YANGON UNIVERSITY OF ECONOMICS

DEPARTMENT OF APPLIED ECONOMICS

MASTER OF PUBLIC ADMINISTRATION PROGRAMME

A STUDY ON KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS HOUSEHOLD WASTE DISPOSAL (A CASE STUDY IN KYAUKTADA TOWNSHIP, YANGON REGION)

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MPA – 5 (20th BATCH)

MARCH, 2023

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A thesis submitted as partial fulfillment towards the requirements for the Degree of Master of Public Administration (MPA).

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MARCH, 2023

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This is to certify that this thesis entitled **"A Study on Knowledge, Attitude and Practice towards Household Waste Disposal (A Case Study in Kyauktada Township, Yangon Region)",** submitted in partial fulfilment towards the requirements for the degree of Master of Public Administration (MPA) has been accepted by the Board of Examiners.

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ABSTRACT

The objective of this study is to assess the Knowledge, Attitude and Practice of the people towards household waste disposal in Kyauktada township, Yangon. The study uses structured questionnaires to randomly selected 395 respondents. The study shows the participants having high knowledge and positive attitude have good practice towards household waste disposal. Those having low knowledge and negative attitude have poor practices towards household waste disposal. The government staffs are the best practice group towards household waste disposal. The respondents less than 500 yards living near municipal garbage bin have good practices towards household waste disposal. It is recommended that a well-organized awareness program should be implemented to raise practice on proper household waste disposal and to provide enough garbage bin keeping within 500 yards of the buildings and to promote 3R behavior change for sustainable environment.

ACKNOWLEDGEMENTS

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LIST OF ABREBEVIATIONS

3R	Reduce, Reuse, Recycle
B.O.T	Built-Operated-Transfer
CO_2	Carbon Dioxide
FDS	Final Disposal Site
GHGs	Green House Gases
HHP	Hazardous Household Products
HHW	Hazardous Household Wastes
ICIMOD	International Centre for Integrated Mountain Development, Nepal
JCM	Joint Credit Mechanisms
JFE	Japanese Fe Engineering
JICA	Japan International Cooperation Agency
KW	Kilowatt
MMK	Myanmar Kyats
MOEJ	Ministry of Environment, Japan
MoU	Memorandum of Understanding
MSW	Municipal Solid Waste
PCCD	Pollution Control and Cleansing Department
SWM	Solid Waste Management
UECCD	Urban Environmental Conservation and Cleansing Department
UN	United Nations
USD	United States Dollar
WEEE	Waste from Electrical and Electronic Equipment
WtE	Waste to Energy
YCDC	Yangon City Development Committee

CHAPTER I
INTRODUCTION

1.1   Rationale of the Study

In Myanmar, increases in population and industrialization lead into urbanization and migration of labors from agricultural sector into the cities. These generate enormous amount of waste in the cities. Yangon City is the commercial capital of Myanmar and over 7 million people are living in it. Yangon City Development Committee (YCDC) is responsible for all the public services concerning waste management in 33 townships.

Within the wide range of YCDC services, waste management is one of the top priorities to be developed by YCDC. People living in downtown area are coming from different background, work, education, beliefs and ethnic origins. Several people are still lacking to live in compliance with the proper waste disposal practice. Several backstreet lanes are still full of garbage and household waste that is the most disgusting feature of the city.

Yangon downtown area has good reputation for having many intact colonial-east buildings. It is the largest quantity in Southeast Asia. Among these, Kyauktada township possesses the greatest number of 66 colonial buildings which are reputed for tourist attraction. The people living in Kyauktada are important to maintain the clean and tidiness of the city. Proper waste disposal practice is crucial to make the city clean.

In Kyauktada township, main sources of wastes are from households, markets, venders, hotels, gardens, offices, shops and businesses and health care services. Among these, household wastes constitute the largest portion of the wastes generated in the township. The Urban Environmental Conservation and Cleansing Department (UECCD) in YCDC is responsible for management of all the solid wastes of Yangon city. At township level, Township Cleansing Forces are organized for daily operations of waste collection, delivery and cleansing.

