SOLID WASTE MANAGEMENT PRACTICES OF RURAL HOUSEHOLDS IN ERODE DISTRICT

BY

INDHU.K

(17PEC005)

A DISSERTATION SUBMITTED TO

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN

COIMBATORE- 641 043

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF

MASTER OF ARTS IN ECONOMICS

APRIL - 2019

SOLID WASTE MANAGEMENT PRACTICES OF RURAL HOUSEHOLDS IN ERODE DISTRICT

BY

INDHU.K

(17PEC005)

A DISSERTATION SUBMITTED TO

AVINASHILINGAM INSTITUTE FOR HOME SCIENCE AND HIGHER EDUCATION FOR WOMEN

COIMBATORE- 641 043

IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF MASTER OF ARTS IN ECONOMICS

APRIL - 2019

Signature of the Head of the Department

Signature of the Guide 22/4/19

ACKNOWLEDGEMENT

The investigator wishes to express her immense gratitude to the **managing trustee, Dr. T.S.K Meenakshisundaram,** Avinashilingam Institute Home Science and Higher Education for Women, Coimbatore, for providing the opportunity and exposure to the world of knowledge.

The investigator is thankful to the **Chancellor, Dr. P.R. Krishna Kumar,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for providing the opportunity to conduct the study.

The investigator has great pleasure in conveying her profound gratitude to **Vice Chancellor, Dr. Premavathy Vijayan,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for the academic support given for the study.

The investigator is thankful to the **Registrar, Dr. (Tmt) R. Kowsalya,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for all the administrative support given for the completion of the study.

The investigator conveys her heartfelt thanks to **Dr. K.T. Geetha, Dean School of Arts and Social Science and Professor in Economics,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for all the administrative and valuable suggestions given during the study.

The investigator conveys her gratitude to **Dr. M. Manonmani, Professor and Head of the Department of Economics,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for her inspiration and constant encouragement during the course of the study.

The investigator sincerely thanks and express her deep sense of gratitude to **Dr. (Mrs.) M. Shanthi, Assistant professor, Department of Economics,** Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, for her expert guidance, keen interest and immense help rendered throughout for the successful completion of the study.

The investigator expresses her deep sense of gratitude to the **Librarians** of the Avinashilingam institute for Home Science and Higher Education for Women, Coimbatore, for their help rendered in compiling literature from e-journals and reference books. The investigator extends her thanks to **other soul** who gave direct and indirect help for the undergoing this study.

TABLE OF CONTENT

CHAPTER NUMBER	CONTENT	PAGE. NO
List of tables		
List of figures		
I	Introduction	1-8
II	Review of literature	9-16
III	Methodology	17-18
IV	Results and Discussion	19-33
V	Summary and Conclusion	34-38
Bibliography		
Appendix – I Questionnaire		

LIST OF TABLES

Table Number	Table Name	Page. No
4.1	Gender wise classification of the respondents	19
4.2	Age classification of the respondents	20
4.3	Marital status of the respondents	20
4.4	Religion of the respondents	21
4.5	Educational status of the respondents	21
4.6	Occupation Level of the respondents	22
4.7	Monthly income	23
4.8	Housing Details	23
4.9	Ownership Status	24
4.10	Type of Family	24
4.11	Size of the Family	24
4.12	Methods of disposing solid waste	25
4.13	Distance of waste disposal site	26
4.14	Quantity of solid waste stored per day by the selected households	26
4.15	Frequency of solid waste disposal	27
4.16	Problem faced while disposing municipal solid waste	27
4.17	Solid waste collection by the Panchayat	27
4.18	Willingness to pay to improve Solid Waste Management services	28
4.19	Impact of solid wastes on health	32
4.20	Family members suffered by waterborne diseases	32
4.21	Association Between Method of Waste Disposal and Contraction of Diseases	33

LIST OF FIGURES

Figure Number	Title of the figure	Page. No
4.1	Willingness to pay for solid waste collection	29
4.2	Impact of solid waste on their daily life	30
4.3	Awareness on water pollution	31

CHAPTER – I

INTRODUCTION

Wastes are the material that are not needed and are not usable economically with further processing. It may be in the form of solid, liquid, and gas. Increase in urban population and changing life styles lead to the generation of solid waste. Solid waste refers to all non-liquid wastes. Generally, solid waste is heterogeneous in nature such as mixture of vegetables, food items, paper, plastics, rags, glass etc., they originate from the human activities such as agriculture, industry, domestic activities etc. Solid waste can be classified into different types depending on their source.

MAJOR SOURCES OF SOLID WASTE:

a) Residential

Residences and homes where people live are some of the major sources of solid waste. Garbage from these places include food wastes, plastics, paper, glass, leather, cardboard, metals, yard wastes, ashes and special wastes like bulky household items like electronics, tires, batteries, old mattresses and used oil. Most homes have garbage bins where they can throw away their solid wastes in and later the bin is emptied by a garbage collecting firm or person for treatment.

b) Industrial

Industries are known to be one of the biggest contributors of solid waste. They include light and heavy manufacturing industries, construction sites, fabrication plants, canning plants, power and chemical plants. These industries produce solid waste in form of housekeeping wastes, food wastes, packaging wastes, ashes, construction and demolition materials, special wastes, medical wastes as well as other hazardous wastes.

c) Commercial

Commercial facilities and buildings are yet another source of solid waste today. Commercial buildings and facilities in this case refer to hotels, markets, restaurants, go downs, stores and office buildings. Some of the solid wastes generated from these places

include plastics, food wastes, metals, paper, glass, wood, cardboard materials, special wastes and other hazardous wastes.

d) Institutional

The institutional centers like schools, colleges, prisons, military barracks and other government centers also produce solid waste. Some of the common solid wastes obtained from these places include glass, rubber waste, plastics, food wastes, wood, paper, metals, cardboard materials, electronics as well as various hazardous wastes.

e) Construction and Demolition Areas

Construction sites and demolition sites also contribute to the solid waste problem. Construction sites include new construction sites for buildings and roads, road repair sites, building renovation sites and building demolition sites. Some of the solid wastes produced in these places include steel materials, concrete, wood, plastics, rubber, copper wires, dirt and glass.

f) Municipal services

The urban centers also contribute immensely to the solid waste crisis in most countries today. Some of the solid waste brought about by the municipal services include, street cleaning, wastes from parks and beaches, wastewater treatment plants, landscaping wastes and wastes from recreational areas including sludge.

g) Treatment Plants and Sites

Heavy and light manufacturing plants also produce solid waste. They include refineries, power plants, processing plants, mineral extraction plants and chemicals plants. Among the wastes produced by these plants include, industrial process wastes, unwanted specification products, plastics, metal parts just to mention but a few.

h) Agriculture

Crop farms, orchards, dairies, vineyards and feedlots are also sources of solid wastes. Among the wastes they produce include agricultural wastes, spoiled food, pesticide containers and other hazardous materials.

i) Biomedical

This refers to hospitals and biomedical equipment and chemical manufacturing firms. In hospitals there are different types of solid wastes produced. Some of these solid wastes include syringes, bandages, used gloves, drugs, paper, plastics, food wastes and chemicals. All these require proper disposal or else they will cause a huge problem to the environment and the people in these facilities.

If these wastes remain untreated, it leads to air, water, soil or solid waste pollution. Increase in urban population and changing life styles lead to the generation of solid waste. Solid waste means all non-liquid wastes. Generally, solid waste is heterogeneous in nature such as mixture of vegetables, food items, paper, plastics, rags, glass etc., if solid waste is disposed of on land in open areas, then it causes a negative impact on the environment, ground water and on health.

The most common problem associated with improper management of solid waste includes diseases, odor nuisance, fire hazards, atmospheric and water pollution, aesthetic nuisance and economic losses. There has been a significant increase in solid waste generation in India over the years from 100 gm per person per day in large towns. Currently most of the municipal waste in India is being disposed unscientific. Generally municipal solid wastes collected and deposited in landfill such unscientific disposal attracts birds, rodents and fleas to the waste sites and creates unhygienic conditions. Hence, solid waste management is very essential.

SOLID WASTE MANAGEMENT IN INDIA:

Solid waste management is the process of collecting and treating solid wastes. It also offers solutions for recycling items that do not belong to garbage or trash. As long as people have been living in settlements and residential areas, garbage or solid waste has been an

issue. Waste management is all about how solid waste can be changed and used as a valuable resource.

