

In this project household waste management of a particular area (Thrikkakara) was analyzed.

Out of the 60 respondents most of the respondents were below 30 years (68%) old . Only 10%

Were between 30-40 years 18.3% were between 40- 50 years and 3.7% were 50 and

Table – 2 Age of the respondent

age	response	%
Below30	40.98	68.3
30-40	6	10
40-50	10.98	18.3
50 and above	2.22	3.7

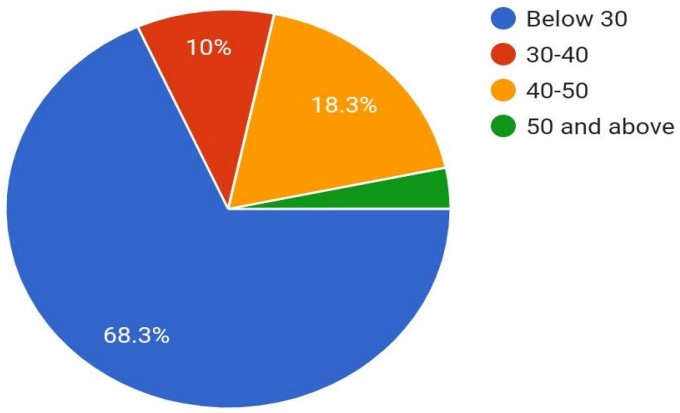

Fig 1:1 Status of the respondent about their age

86.7% respondent were joint family and only 13.3 % were the nuclear family . 66.7% participants are living in a small family having members of 1-4 and 25% medium family having 4-6 members and only 8.3% are having large or 6 to above members

Type of family	response	%
small	40.02	66.7
medium	15	25
large	4.98	8.3

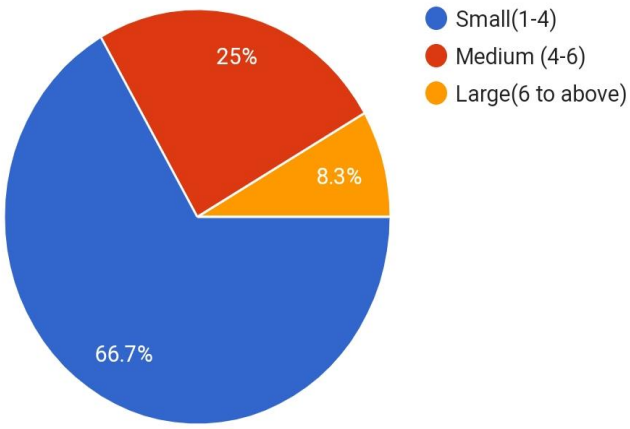

Fig 1:2 Status showing type of family

Out of 60 respondents the opinion about the in their area is 61.7% says that it effects on environment ,and 26.7% says that it effect on the human health,5% says that it is littering and looks bad and rest of the 7.3% agree all of this

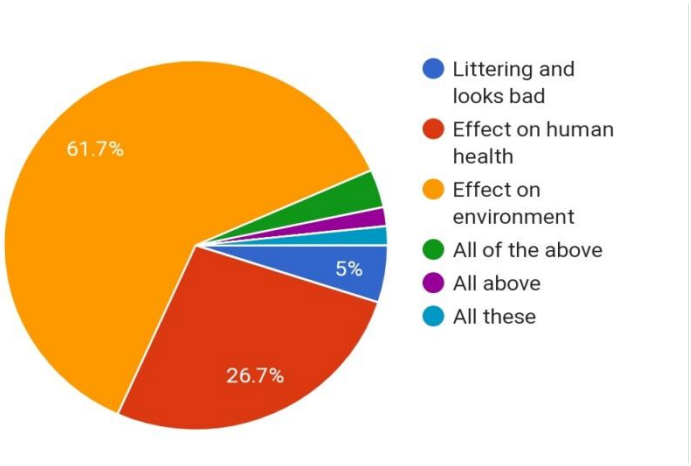

Fig 1:3 Status showing the opinion about the waste in their area

Among 60 respondents 46.7% dispose their waste nearby container ,35% people dispose nearby home and rest of the 18.3% dispose their waste in open spaces ,home surrounding , in waste bin ,and others use the municipality service.