The specific dumping sites are designated for the daily waste disposal in Kyauktada township. The people are expected to dispose their daily household waste

properly at the specific waste collection sites. However, there are several backstreet lanes full of improper dumping of the daily household wastes. These wastes severely affect the image of most beautiful downtown township.

Moreover, improper waste disposal causes blockage of sewage drainage and flood over streets during raining. It has severe impact on environment and health. Foul smelling from those household wastes attracts many rodents like rats. These rodents dig the ground causing holes and burrows under the streets and pavements. Those pavements built with interlock blocks become eventually destroyed. The pedestrian people walking over there become inconvenient in walking and injury incidents are often encountered. The blockage of sewage drainage leads into stagnant sewage flow. It favors breeding of mosquitos impacting on public health.

It is obvious that improper disposal of daily household wastes has several impacts on the environment, public health and finally cost the state budget. The people have to convince that the consequences of household wastes are related to their deliberate actions of improper waste disposal. That is why it is needed to study on public knowledge, attitude and practice on household waste disposal in Kyauktada township.

1.2   Objective of the Study

The objective of the study is to determine the knowledge, attitude and practice regarding household waste disposal in Kyauktada Township.

1.3   Method of Study

This study is based on descriptive method using both primary and secondary data. The primary data is collected by survey. For calculation of sample size, Yamane's formula is used. The structured questionnaire is used during interviewing on 395 respondents. The secondary data obtained from the various references and the publication from UECCD at YCDC.

1.4   Scope and Limitations of the Study

This study is mainly focused on household waste disposal at Township Level. The primary data are collected through survey questionnaires on a sample of participants in nine quarters of Kyauktada township. The survey period is during December 2022 to January 2023.

1.5   Organization of the Study

This thesis is organized into five chapters. Chapter one introduces rationale, objectives, method, scope and limitations of the study. In chapter two, the literature review is revealed including municipal solid waste, household waste disposal, hazardous household wastes, and review on previous studies. Chapter three describes about legal framework in waste management, solid waste management in Yangon, Household Waste Disposal in Kyauktada Township and Cleansing Activities in Kyauktada Township. Chapter four presents survey profile, survey design and survey results. Finally, chapter five describes the conclusion with findings and recommendations.

CHAPTER II
LITERATURE REVIEW

2.1 Municipal Solid Waste

Municipal solid waste (MSW) is a type of waste generated in urban and it includes predominantly household waste and commercial wastes. These are collected by municipal in a given area. MSW may be either solid or semisolid. (GKToday, 2015)

MSW also include non-household wastes that are from commerce and trade, small businesses, office buildings and institutions (schools, hospitals, government buildings) and public spaces (park, garden). MSW exclude wastes from municipal sewage network and treatment, industrial hazardous wastes, municipal construction and demolition waste.

MSW are collected from the point of generation and designated collection points and transported to facilities where the wastes are recovered or disposed. The public receive waste collection services vary from city to city in terms of frequency, regularity and proximity of the collection points.

Many wastes are generated due to inefficient production processes, and low durability of goods as well as unsustainable usage of resources (Nicholas 2003). The first human-made plastic was invented in mid-19th century which now makes more than 10 % of solid waste in most of the urban area throughout the world.

While the riches have been known for 'use and throw' habit resulting many wastes. The poor use and reuse the resources available to most extent and hence resulting lower quantity of waste. Many factors leading to varying waste quantities and qualities include weather, economy, natural disaster, mindset of the people, and any others. The packed food usually provides more waste throughout manufacturing, transportation and use.

In Singapore, waste generated by the domestic sectors increased in 2021, from 1.77 million tons in 2020, to 1.82 million tons in 2021. Recycled waste likewise increased from 0.23 million tons in 2020, to 0.24 million tons in 2021 (NEA 2021).

Increasing population with fast food life style generates more wastes throughout the world.