Present practices regarding solid waste in India are as follows:

- Generally solid waste is disposed of in low-lying areas, outskirts of cities, alongside roads or any vacant place wherever waste collection find that they will not be seen or objected by anybody.
- Handling of waste by solid waste workers is done without taking any precautions or protective measures which lead to many communicable and non-communicable diseases to them.
- Community bin collection system is usually practiced in India for collection of waste by civic bodies. But these bins neither they are properly designed as per requirements and quality nor they are placed at proper places so that they are within reach of everyone hence the people who find these bins beyond their reach throw their waste anywhere at vacant place.
- Vehicles transporting this waste ae also not designed properly, neither they are covered nor equipped with instruments to collect th whole waste. So, waste scatters here are there during collection and transportation.
- Landfill sites are also not scientifically designed so create air, water and soil pollution. Waste workers work on these sites work without any protective measures are prone to various diseases. Also, incineration method is usually followed in maximum places to reduce the waste which itself releases many toxic elements and gases to the environment making the people ill.
- Lack of coordination among various departments of civic bodies also lead to poor management of solid waste management.
- Public apathy and low social status assigned to this task has made the situation worse.

THE SOLID WASTE MANAGEMENT CHALLENGES IN INDIA:

The explosion in world population is changing the nature of municipal solid waste management mainly from a low priority, localized issue to an internationally social problem. The problem of managing municipal solid waste is growing day by day, which results into a direct threat to the public health and to the environment. More than 90% of the MSW generated in India is directly disposed on land in an unsatisfactory manner. The problem is

already acute in cities and towns as disposal facilities have not been able to keep pace with the quantum of wastes generated.

In India solid waste management services are provided by municipal corporations/municipalities/ panchayats as per their rules. Many of the laws are quite old and they need changes as per requirement. Even their implementation is also very poor. In maximum of the municipalities there is no separate department for waste management. SWM is the responsibility of a health officer who is assisted by the engineering department in the transportation work. The activity is mostly labour intensive, and 2-3 workers are provided per 1000 residents served. The municipal agencies spend 5-25% of their budget on SWM which is Rs. 750-250 per capita per year (Kumar and Gaikwad, 2004). In spite of this huge expenditure, services are not provided to the desired level.

Municipal solid waste (MSW) is one of the major areas of concern all over the world. In developing country like India, there is rapid increase in municipal solid waste due to urbanization and population growth. The population in Indian cities is increasing exponentially due to rapid urbanization and industrialization. As per more than 55 million tons of MSW is generated in India per year; the yearly increase is estimated to be 5%. It is estimated that solid waste generated in small, medium and large cities and towns in India is about 0.1 kg, 0.3-0.4 and 0.5 kg per day respectively. The estimated annual increase in per capita waste generation is about 1.33% per year. In India, the biodegradable portion dominates the bulk of MSW. This is mainly due to food and yard waste. With rising urbanization and change in lifestyle and food habits, the amount of municipal solid waste has been increasing rapidly and its composition has been changing.

Realizing the need for proper and scientific management of solid waste, the Municipal Solid Waste (Management and handling rules, 2000) were notified by the Ministry of Environment and Forests, Government of India. The objective of these rules was to make every municipal authority responsible for the implementation of the various provisions of the rules within its territorial area and also to develop on effective infrastructure for collection, storage.

MSW management in India:

A typical waste management system in India the following elements:

- Segregation, reuse, and recycling at the household level

- Waste generation and storage
- Primary waste collection and transport to a transfer station or community bin
- Street sweeping and cleaning of public places
- Management of the transfer station or community bin
- Secondary collection and transport to the waste disposal site.
- Waste disposal in landfills

In most of the Indian cities, the MSW collection, segregation, transportation, processing and disposal is carried out by the respective municipal corporations and the state government enforces regulatory policies. The indiscriminate dumping of solid waste in waste bodies and low-lying areas is a common practice followed by most of the municipalities with no consideration of its effect on the environment. The waste management in India is the responsibility of local governments, though it has been intended that local government would raise the financial resources required for the provision of basic civil amenities, including waste management, as a result, local authorities are not strongly placed to have a comprehensive set of waste management policies of their own. Instead; they act only as implementing agencies for scheme formulated at the national level.

The management of urban and rural solid waste suffers from many problems and constraints, which inhibit the proper and effective disposal of solid waste, these problems and constraints result in operational and maintenance functioning and in inadequate salvaging of resources present in the wastes.

Solid waste management rules (2016) placed greater emphasis on door-to-door collection of waste segregated at the source of generation and Swachh Bharat Mission providing funds for infrastructure, many cities are reporting increased coverage of door-to-door collection, although the collection is mostly not of segregated waste and the collection coverage also tends to be overstated (Isher Judge Ahluwalia, 2018).

SOLID WASTE MANAGEMENT IN RURAL AREAS:

Solid waste management in rural areas is a key issue in developing and transitioning countries due to the lack of proper waste management facilities and services. In India especially in the rural areas, waste is a severe threat to the public health concern and cleanliness. Though, the form of waste (both solid and liquid) generated in rural areas is predominantly organic and biodegradable yet it has become a major problem to the overall sustainability of the ecological balance. Solid waste management is one of the major

environmental problems of Indian rural areas which are emerging towards growth centre. Improper management of solid waste causes hazards to inhabitants.

In developing countries, informal sector plays a crucial role in diverting recyclables from waste dumping and to provide basic waste collection services, but it is mainly developed in urban and semi-urban areas. However, rural areas which are remote from major urban areas are usually the most neglected by waste management services. Waste operators avoid such areas, and local authorities provide no or low financial resources to provide appropriate public services. In addition, the geographical constraints make more difficult to implement proper waste management facilities. Animal-driven carts, tricycles, and tractor trailers are frequently used for the transportation of waste across rural communities. The waste management infrastructure is rudimentary; the amounts of waste collected are frequently disposed on open dumps or river banks.

Solid waste management has become a practical necessity in rural areas too. Next to becoming Open Defecation Free (ODF) villages, the Swachh Bharat commitment demands rural households to dispose of garbage in a scientifically sensible manner. Sanitation and street cleaning are one of the basic functions of a Gram Panchayat, and they should make arrangements for attending to it. The Swachh Bharat Mission (SBM- Garmin) requires every Gram Panchayat to put in place a functional waste management system. Most of the State governments also encourage the GPs to chalk out a plan for SWM and practically start managing solid waste in a scientifically acceptable manner. The domestic waste generated in rural households of India is increasingly becoming an issue of serious concern. With this background an attempt was made to assess waste management practices in rural households of Erode District.

Research gap:

There are many studies have been undertaken during the past years on solid waste management in India. The earlier studies were mostly concentrated on urban waste management but there were limited studies rural waste management. Hence, in the present study an attempt was made to assess the solid waste management practices in Erode district.

The Objectives of the study are as follows:

- To identify the socio-economic conditions of the selected households of the study area
- To analyse solid waste management practices of the selected rural households in the study area
- To assess the perception and awareness on the effects of solid waste
- To examine the association among distance of waste disposal, waste disposal method and contraction of diseases.

Hypothesis:

☞ H_0: There is no association among the method of waste disposal and distance of waste disposal site with respect to contraction of diseases

☞ H_a: There is association among the method of waste disposal and distance of waste disposal site with respect to contraction of diseases.

CHAPTER - II

REVIEW OF LITERATURE

Imam et al., (2007) reviewed the current status of Solid Waste Management in Abuja. The results revealed that the existed Solid Waste Management system was affected by unfavourable economic, institutional, legislative, technical and operational constraints. A reliable waste collection service is needed and waste collection vehicles need to be appropriate to local conditions. More vehicles were required to cope with increased waste generation. Wastes need to be sorted are source as much as possible, to reduce the amount requiring disposal. Co-operation among communities, the informal sector, the formal waste collectors and the authorities is necessary if recycling rates are to increase. Markets for recycle materials need to be encouraged. Despite recent improvements in the operation of the existed dumpsite, a properly sited engineered landfill should be constructed with operation contracted to the private sector. Wastes dumped along roads, underneath bridges, in culverts and in drainage channels need to be cleared. The study based secondary data. The study also suggested that Small-scale waste composting plants could promote employment, income generation and poverty alleviation. Enforcement of waste management legislation and a proper policy and planning framework for waste management are required.

Mufeed sharholy et.al (2007) reviewed the characteristics, generation, collection and transportation, disposal and treatment technologies of MSW practiced in India. The study pertained to MSWM for Indian cities had been carried out to evaluate the current status and identify the major problems. The study based secondary data. The study suggested which may be beneficial to encourage the competent authorities' researcher to work towards further improvement of the system. The study concluded that the lack of resources such as financing, infrastructure, suitable planning and data and leadership, are the main barriers in MSWM.

Vikash Talyan et al., (2008) described the status of Municipal Solid Waste Management in Delhi. Results revealed that the inhabitants of Delhi generate about 7000 tonnes/day of MSW. About 70–80% of generated MSW was collected and the rest remains unattended on streets or in small open dumps. Only 9% of the collected MSW was treated through composted, the only treatment option, and rest was disposed in uncontrolled open land fills at the outskirts of the city. The existed composted plants were unable to operate to their intended treatment capacity due to several operational problems.

Babayemi et al., (2009) investigated the quantity, rate, factors influenced the generation, solid waste types, collection, disposal, reuse, recycling, and environmental problems of solid waste generation in Nigeria. The study was based on primary data. Results revealed that 35.8% used waste collection services, 64.2% used other waste disposal options, 16.4% used both. 68.7% were aware of waste collection service and waste management regulations.