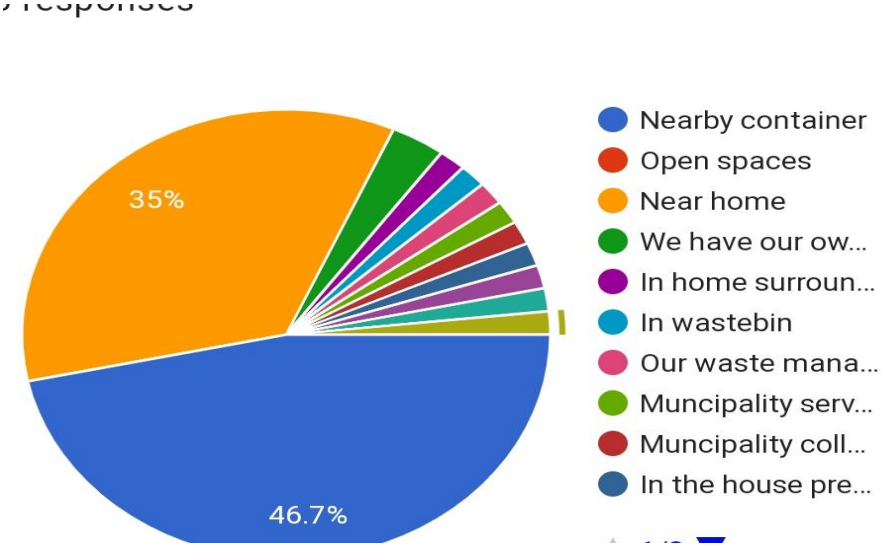

Fig 1:4 Status showing the mode of waste disposal

Wastes are different types – normal domestic waste and toxic and hazardous waste; there are reusable and non-reusable varieties ; some are degradable and some non –degradable. Out of 60 respondents71% people separates their wastes and 11.7% do not separate their wastes in their house and rest of the 16.7% they sometimes separates .And among them 83.3% do this because it is told by their collection service provider and 6.7 respondent do as their convenience and rest of the 10% they may be separating the waste sometimes.

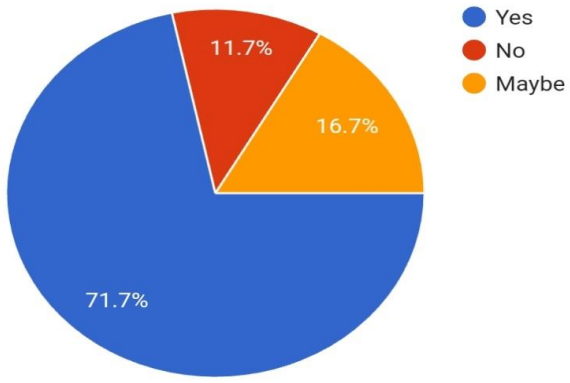

Fig 1: 5 Status showing the separation of wastes

83.3% of the respondent agrees that there is a large waste bin in their area and 15% of the people says there is no large waste bin and rest of the 1.7% of the people they are not sure about that. Among these respondents 53.3% people agree that there is regular garbage collection in their area .And 35% of the respondents disagree that .And rest of the11.7% people they are not sure about their garbage collection.

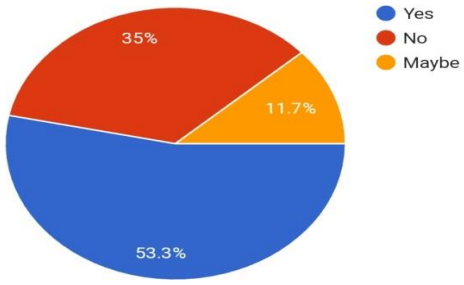

Fig – 1: 6 Status showing the regular garbage collection in their area

Even though there is regular garbage collection only 51% of the people use that and 35.2% orf the respondent do not use it , and 13 % of them are not sure about it. And 31.75 of the respondents use the collection service monthly and 26.75 of them uses never , 16.7% people uses daily ,and rest of the 24.85 respondents uses weekly and some of them dispose by themselves and some of them do not have any collection methods .