Ali Jafari et al., (2010) investigated the current municipal Solid Waste Management in Khoram Abad city. The study was based on primary data. The findings of the study showed that the waste generation rate was estimated as 800 g/cap. d with density of 243 kg/m3. Solid waste was stored in different types of containers at the source of generation in different areas. Local Authority was responsible for waste collection and transportation. Both mechanical and manual methods were used to collect residential waste. Land filled was the main disposal method. Problem and deficiencies were still identified in the city.

Chatterjee (2010) analyzed the management issues of Municipal Solid Waste in Kohima. The objective of the study was to create an efficient, reliable and holistic system for management of municipal solid waste. The study was based on both Primary and Secondary data collection. Results revealed that 35- 40 per cent of wastes are collected from the entire city. Min sources were community bins and dustbins. Spillage occurred during the transportation of wastes, as vehicles are not covered or properly sealed. Wastes were cleared daily with the majority of vehicles carrying out 2 trips and a few carrying out only 1 trip.

Vyas (2011) investigated the chemical analysis of MSW like proper collection of waste, its treatment and disposal. The study was based on secondary data. Proper segregation would lead to better options and opportunities for scientific disposal of waste. The biodegradable matter could be disposed of either by aerobic compositing, aerobic digestion or sanitary land filling. The study suggested that depending upon land availability and financial resources, either of these disposal methods could be adopted.

Gakungu et al., (2012) examined the generation, collection and disposal of Solid Waste in the public technical trained institutions and also assessed their annual generation, collection and disposal of waste in public technical training institutions. Results revealed that accumulation of garbage from the institutions caused pollution and unsightliness. The results of data analysis indicated that all the institutions disposed of their waste in open disposal sites.

Vijay Kumar et al., (2013) analyzed the problems of Solid Waste Management in Indian cities. The study was based on secondary data. The results revealed that the formal processing and recovery units were not established. Recovery and recyclable activities restricted to small and medium kabadiwalas. There were an involvement of small children and old people employed for sorting and segregating waste. No protective clothing consideration for rag pickers and scavengers.

Swapan Das et al., (2013) analysed the current Municipal Solid Waste (MSW) management in Kolkata. The results of the study revealed that percentage of components and specific weight of the MSW, the composited parameters (moisture content, total organic carbon, total nitrogen and PH), organic matter content, calorific value and heavy metal concentrations (Cd, Cr, Cu, Ni, Pb, Zn, Fn, Mn, Co) of the compostable waste sorted form the mixed MSW were determined and evaluated. Kolkata city generates approximately 5114.76 ton/d i.e., 1.10 kg/cap-d of MSW daily. Approximately 700 ton of MSW were collected and stored in every day. Approximately 30% of the MSW generated was compostable waste and yearly mean moisture content, organic matter content, C/N ratio and PH of these are 46%, 31.81%, 21.6 and 8.07, respectively, and approximately 15% of the MSW consists of recyclable materials.

Javeriya Siddiqui et al., (2013) examined the waste collection scheme, present status of Solid Waste Management and sanitary landfill in Mysore city. Municipal Solid Waste Management (MSWM) in India was a system which consists of regulatory, administrative, technology, market, and social subcomponents. The study was based both primary and secondary data. The study concluded that the implementation of a Sustainable Municipal Solid Waste Management in Mysore city along with environment friendly management of plastic waste should be taken up while encouraging people's participation as well.

Archana et al., (2014) analyzed the existing Municipal Solid Waste Management practises in Lucknow city. The study was based on both primary and secondary data. The results of the study showed that they generated 1500 tonnes of MSW every day. In the absence of sanitary landfills or other protected and lined dumped places, the MSW was transported to the various dumpsites. The study suggested that the Municipal authorities were to establish and to maintain MSW storage facilities that do not create unhygienic and unsanitary conditions in the area. Citizens must be encouraged by the municipal authority to

segregate wastes. Vehicles during waste transportation must be covered and must be processed in such a way which could reduce burden on landfills.

Mohanty et al., (2014) assessed the existing state of Municipal Solid Waste Management (MSWM) in Bhubaneswar city. The study was based on both primary and secondary data. It also concluded that the city had been facing these deficiencies in varying degrees and there is a need to make substantial improvement in the MSW practices prevailing in the city to raise the standard of health sanitation and urban environmental keeping pace with the rapid urbanization and growing population.

Arti Pamnani et al., (2014) investigated the current scenario of municipal solid waste quantity, quality and its management in India. The study was based on primary data. The results revealed that Municipal solid waste generated depends on population climate, urbanization, socioeconomic criteria etc. It was suggested that efforts were made to improve MSWM in major cities.

Nitin Mundhe et al., (2014) assessed the municipal solid waste management system like collection, storage, segregation, transportation, processing and disposal of Pune city using Geospatial tools. The study demonstrated the capacity to see GIS, GPS and remote sensing technology for the effective assessment of solid waste management system will minimize the environmental risk and human health problems.

Jadhav et al., (2015) estimated solid waste management practices in Bhor town, sub urban area of Maharashtra, India and suggests solution to some of the major problems. Approximately 5.96 ton/d of solid wastes are generated in the Bhor Municipal Council area. Deficiencies were found in all elements of SWM. Presently no treatment is provided to the waste and waste is dumped on open land after collection. Lack of suitable facilities and underestimates of waste generation rates, inadequate management and technical skills, improper collection and route planning are responsible for poor collection and transportation of municipal solid wastes. Waste generation rate in municipal council area is approximately kg/capita/day. Approximately 70% of the MSW generated is compostable wastes and mean moisture content and organic matter content is large in amount. The study was based primary data. The study suggested the system deals with maximizing recycling and minimizing land filling of the MSW. Thus, vermin composting or energy recovery becomes as a suitable alternative as final treatment process to the organic fraction.

Sreedevi (2015) assessed the type and amount of waste generated in St. Pious X Degree and PG College for women Hyderabad and suggested the possible ways of managing the solid waste generated in the college campus. The waste was collected on a daily basis from various sources in the college and waste separated into dry waste and wet waste. Dry waste was then segregated into recyclables (paper, plastic, glass, metals) and non-recyclables and weighed. The study was based on primary data. The result showed that out of the total waste generated, 24% was wet waste, 48.6% was dry non-recyclables waste and remaining was dry recyclables. 14.7% paper, 8% plastic, 3.3% glass and 0.7% metals. It was suggested to employ colour coded dustbins for different types of wastes at main sources of waste generation in the college campus.

Neha Gupta et al., (2015) analysed the changing trends of quantity and characteristics of MSW in India. The study found variations in composition of MSW of four mega cities i.e. Chennai, Delhi, Kolkata and Mumbai over past century. In urban areas, the major fraction of municipal solid waste was compostable materials (40%-60%) and inerts (30%-50%). The relative percentage of organic waste in municipal solid waste was generally increasing with the decreasing socio-economic status; so rural household generate more organic waste than urban households. Percentage of recyclables (paper, glass, plastic and metals) was very low because of rag pickers who segregate and collect the materials at generation sources, collection points and disposal sites. The waste collection in India was very unorganized. Most of the urban areas were lacking in MSW storage at the source, significantly. The collection bins used in various cities were neither properly designed nor properly located and maintained. The average collection efficiency for MSW in India cities and states was about 70%.

Arti Pamnani et al., (2015) analysed the quantity and characteristics of MSW and existed disposal methods for small-scale towns and nearby villages. The study was based of secondary data. Results revealed that formation of clusters for segregation and treatment of MSW and final disposal at landfill site was more economical than segregation.

Omambia Bernard et al., (2015) assessed awareness on solid waste management systems in Baraton Centre. The study showed that majority of the respondents (78%), knew about Solid Waste Management.

Shaheda Niloufer et al., (2015) attempted to study the physical and chemical characteristics of Municipal Solid Waste in Vijayawada city. The study was based on primary

data. The waste generates from the city comprised a maximum portion of organic waste as compared to non-degradable portion of waste. The results revealed that the average organic percentage of waste in MSW was 55%, combustibles were 37% and recyclables were 11%. The leach ate produced was highly contaminated that reflected the MSW characteristics in the city.

Ganeshwaran et.al (2015) analysed the proportions of solid waste management**.** The results revealed that waste generation rate varied from 0.12 to 0.60 kg per capita per day. Analysis of physical composition indicated total compostable matter in the waste ranged from 40-60 percent. Recyclable fraction showed between 10 and 25 percent. The moisture content in the MSW was varied from 30 to 60 per cent and the C:N ratio ranged from 20-40.

Arti Pamnani (2015) analysed the problem related to environment in small scale municipality of Sojitra, Gujarat state. The study was based on primary data. The results revealed that waste comprised major portion of organic waste which can be handled properly for making natural manure or for utilizing as alternative fuel. The study suggested that collection should have been given as an alternate day collection of waste for organic and inorganic wastes.

Warunasinghe et al., (2015) examined the status of Solid Waste Management in Colombo. The study was based on primary data. The findings of the study showed that the waste separation at household level was practiced by 52% while 42% do not practice it. Compost bins were popular among 30% of the households. Compost bins were unknown to 6%. Active participation for home composted was 26%. Awareness about the environmental hazards caused by improper waste management was 100%. Only 2% of the respondents did not had much concern about the health impact of improper waste management. 54% of the household was unsatisfied with the prevailed waste management practices and 70% of them expect more involvement by the government to correct the problem. 26% of the households were not aware of waste recycling, reuse & reduction. 96% of the respondents agreed to co-operate & to participate for a proper waste management programme. The study suggested that an effective waste management programme had to be implemented for better improvements.

Kale Tejas Sunil et al., (2016) analysed the solid waste management in Gotkhindi village near Islampur. The study was based on secondary data and it suggested solid waste

management plan will keep village campus clean and healthy. This will not only contribute to the health of communities but also has positive impact on socio-economic conditions.

Ashok Tejankar et al., (2017) analyzed the characteristics of Solid Waste in Aurangabad city. The study showed that the imminent selection of dumping sites away from the city was due to unavailability of land and/or higher land price would induce three times as high daily waste transportation cost as compared to that at present.

Salma Sultan (2017) overviewed the existed municipal Solid Waste Management in India. The study founded that there were 34 landfills which together occupy a total of 1,895 hectares of land. The study concluded that the state of municipal Solid Waste Management service in most Indian cities remains substandard. The state of the urban Solid Waste Management was still far from a satisfactory level and there was thus an urgent need to address the issues by involving residents, private sector players ad non-governmental organizations along with civic authorities.

Kadafa (2017) analysed the environmental issues of MSWM in Abuja. The study was based secondary data. The findings of the study showed the 42% of residents had collection services available to them provided by the municipality. Recycling as also not well advanced in 17% f population recycle. Abuja resident practice more unsustainable waste management practices waste burning and dumping with neighbourhoods. Waste minimization still was an issue that had not been addressed in Abuja. Open dumping within neighbourhoods was a common practise in Abuja at 80%. The open dumps in FCT (Federal Capital Territory) can be attributed to the irregular frequency of waste collection service were not available in all districts. The frequency of daily waste collection by the municipality was 10.3%. The study suggested importance for a basic waste collection service a separate management system for hospital waste and had to be established.

Moharanan choudhury et.al (2017) analyzed the waste management status of three major towns of Assam state namely Jorhat, Tezpur and Dibrugarh. A comparative analysis is carried out on the basis of municipal solid waste generation in these three prominent municipalities of upper Assam. During the present study it is estimated that Tezpur town produces around 28 MT of waste. Jorhat town produces 35 MT of waste and Dibrugarh town produces 75 MT of waste respectively. All the three municipalities are facing problem for disposal of waste as the open dumping ground is affecting the people and environment around the site.

Pankaj Mandawat (2017) analysed the solid waste management in Haridwar district were selected five villages. The population of all the studied villages was estimated about 17348 in 2011. The results showed that average daily per capita of household waste and cattle waste generation is 0.18, 18 kg/cap-day, organic and bio-degradable which is around 75% and remaining fraction comprise of paper, polythene, plastics, textiles, rubber, glass, metal and inert are 6.62, 2.45, 0.89, 2.57, 0.32, 0.42, 0.41 and 5.26 in percentage, bulk density of household and cattle waste is 310.33 kg/m3, 805.076 kg/m3.

Suman Rawat et al., (2018) examined the characterization of Solid Waste Management in Rishikesh, Uttarakhand. The study revealed that the households were collected to characterize the household solid waste (HSW). The average (HSW) generation rate was 0.26kg/c/d and it was composed of organic waste (57.3%), plastic (14%), paper (10.9%), and glass and ceramic (13%) and other materials (16.5%). There was an inverse relationship between household waste generation rate and family size (< 0.05). The MSW management system practiced in Rishikesh was unsound. Waste segregation at source, no provisions of composted and no recycled by formal sector. The collection and transportation of waste was inadequate and inappropriate. Collected waste was dumped in open dumped site without scientific management.

Raj Parmar et al., (2018) examined the status of solid waste management of Jetpur town in western region of Gujarat state. The study suggested scientific methodology of solid waste management. The problem of solid waste can be solved by adopting the scientific way of solid waste management. This can be achieved by educating people about the importance of solid waste management, by achieving the source separation of solid waste, by introducing the effective method for collection and transportation of solid waste.

CHAPTER - III

METHODOLOGY

The methodology adopted in the present study is discussed under the following heads:

- Profile of the study area
- Selection of the sample
- Data base of the study
- Period of study
- Techniques of analysis

I. Profile of the study area

Erode District is a district in the Kongu region (western part) of the Tamil Nadu State, India. Erode is a highly progressive district in Tamil Nadu. There are seven taluks in this district viz., Erode, Perundurai, Bhavani, Kangeyam, Dharapuram, Gobi and Sathyamangalam. There are three revenue divisions viz., Erode, Gobi and Dharapuram. Erode is the administrative head-quarter of this district. There are 539 villages in the district, spread over 20 community development blocks. There are five municipal towns, or township and 61 town panchayats in this district.

According to 2011 census, Erode district had a population of 2,251,744 with a sex-ratio of 993 females for every 1,000 males, much above the national average of 929. A total of 195,213 were under the age of six, constituting 99,943 males and 95,270 females. Scheduled Castes and Scheduled Tribes accounted for 16.41% and .97% of the population respectively. The average literacy of the district was 66.29%, compared to the national average of 72.99%. The district had a total of 658,071 households. There was a total of 1,195,773 workers, comprising 173,376 cultivators, 331,414 mains agricultural labourers, 48,960 in house hold industries, 557,301 other workers, 84,722 marginal workers, 4,794 marginal cultivators, 38,798 marginals agricultural labourers, 5,362 marginal workers in household industries and 35,768 other marginal workers.

II. Selection of the sample:

The study adopted multi stage sampling technique in selecting the sample. In the first stage Erode district was selected because it is one of the forerunners in Tamil Nadu in

agriculture and industrial activities. In the second stage sathyamangalam taluk was selected on basis of a greater number of villages. In the third stage Rajan Nagar village was selected which is a large village located in Sathyamangalam Taluka of Erode district. A sample of 100 households were randomly chosen from Rajan Nagar village.

III. Database of the study:

Relevant and required data for the present study were collected from primary source by administering by questionnaire to analyze the respondent's disposing their household solid waste questionnaire was first pre-tested to check for clarity and specificity and the necessary modifications were made on the basis of the experience gained during pre-testing.

IV. Period of study:

The field investigation and data collection for the study was carried out during the period November to December 2018.

V. Techniques of analysis:

Data collected were tabulated and analysed for the purpose of giving precise and concise information. Besides, percentages, graphs and chi – square analysis was used.

Chi – square test is one of the simplest and most widely used non – parametric test in statistics. The quantity $\varkappa^2$ describes the magnitude of the discrepancy between theory and observation and is symbolized as:

$$\varkappa^2 = \frac{\sum (O - E)^2}{E}$$

Where O refers to observed frequency and E refers to expected frequency. In the present study, Chi – Square test was applied to find association among the method of waste disposal and distance of waste disposal site with respect to contraction of diseases.

CHAPTER - IV

RESULTS AND DISCUSSION

The major findings of the study are presented and discussed under the following heads:

I. Socio Economic Profile of the respondents
II. Solid waste management practices of selected households
III. Perception and awareness on the effects of solid waste

I. SOCIO - ECONOMIC PROFILE OF THE RESPONDENTS

a) Gender of the respondents:

Gender plays an important role in managing solid waste in the study area. The following table gives the details of gender wise representation of the selected households.

Table – 4.1

Gender wise classification of the respondents

Gender	Percentage
Male	55.0
Female	45.0
Total	100

Source: Field survey 2018

Table 4.1 represents gender wise classification of the selected households in the study area. Nearly 55 percent of the respondents were male and 45 percent of the respondents were female.

b) Age of the respondents:

Age is another important socio-economic determinant of the selected households. The age wise distribution of the respondents is depicted in the following table4.2.

Table 4.2

Age classification of the respondents

Age	Percentage
Below 40	37.0
40-50	35.0
Above 50	28.0
Total	100

Source: Field survey, 2018

Age classification of the selected households reveals that majority of the households were belongs to the age group below 40, about 35 percent were in the age group of 40 to 50 and remaining 28 percent were in the age group above 50.

c) Marital status:

Marriage is an important event particularly from the stand point of additional burden of responsibility on the marriage partners to pull together as constituent of a new family. The following table4.3 shows marital status of the selected households.