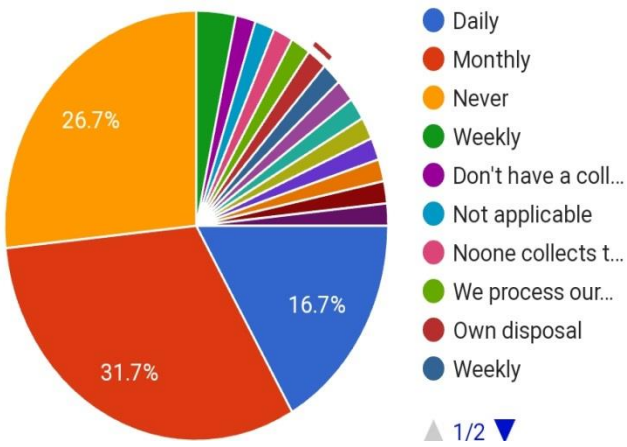

Fig 1:7 Status showing the use of garbage collection service

Among these participants 36.7% uses the public collection service and 26.7% of them uses the private method and 30% do not use any of these and rest of the 6.6% of them it is not applicable for them some are making it as manure. And 55% of the respondents are satisfied with their current waste collection service and rest of the 45% people are not satisfied with that. The main reasons for the level of satisfaction dissatisfaction is , 43% of them says it it reliable 30% says that it is due to improper collection method 13% says it is unreliable and rest of the 13 % says it is costly.

Among these participants 31% of them agree that people dumb their waste alongside the garbage bins instead of putting it inside , 38.3% of them are doubt about that and rest of the 30% people disagree that .The reason for this behavior 33.3%of the participant says that it may be difficult to put the waste inside the bin due to waste and litter spread around the bin . 13.3% says it may be because of the stray animals near the bin and rest of 53.3% says it may be because of any other reasons.

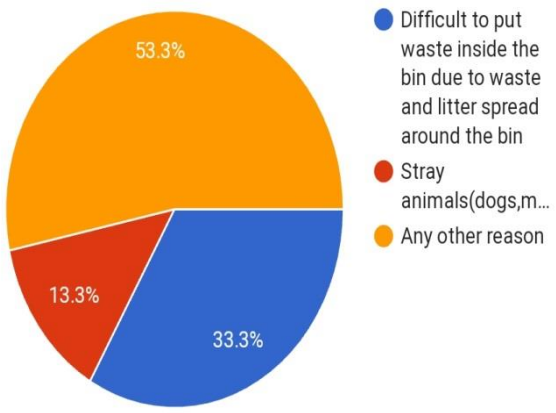

FIG 1:8 Status showing the reasons for throwing waste outside the bin

Among 60 respondent 35% of them recycle their waste , 35% of them do not do , and 35% of them are not sure about it.

According to these respondents some of the main problems with current solid waste management systems are waste lying around ,odor flies and rats and some have no problems

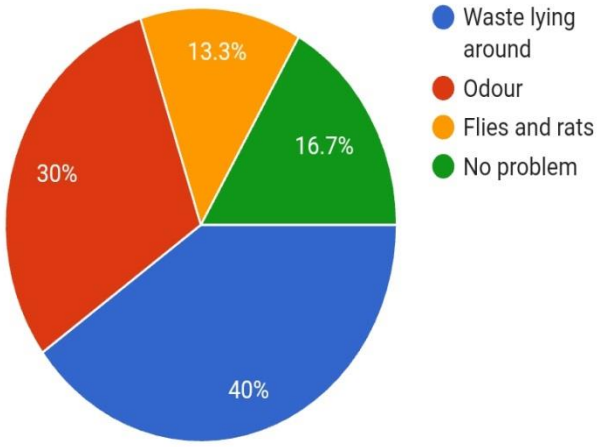

Fig 1:9 Status showing the main problems of current waste management system

According to this survey due to the improper waste management 20% of the people are suffered with skin disease, 8.3% have been suffered with Dengue fever, 5% of them are suffered with diarrhea , and very few of them are suffered with Typhoid, and rest of the65% of them do not affect with any diseases.