Table 4.3

Marital status of the respondents

Marital Status:	Percentage
Married	90.0
Unmarried	9.0
Widow	1.0

Source: Field survey, 2018

Table 4.3 indicates that majority of the respondents were married 90 percent, nine percent of the respondents were unmarried and remaining 1 percent were widow.

d) Religion of the respondents:

Table 4.4

Religion of the respondents

Religion:	Percentage
Hindu	95.0
Christian	2.0
Muslim	2.0
Others	1.0

Source: Field survey, 2018

Data pertaining to religion of the respondents reveals that 95 percent of the respondents were Hindus, followed by Muslims 2 percent, Christians 2 percent and 1percent of them belongs to other religions. Thus, majority of the respondents belonged to Hindu religion.

e) **Education status of the respondents:**

Education shapes the personality and sharpens the mind of an individual. For the purpose of this study, educational qualification of the households has been classified into four strata viz., no formal education, primary level educated respondents, secondary level and higher secondary level.

Table 4.5

Educational status of the respondents

Educational Qualification:	Percentage
Illiterate	17.0
Primary	8.0
Middle	32.0
Higher Secondary	31.0
Degree	12.0

Source: Field survey, 2018

About 32% of the respondent have studied in middle level education, 31% of the respondent have studied in higher secondary level, 17% of the respondents were illiterate,

12% respondent were completed degree and 8% of the respondents were studied primary level.

f) Occupation level of the respondents:

Occupation is a status symbol for an individual. The society respects and recognises the common man based on the occupation status. The details of occupational status are presented in the following table 4.6.

Table 4.6

Occupation Level of the respondents

Occupation	Percentage
Agriculture Labour	18.0
Business	21.0
Government Employee	4.0
Private Employee	27.0
Self-Employed	20.0
Unemployed	10.0

Source: Field survey, 2018

It is known from the above table that about 27 percent of the respondents were private employee, followed by 21 percent were doing business, 20 percent of respondent were self-employed, 18 percent were belongs to agricultural activity, 10 percent of the respondent were unemployed and remaining 4 percent of the respondent were government employees.

g) Monthly income:

Income is the base to fulfil the needs of the individual and family members. The quantum of income generated by the individual shows the skill and talent. For the purpose of this study, income of the respondent was studied under four categories, less than 5000, 5000-7500,7500-10000, above 10000.

Table 4.7

Monthly income

Monthly Income (in Rs.)	Percentage
Less than 5000	2.0
5000-7500	20.0
7500-10000	44.0
Above 10000	34.0

Source: Field survey, 2018

The data regarding monthly income of the households were revealed that around 44 percent of the respondents were earning Rs. 7500 to Rs. 10000, about 34 percent of the respondents were earning more than Rs. 10000, twenty percent of the respondents were earning Rs. 5000 to Rs. 7500 and only 2 percent of the respondents were earning less than Rs. 5000.

h) Housing details:

Table 4.8

Housing Details

Housing Details	Percentage
Thatched	4.0
Katcha	44.0
Semi pucca	51.0
Pucca	1.0

Source: Field survey, 2018

Table 4.8 shows the housing details of the households. Majority of the (51 percent) respondents were living in semi pucca house, about 44 percent of the respondents were living in Katcha house, about 4percent of the respondents were living in Thatched house and only 1% of the respondent were living in Pucca house.

i) Ownership status:

Shelter is the one of the basic needs of mankind. The distribution of the respondents according to ownership of house is furnished in table 4.9.

Table 4.9

Ownership Status

Ownership Status	Percentage
Owner	83.0
Rented	17.0

Source: Field survey, 2018

The ownership status of household indicated that majority of the respondents (83 percent) possess their own house. On the other hand, about 17 percent respondents were living in the rented house.

j) Type of family:

Table 4.10 represents type of family of the selected respondents.

Table 4.10

Type of Family

Type of Family	Percentage
Nuclear	68.0
Joint	32.0

Source: Field survey, 2018

Nearly 68% of the households were belonged to nuclear family and remaining 32% of the households were belonged to joint family.

k) Size of the family:

Table 4.11 represents size of the family of the selected households.

Table 4.11

Size of the Family

Size of the Family	Percentage
1-4 members	67.3
5-8 members	18.8
Above 8 members	13.9

Source: Field survey, 2018

Nearly 67.3% of the households were having 1-4 members in their family, about 19% of the households having 5-8 members in their family and remaining 14% of the households having more than 8 members in their family.

II. SOLID WASTE MANAGEMENT PRACTICES OF THE SELECTED HOUSEHOLDS

a) Methods of disposing solid waste

Table 4.12 represents methods of disposing solid wastes by the selected households.

Table 4.12

Methods of disposing solid waste

Dispose of solid waste	Percentage
Throw in to the nearby river	63.0
Throw into an open space	36.0
Take it to the nearby secondary storage receptable (dustbin)	1.0

Source: Field survey, 2018

Majority of the (63 percent) of the households were stated that they were used to throw in to the nearby river, about 36 percent of the households were used to throw into an open space, and remaining 1 percent of the households were disposing their household wastes in the secondary storage receptacle (dustbin).

Table 4.13 represents distance of waste disposal site from the sample respondents households.

Table 4.13

Distance of waste disposal site

Particulars	Percentage
Less than 1(km)	32.0
1-2 (km)	51.0
Above 3 (km)	17.0

Source: Field survey, 2018

The data relating to distance of waste disposal site of selected households reveal that, fifty one percent of households had been disposing the wastes one to two kilometre distance, about 32 percent households used to dispose less than one kilometre distance and remaining 17 percent were disposing more than 3 kilometres.

a) Quantity of solid waste stored per day by the selected households:

Table 4.14

Quantity of solid waste stored per day by the selected households

Storage of solid waste per day	Percentage
Below ½ kg	25.0
½-1 kg	49.0
Above 1 kg	26.0

Source: Field survey, 2018

The quantity of solid waste stored per day by the selected households reveals that more than 40 percent of the households were storing the solid wastes from half kilo gram to one kilo gram per day, about 26 percent of the households were storing the wastes more than 1 kilogram per day and twenty five percent of the households were used to store the wastes below half kilogram.

b) Frequency of solid waste disposal

Table 4.15

Frequency of solid waste disposal

Frequency of disposal	Percentage
Everyday	100.0

Source: Field survey, 2018

The data on frequency of solid waste disposal implies that all the households used to dispose the household wastes every day.

c) Problem faced while disposing solid wastes:

Table 4.16

Problem faced while disposing municipal solid waste

Particulars	Percentage
Yes	43.0
No	57.0

Source: Field survey, 2018

About 57 percent of the households were stated that they were not face any problem during the disposal their waste and 43 percent of the households replied that they were facing issues to dispose the wastes.

d) Solid waste collection by the Panchayat:

Table 4.16

Solid waste collection by the Panchayat

Particulars	Percentage
Yes	5.0
No	95.0

Source: Field survey, 2018

Majority of the households (95 percent) not getting the service from the panchayat to dispose the solid waste and only 5 percent of the households were getting service of solid waste collection from the government.

e) Willingness to pay to improve Solid Waste Management services:

Table 4.16

Willingness to pay to improve Solid Waste Management services

Particulars	Percentage
Yes	45.0
No	55.0

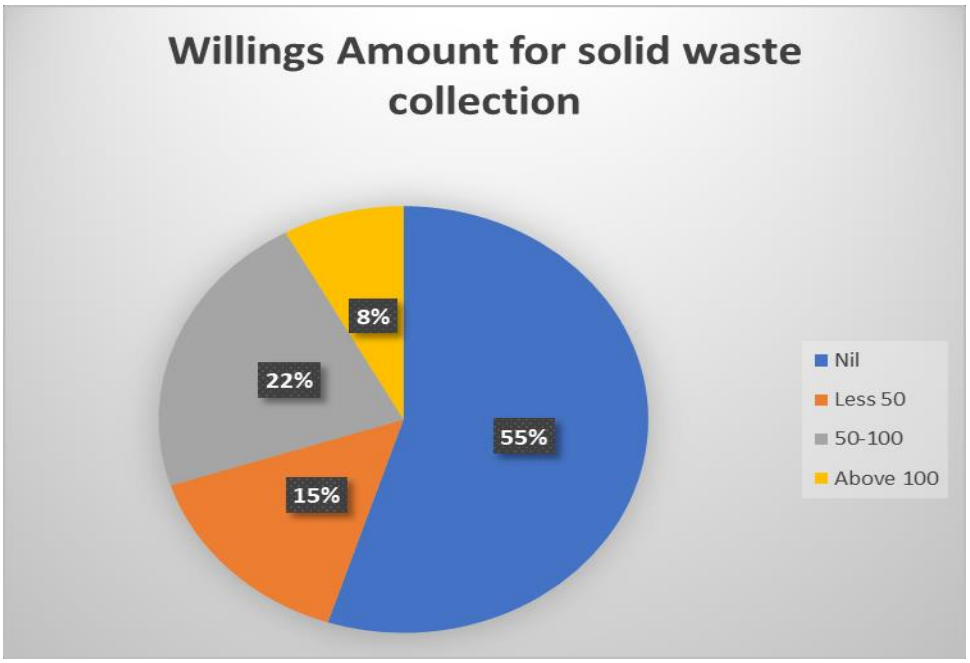
Source: Field survey, 2018

Majority 55 percent of the respondents replied that they were not willing to pay to improve solid wastes management service and 45 percent of the respondents were willing to pay to improve solid wastes management service.

Figure 4.1 represents the amount willing to pay for solid waste collection by the selected respondents.

FIGURE – 4.1

WILLINGNESS TO PAY FOR SOLID WASTE COLLECTION



More than 50% of the respondents were stated that they were not willing to pay any amount to improve solid waste management, about 22 percent were willing to pay Rs. 50 to Rs. 100, about 15 percent of the respondents stated that they were willing to pay less than Rs.50 and only 8% of the respondents willing to pay above 100 rupees.

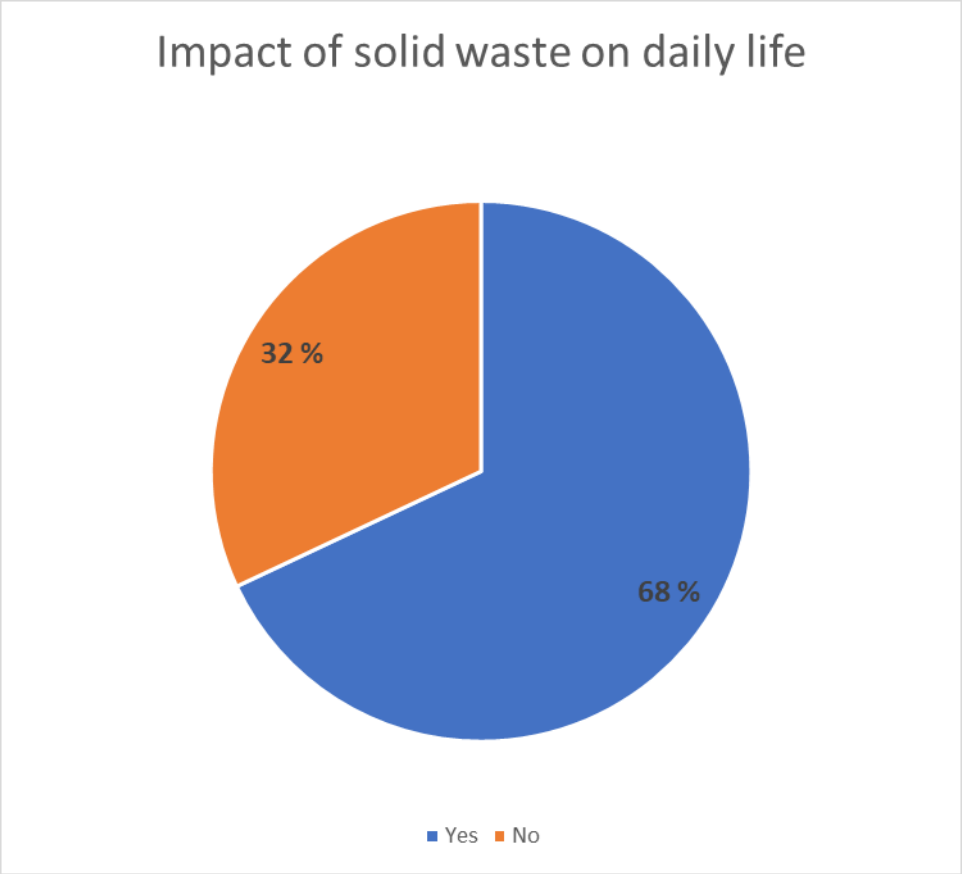
III. PERCEPTION AND AWARENESS ON THE EFFECTS OF SOLID WASTE:

a) Impact of solid waste on their daily life:

Figure 4.2 represents the perception among the selected households about the impact of solid waste on their daily life.

Figure 4.2

Impact of solid waste on their daily life



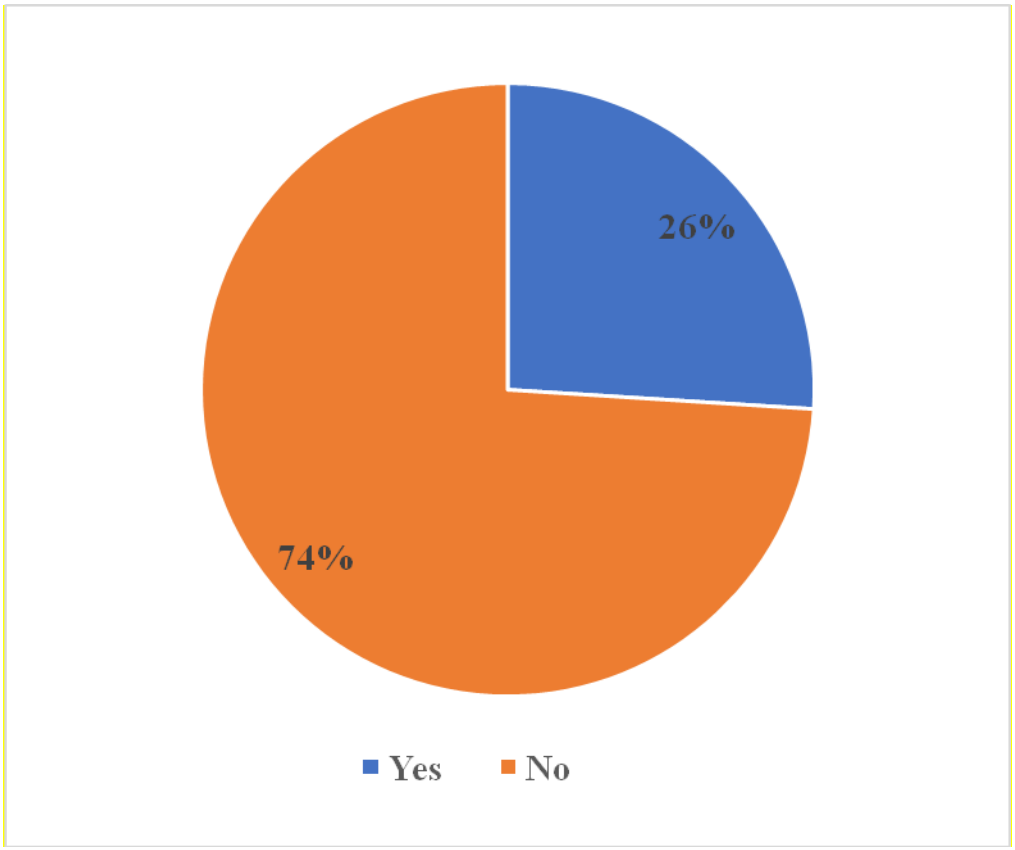
Nearly 68% of the respondents stated that solid wastes affect their daily life and about 32% of the respondents stated that solid wastes not affected their daily life.

b) Awareness on water pollution:

Figure 4.3 represents the awareness on water pollution due to solid wastes among the selected households.

Figure – 4.3

Awareness on water pollution



About 74% of the respondents were stated that they were not aware about water pollution due to solid waste and only 26% of the respondents were aware about water pollution due to solid wastes.

c) Impact of solid wastes on health

Table 4.19 represents the awareness among the respondents about the impact of solid wastes on health.

Table 4.19

Impact of solid wastes on health

Particulars	Percentage
Yes	3.0
No	97.0

Source: Field survey, 2018

Majority of the (97 percent) respondents were not aware about the impact of solid waste on health and only 3 percent of the respondents were aware about the impact of solid waste on health.

d) Family members suffered by waterborne diseases

Table 4.20 represents the family members suffered by waterborne diseases among the sleeted households.

Table 4.20

Family members suffered by waterborne diseases

Family members suffered by waterborne diseases	Percentage
Common cold	45.0
Typhoid fever	43.0
Malaria	11.0
Cholera	1.0

Source: Field survey 2018

About 45 percent of the respondents stated that family members were affected by common cold followed by (43 percent) typhoid fever, malaria (11 percent) and Cholera (1 percent).

Chi square analysis:

In this section, an attempt was made to examine association between method of waste disposal and contraction of diseases by using chi-square test. The hypothesis framed was

H_0: There is no association among the method of waste disposal and distance of waste disposal site with respect to contraction of diseases

H_a: There is association among the method of waste disposal and distance of waste disposal site with respect to contraction of diseases.

The results of Chi – square analysis is presented in Table – 4.21

TABLE –4.21

ASSOCIATION AMONG THE METHOD OF WASTE DISPOSAL AND DISTANCE OF WASTE DISPOSAL SITE WITH RESPECT TO CONTRACTION OF DISEASES

S. No	Variables	χ^2 value	Degrees of freedom	Level of significance	Inference
1	Distance of disposal site	17.42	2	.000	Rejected H_0
2	Method of waste disposal	182.420	2	.000	Rejected H_0

Source: Estimation based on field survey, 2018

The estimated chi – square values reveals that distance of waste disposal and method of waste disposal significantly associated with contraction of diseases.