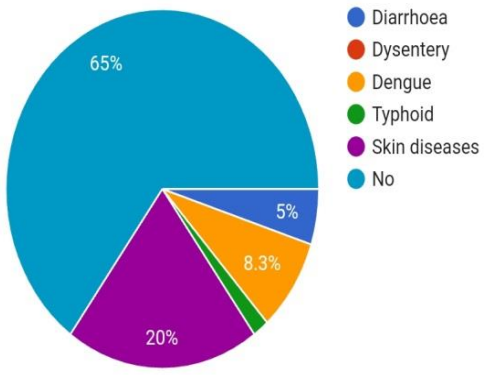

Fig 1 :10 Status showing the types of diseases caused by improper waste management

Among these respondents 91% of them are willing to separate collected waste like plastic, paper, metals etc. into separate bags for collection purposes. And only few about 8.3% of them disagree.

About 41.7 %of them are willing to compost the wastes and rest of the 15% and 43.35 of them do not wish or they are not interested. And 58.3% of them have clear idea about composting, and 41.7% they do not have any idea about it.

All those who are interested in composting giving the reasons that

- By composting we can reduce the purchase of chemical fertilizer
- It became manure and can use for the cultivation
- Food waste can be reduced.

Out of 60 participants 83.3% of the people have garden , and rest of the 16.7% do not have.

All those who have the garden give the reasons for keeping it

- We can consume fresh fruits and vegetables.
- Healthy food
- Eco friendly and good for health.

Among these 60 participants 91.7% of the people feel that it will improve our economic condition. And only few about 8.3% of them disagree this.

These are the results I could collect from the survey. According to these respondents the main cause of environmental degradation is throwing wastes here and there without any care .

DISCUSSION

The study entitled "ANALYSIS OF SOLID WASTE MANAGEMENT IN THE THRIKKAKKARA LOCALITY " aims to analyze the proper household waste management system. Waste, anywhere in the world, is known variously as an annoying headache, an unending problem or more correctly as an ever-growing pile of garbage. This survey results clearly show that ,improper waste management system is continuing still now , and also it gives negative impact on our environment and on human health. The findings from this study helps to understand how the people manages their household wastes.

Solid waste refers to the range of garbage materials – arising from animal and human activities that are discarded as unwanted and useless. Wastes can be categorized based on material , such as plastic ,paper , glass , metal ,and organic waste.

The study shows that all the participants are well aware about the waste management system . As it is seen in the result majority of them agree that improper waste management will effect on the environment. If our surroundings are not clean it is very harmful for our health

The study found that most of them dispose their waste near home or nearby container . Only very few of them dispose in the open places.

Waste collection method includes activities such as placing waste collection bins , collecting waste from those bins ,and accumulating trash in the location where the collection vehicle is emptied . In the present study we find that even there is large waste bin in the area people are unable to use in the proper way because mostly the wastes throwing surrounding the waste bin , not inside the bin . It causes the stray animals ,rat and other animals to wander around the waste bin it affect the people who are coming with good intensio0on to throw the waste into the bin so they too throw the waste outside the waste bin.

Due to improper waste management many are suffering with diseases like dysentery , dengue fever , typhoid , skin diseases , and diarrhea .

The study is also focus on the open dumping . Open dumping has been found to create environmental problems because of the air pollution , bad smell , presence of insects and rodents which are injurious to health .

Another method of solid organic waste management currently gaining popularity is composting . Organic wastes such as food materials can be used to for preparing compost . In current study we realize that majority of the people are interested in composting and gardening . It helps us for the ecofriendly eating habit.

The main reasons for the improper waste management is the carelessness of each person . If we are ready to take up the responsibility of our own waste materials it will be very helpful to keep our surroundings clean.