CHAPTER – V

SUMMARY AND CONCLUSION

Wastes are the material that are not needed and are not usable economically with further processing. It may be in the form of solid, liquid, and gas. Increase in urban population and changing life styles lead to the generation of solid waste. Solid waste refers to all non-liquid wastes. Generally, solid waste is heterogeneous in nature such as mixture of vegetables, food items, paper, plastics, rags, glass etc., they originate from the human activities such as agriculture, industry, domestic activities etc. Solid waste can be classified into different types depending on their source.

Solid waste management in rural areas is a key issue in developing and transitioning countries due to the lack of proper waste management facilities and services. In India especially in the rural areas, waste is a severe threat to the public health concern and cleanliness. Though, the form of waste (both solid and liquid) generated in rural areas is predominantly organic and biodegradable yet it has become a major problem to the overall sustainability of the ecological balance. Solid waste management is one of the major environmental problems of Indian rural areas which are emerging towards growth centre. Improper management of solid waste causes hazards to inhabitants.

In developing countries, informal sector plays a crucial role in diverting recyclables from waste dumping and to provide basic waste collection services, but it is mainly developed in urban and semi-urban areas. However, rural areas which are remote from major urban areas are usually the most neglected by waste management services. Waste operators avoid such areas, and local authorities provide no or low financial resources to provide appropriate public services. In addition, the geographical constraints makes more difficult to implement proper waste management facilities. Animal-driven carts, tricycles, and tractor trailers are frequently used for the transportation of waste across rural communities. The waste management infrastructure is rudimentary; the amounts of waste collected are frequently disposed on open dumps or river banks.

Solid waste management has become a practical necessity in rural areas too. Next to becoming Open Defecation Free (ODF) villages, the Swachh Bharat commitment demands rural households to dispose of garbage in a scientifically sensible manner. Sanitation and street cleaning are one of the basic functions of a Gram Panchayat, and they should make

arrangements for attending to it. The Swachh Bharat Mission (SBM- Garmin) requires every Gram Panchayat to put in place a functional waste management system. Most of the State governments also encourage the GPs to chalk out a plan for SWM and practically start managing solid waste in a scientifically acceptable manner. The domestic waste generated in rural households of India is increasingly becoming an issue of serious concern. With this background an attempt was made to assess waste management practices in rural households of Erode District.

Research gap:

There are many studies have been undertaken during the past years on solid waste management in India. The studies were mostly concentrated on urban waste management but there were limited studies done on rural waste management. Hence, in the present study an attempt was made to assess the solid waste management practices in Erode district.

The Objectives of the study are as follows:

- To identify the socio-economic conditions of the selected households of the study area
- To analyse solid waste management practices of the selected rural households in the study area
- To assess the perception and awareness on the effects of solid waste
- To examine the association among distance of waste disposal, waste disposal method and contraction of diseases

Hypothesis:

- H_0: There is no association among the method of waste disposal and distance of waste disposal site with respect to contraction of diseases
- H_a: There is significant association among the method of waste disposal and distance of waste disposal site with respect to contraction of diseases.

The study adopted multi stage sampling technique in selecting the sample. In the first stage Erode district was selected because it is one of the forerunners in Tamil Nadu in

agriculture and industrial activities. In the second stage sathyamangalam taluk was selected on basis of more number of villages. In the third stage Rajan Nagar village was selected which is a large village located in Sathyamangalam Taluka of Erode district. A sample of 100 households were randomly chosen from Rajan Nagar village.

The field investigation and data collection for the study was carried out during the period November to December 2018. Data collected were tabulated and analysed for the purpose of giving precise and concise information. Besides, percentages, graphs and chi – square analysis was used.

MAJOR FINDINGS OF THE STUDY:

- Among the 100 samples surveyed, nearly 55 percent of the respondents were male and 45 percent of the respondents were female.
- Age classification of the selected households reveals that majority of the households were belongs to the age group below 40, about 35 percent were in the age group of 40 to 50 and remaining 28 percent were in the age group above 50.
- Majority of the respondents were married 90 percent, nine percent of the respondents were unmarried and remaining 1 percent was widow.
- Data pertaining to religion of the respondents reveals that 95 percent of the respondents were Hindus, followed by Muslims 2 percent, Christians 2 percent and 1percent of them belongs to other religions. Thus, majority of the respondents belongs to Hindu religion.
- About 32% of the respondent have studied in middle level education, 31% of the respondent have studied in higher secondary level, 17% of the respondents were illiterate, 12% respondent were completed degree and 8% of the respondents were studied primary level.
- About 27 percent of the respondents were private employee, followed by 21 percent were doing business, 20 percent of respondent were self-employed, 18 percent were belongs to agricultural activity, 10 percent of the respondent were unemployed and remaining 4 percent of the respondent were government employees.
- The data regarding monthly income of the households were revealed that around 44 percent of the respondents were earning Rs. 7500 to Rs. 10000, about 34 percent of the respondents were earning more than Rs. 10000, twenty percent of the respondents

were earning Rs. 5000 to Rs. 7500 and only 2 percent of the respondents were earning less than Rs. 5000.

- The housing details of the households. Majority of the (51 percent) respondents were living in semi pucca house, about 44 percent of the respondents were living in Katcha house, about 4percent of the respondents were living in Thatched house and only 1% of the respondent were living in Pucca house.
- The ownership status of household indicated that majority of the respondents (83 percent) possess their own house. On the other hand, about 17 percent respondent living in the tenant house.
- Nearly 68% of the households were belonged to nuclear family and remaining 32% of the households were belonged to joint family.
- Nearly 67.3% of the households were having 1-4 members in their family, about 19% of the households having 5-8 members in their family and remaining 14% of the households having more than 8 members in their family.
- Majority of the (63 percent) of the households were stated that they were used to throw in to the nearby river, about 36 percent of the households were used to throw into an open space, and remaining 1 percent of the households were disposing their household wastes in the secondary storage receptable (dustbin).
- The quantity of solid waste stored per day by the selected households reveals that more than 40 percent of the households were storing the solid wastes from half kilo gram to one kilo gram per day, about 26 percent of the households were storing the wastes more than 1 kilogram per day and twenty five percent of the households were used to store the wastes below half kilogram.
- The data on frequency of solid waste disposal implies that all the households used to dispose the household wastes every day.
- About 57 percent of the households were stated that they were not face any problem during the disposal their waste and 43 percent of the households replied that they were facing issues to dispose the wastes.
- Majority of the households (95 percent) not getting the service from the panchayat to dispose the solid waste and only 5 percent of the households were getting service of solid waste collection from the government.

- Majority 55 percent of the respondents replied that they were not willing to pay to improve solid wastes management service and 45 percent of the respondents were willing to pay to improve solid wastes management service.
- More than 50% of the respondents were stated that they were not willing to pay any amount to improve solid waste management, about 22 percent were willing to pay Rs. 50 to Rs. 100, about 15 percent of the respondents stated that they were willing to pay less than Rs.50 and only 8% of the respondents willing to pay above 100 rupees.
- Nearly 68% of the respondents stated that solid wastes affect their daily life and about 32% of the respondents stated that solid wastes not affected their daily life.
- About 74% of the respondents were stated that they were not aware about water pollution due to solid waste and only 26% of the respondents were aware about water pollution due to solid wastes.
- Majority of the (97 percent) respondents were not aware about the impact of solid waste on health and only 3 percent of the respondents were aware about the impact of solid waste on health.
- About 45 percent of the respondents stated that family members were affected by common cold followed by (43 percent) typhoid fever, malaria (11 percent) and Cholera (1 percent).
- The estimated chi – square values reveals that distance of waste disposal and method of waste disposal significantly associated with contraction of diseases.

BIBLIOGRAPHY

Journals

1. A. Imam, B. Mohammed, D.C. Wilson, C.R. Cheeseman (2007), **"Solid Waste Management in Abuja, Nigeria"**, Science Direct, Waste Management, pp: 468-472.
2. Ali Jafari, Hatam Godini, Saed Hamed Mirhousaini (2010), "**Municipal Solid Waste Management in KhoramAbad City and Experiences**", World Academy of Science, Engineering and Technology International Journal of Environmental and Ecological Engineering, Vol: 4(2), pp: 64-69.
3. Archana, Daoud Ali, Mohammad Yunus, Dutta (2014), "**Assessment of the status of municipal solid waste management (MSWM) in Lucknow- Capital City of Uttar Pradesh, India**" IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), Vol:8 (5), pp: 41-49.
4. Arti Pamnani (2015), "**Management of Municipal Solid Waste: A Study of Small-Scale Municipality**", International Journal of Engineering Science and Research Technology, Vol: 4 (1), pp: 19-24.
5. Arti Pamnani, Meka Srinivasarao (2014), "**Municipal Solid Waste Management in India: A Review and Some New Results**" International Journal of Civil Engineering and Technology (IJCIET), Vol: 5 (2), pp: 1-8.
6. Arti Pamnani, Srinivasarao Meka (2015), "**Integrated Solid Waste Management Solid Waste Generated from Small- Scale towns and Nearby Villages Located in a Developing Country**", International Journal of Engineering Research and General Science, Vol: 3(1), pp: 596-603.
7. Babayemi J.O, Dauda K.T (2009), "**Evaluation of Solid Waste Generation, categories and Disposal Options in Developing Countries: A Case of Nigeria**", J. Appl. Scie. Environ. Manage, Vol: 13 (3), pp: 83-88.
8. Chatterjee (2010), "M**unicipal Solid Waste Management in Kohima City- India**", Iran. J. Environ. Health. Sci. Eng, Vol: 7 (2), pp: 173-180.
9. Choudhury moharana and Dutta Joystu (2017**), "A comparative study of municipal solid waste management status for three major towns of upper Assam- India",** International Journal of Waste Resources, Vol. 7(3), Pp: 1-8.

10. Dr. Ashok Tejankar, Mr. K. Pathrikar (2017), "**Analysis and Recycling of Municipal Solid Waste: A Case Study of Aurangabad City, Maharashtra, India**", International Journal of Scientific Research in Engineering, Vol: 2 (1), pp: 1-7.
11. Jadhav, Takale, Kokane, Bhilare, Sondkar and Kank (2015), "**Present status of solid waste management in Bhor, Pune, India: Practices and Challenges"**, International Journal of Innovation research in science, engineering and technology, Vol. 4(4), Pp: 2059- 2064.
12. Javeriya Siddiqu, Pandey Govind, Akhtar Sania (2013), "**A case study of solid waste management in Mysore City",** International Journal of Application or Innovation in Engineering and Management, Vol. 2(11), Pp: 290-294.
13. Javeriya Siddiqui, Dr. Govind Pandey, Dr. Sania Akhtar (2013), "**A Study of Solid Waste Management in Mysore City**", International Journal of Application or Innovation in Engineering and Management (IJAIEM), Vol: 2(11), pp:290-294.
14. Kadafa (2017), "**Solid Waste Management Practice of Residents in Abuja Municipalities (Nigeria)**", IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), Vol: 11(2), pp: 87-106.
15. Kale Tejas Sunil, Dr. A.C. Attar (2016), "**Sustainable Solid Waste Management for Rural Areas**", IOSR Journal of Environmental Science, Toxicology and Food Technology (IOSR-JESTFT), Vol: 10(8), pp: 133-137.
16. Mufeed sharholy, Ahmad Kafeel, Gauhar Mahmood and Trivedi. R. C (2008), **"Municipal solid waste management in Indian cities- A Review",** Science direct, waste management, Vol. 28, pp: 459- 467.
17. N.K Gakungu, A. Gitau, B.N.K Njoroge, M.W. Kimani (2012), **"Solid Waste Management in Kenya: A Case Study of Public Technical Training Institutions"**,
18. Neha Gupta, Krishna Kumar Yadav, Vinit Kumar (2015), "**A Review on Current Status of Municipal Solid Waste Management in India**", Journal for Environmental Science, pp: 206-217.
19. Nitin Mundhe, Ravindra Jaybhye, Bhalachandra Dorik (2014), "**Assessment of Municipal Solid Waste Management of Pune City Using Geospatial Tools**", International Journal of Computer Application, Vol: 100, pp: 24-32
20. Omambia Bernard, Ogonya A. Mildred (2015), "**Assessing Household Solid Waste Management Systems in Baraton Centre**", Baraton Interdisciplinary Research Journal, issue:5 pp: 140-150.

21. P.B Vyas (2011), "**Municipal Solid Waste Management in India**", Journal of industrial pollution control, vol: 27 (1), pp: 79-81.
22. Pa. Ganeshwaran, S. Deepa Shri (2015), "**A Solid Waste Management in Coimbatore City**", ARPN Journal of Engineering and Applied Science, Vol: 10 (14), pp: 6177-6183.
23. Pankaj Mandawat (2017), "**Characterization and Quantization of Solid Waste in Ganga Villages of Haridwar**", International Journal of Advance Research, Ideas and Innovations in Technology, Vol: 3(6), pp: 558-562.
24. Raj Parmar, Arti Pamnani (2018), "**Revolution in Rural India through Solid Waste Management**", International Journal of Engineering Research in Mechanical and Civil Engineering (IJERMCE), pp: 70-78.
25. Salma Sultan (2017), "**Solid Waste Management in Urban India: An Overview**", International Journal of Environmental Protection and Policy, Vol: 5(4), pp: 61-69.
26. Shaheda Niloufer, Dr. A.V.V.S. Swamy (2015), "**A Brief Assessment of Municipal Solid Waste and its impact on leachate quality at MSW sities in Vijayawada city, India**", international journal of innovative science, Engineering and Technology, Vol: 2 (6), pp: 645-658.
27. Sreedevi S (2015), **Solid waste generation and its management- A case study",** International research journal of environment sciences, Vol. 4(1), Pp: 90- 93.
28. Suman Rawat, Achlesh Daverey (2018), "**Characterization of Household Solid Waste and Current Status of Municipal Waste Management in Rishikesh, Uttarakhand**", Environ. Eng. Res., Vol: 23(3), pp: 323-329.
29. Swapan Das, Bidyut Kr. Bhattacharyya (2013), "**Municipal Solid Waste Characteristics and Management in Kolkata, India**" International Journal of Emerging Technology and Advanced Engineering, vol: 3(2), pp: 147-152.
30. Vijay Kumar, Dr. R. K. Pandit (2013), **"Problems of Solid Waste Management in Indian Cities"**, International Journal of Scientific and Research Publications, Vol: 3 (3), pp: 1-8.
31. Vikash Talyan, R.P Dahiya, T.R Sreekrishnan (2008), "**State of Municipal Solid Waste Management in Delhi, the Capital of India**" Science Direct, waste management, pp: 1276-1287.

ANNEXURE – I

QUESTIONNAIRE ON SOLID WASTE MANAGEMENT PRACTICES OF RURAL HOUSEHOLDS IN ERODE DISTRICT

I. SOCIO ECONOMIC PROFILE OF THE SELECTED HOUSEHOLDS:

1. Sex	1. Male
	2. Female
2. Marital Status	1. Unmarried
	2. Married
	3.Divorced
	4. widow
	5. Others
3. Religion	1. Hindu
	2. Christian
	3. Muslim
	4. Others
4. Qualification	1. Illiterate
	2. Primary
	3. Middle
	4. High
	5. HSS
	6. Degree
5. Occupation	1. Agri. Coolie
	2. Businessman
	3. Govt. Employee
	4. Private Employee
	5. Self-Employment

6. Income

1. Less than Rs. 5000
2. 5000-7500
3. 7500-10000
4. above 10000

☐

7. Housing details

1. Thatched
2. Katcha
3. Semi Pucca
4. Pucca

☐

8. Ownership Status

1. Owner
2. Tenant

☐

9. Type of Family

1. Nuclear
2. Joint

☐

10. Size of family:

11.Family Members:

S. No	Relationship	Age	Sex	Education	Occupation	Monthly income (RS.)

II. SOLID WASTE MANAGEMENT PRACTICES OF THE SELECTED HOUSEHOLDS

12. How do you dispose off your solid waste?

A. Throw it in to the nearby river

B. Throw it on an open space

C. Take it to the nearby secondary storage receptable(Dusbin)

13. Distance of your residene from olid dust bin

S.No	Distance in Km	Tick
1.	Less than 1	
2.	1to2	
3.	2 and above	

14. How many Kilograms (approximaely) of solid waste are generated in your household per week? _____

15. Frequency of disposal

A. Everyday B. Once in two days C. Once in a week D. Once in a month

16.Do you face any problem while disposing the muncipal soild waste?

Yes/ no

17.Is your household getting the service of soild waste collection or disposal from the Government?

A. Yes B. No

18.Would your household br willing to pay to imporve solid waste management service?

A. Yes B. No

If Yes, how much would you like to pay in he following categories?

1.	Less than 50	
2.	50-100	
3.	100 above	
4.	Nill	

III. PERCEPTION AND AWARENESS ON THE EFFECTS OF SOLID WASTE:

19. Whether the muncipal wastes are affecting your daily life? Yes/No

20. Are you aware about the water pollution due to muncipal solid waste Yes/No

21. Do you that the muncipal solid waste is damaging you health? Yes/No

23.Any one of your family members suffered by the following waterborne disease due to muncipal solid waste?

S.No	Water borne disease	Tick
1	Common cold	
2	Typhiod fever	
3	Malaria	
4	Cholera	