The study shows that how the waste management process effect on our daily life

Our environments and on the human health .Only due to the irresponsible act of the man causes all these problems

STRENGTH AND LIMITATIONS OF THE STUDY

. To the best of my knowledge there are many research reports regarding the solid waste management . This study was conducted to analyze the waste management systems In a particular area . It will help to understand how the waste management system in the area occurs . Unless and until we do not have a proper waste management system the waste remain as the waste ,but if it is using or recycling in a particular way the waste turn to wealth.

This study has several limitations to acknowledge . This study is based on a survey conducted online so it lacks face to face interaction and due to that reliability of the answers cannot be checked effectively .

SUGGETIONS TO IMPROVE WASTE MANAGEMENT STYLE

If every household made an effort to plan and segregate their waste, waste management would become much simpler. Here we explain how to manage household waste competently. The first step is to reduce waste in the house. The next step involves reusing or recycling material. Read on to understand how it can be done

1. Avoid Plastics

It can be difficult to manage plastic waste as it is not recyclable. This is one of the primary reasons why you should avoid plastic bags. Carry your own shopping bag when you go to the grocery shop. Do not use plastic containers to store kitchen items either. Use glass for storage. It is healthier for your family and for the environment.

2. Buy Food That Has Minimal Packaging

Shop at the ‘bulk buy’ section of the grocery store. Rice, pulses, and other essentials can be bought without plastic packaging. Food that comes in multi-layered packaging can increase the waste in your house. Pick products that do not include so much packing. For example- you don’t need the box of the toothpaste. So, pick a paste that comes without the carton. It will help you dispose of home waste effectively.

3. Compost Your Kitchen Waste

An eco-friendly waste management method is to compost your organic waste. Invest in a good composting bin and make rich compost from your kitchen waste. This will reduce your organic waste and leave you with quality manure for your gardens.

4. Say no to bottled water

Instead, carry a reusable water bottle. It is a myth that bottled water is healthier than tap water—although both tap and bottled water are federally regulated In the U.S., tap water actually has stricter quality and health standards than bottled water. Benefit the environment, your health, and your finances by embracing the tap and going reusable!

5. Use reusable rags and cloths for cleaning

Avoid paper towels, napkins, and tissues by going reusable! Use handkerchiefs, wash cloths, cloth napkins, towels, and/or cleaning rags to wipe up messes and clean household surfaces. After use, simply toss in the laundry. Wash in hot water and line dry in the sun

6. Buy foods with little or no packaging

Fresh fruits and veggies are typically offered loose in the produce section, and you can also buy many dry foods package-free in the bulk section of grocery stores. Bring your own reusable produce bags, containers, or flour sacks to purchase bulk items and produce instead of the plastic produce bags supplied at the stores. Check out our Package-Free Grocery Shopping Guide to learn more

CONCLUSION

The findings of the current study clearly indicate the negative impact of solid waste in the environment as well as on the human health. This study focuses on the house holds of Thrikkakara locality. The result shows that all are aware of the waste management system .This study was done based on questionnaire including 29 questions. The questionnaire was prepared in the Google form. And distributed the questionnaire through social media like what Sapp and Gmail.

Data regarding the household waste management is collected. Main problems related to the waste management are identified from the questionnaire survey. An integrated waste management solution is proposed. 60 participants responded to the survey . About 68% participants were below 30 .Rest of them are 30- 40 , 40- 50 , 50 and above. Majority of the participants were living in the nuclear family. Most of the participants agree that the wastes are affecting the environment very badly (61.7%).Among them 46.7% dispose their waste nearby container and 35% dispose near their home , and rest of them dispose in open places .

This current study finds that there is no any large waste bin in some of the areas. And also there is no no regular garbage collections in some of the area . And also it is realized that many people dump their waste alongside the garbage bins instead of putting it inside . the current study find that the main problem with present waste management system is the waste are lying around ,odor , flies and rats .

Due to improper waste management many are suffering with diseases like dysentery , dengue fever , typhoid , skin diseases , and diarrhea . The main reasons for the improper waste management is the carelessness of each person .

If we are ready to take up the responsibility of our own waste materials it will be very helpful to keep our surroundings clean .

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