2.1.1 Waste Classification and Types of Wastes

Waste can be generated in many different characteristics depending on source of production, environmental impact, physical, chemical and elemental properties, biological/biodegradable properties, combustion properties and the degree of environmental impact (Demirbas, 2011; Dixon & Jones, 2005; White et al., 1995).

Depending on their source of production, waste can be classified as: municipal waste, which includes household/domestic wastes and services waste; industrial waste, which can include several activities, like light and heavy manufacturing, refineries, chemical, automotive, energy and mining; agricultural waste; medical waste; and construction and demolition waste.

Depending on the environment impact, solid waste can be differentiated as; hazardous waste, that can cause at least one hazard to health or to the environment; and nonhazardous waste, waste that does not have hazardous features due to physical, chemical, or biological changes.

Depending on the physical state, wastes can be classified into solid waste, liquid waste and gaseous waste.

MSWs are difficult to manage as the components are diverse, with materials such as metal, paper, glass and other organics mixed together and are generally prone to changes from city to city and country to country. (White et al. 1995). The constituents of waste materials usually found in MSW are plastics, paper and cardboard, organic waste, textiles, aluminum, ferrous materials, glass, wood and electronic wastes (e-wastes). The waste composition depends on the economic development level (i.e., the income level), educational level (i.e., related to the degree of recycling), and other managerial factors.

In Myanmar, MSW contains mainly organic materials (77%), plastic (13%), paper (7%), and other residuals (3%).

2.1.2 Overview on Waste Management

Every year, an estimated 11.2 billion tons of solid waste is collected worldwide (United Nations Environment Programme, 2022). SDG indicator 11.6.1 monitors progress related to safe waste management. Poor waste management - ranging from

non-existing collection systems to ineffective disposal – causes pollution of air, water and soil.

The components of solid waste management system include waste generation, storage, collection, transport and disposal.

In waste generation, solid wastes are generated when people have no use for their materials, they become valueless to the owner and no longer require them and finally they are being rid of. These materials valueless to the owner may not be necessarily valueless to another. Wastes generation depends on different background of geographic situation, occupation, income, education and attitude of the people. (Adams, 1999)

Another component is the storage of wastes that is a system for keeping materials after they have been discarded and prior to collection and final disposal. The determination of size, quantity and distribution of storage facilities depend on number of users, type of waste, maximum walking distance and frequency of emptying. Typical storage facilities include; small containers, large containers, shallow pits, and communal depots.

After storage, wastes are transported to collection facility for treatment or the final disposal site. The collection systems are carefully planned to ensure that storage facilities are not overloaded. Collection intervals and volumes of collected waste are carefully estimated.

From the collection facility, wastes are transported through various modes of transport depending on the local availability and volume of wastes to reach the final disposal site. They may be: human-powered with open hand cart, wheel barrow; motorized: tractor, trailer and truck; and animal-powered with donkey-drawn card.

At the final stage, wastes are disposed at final disposal site (FDS) and treatment of solid waste management is done. Depending on the availability of required resources, the methods of solid waste disposal is categorized into landfilling, composting, burning or incineration and recycling (Resource recovery). At the final disposal site, any one kind of waste treatment are done as follows:

Dumps and Landfills

These methods are still widely used worldwide. There are several types of landfills. Sanitary landfill provides the most commonly used waste disposal solution. These landfills are used to remove or reduce the environmental risk or public health hazards due to waste disposal. They are located where land features work as natural

buffers between the environment and the landfill. For example, the landfill area can be clay soil which is quite resistant to hazardous wastes or in which there is no surface water bodies or a low water table, that not causing water pollution. Using sanitary landfills presents the minimum health and environmental risk, but the cost of establishing such landfills is comparatively higher than other waste disposal methods.

Another type is Controlled Dumps which are more or less the same as sanitary landfills. These dumps comply with many of the requirements for being a sanitary landfill but may lack one or two. Such dumps may have a well-planned capacity but no cell-planning. It may have partial gas management or not, and basic record keeping, or routine coverings.

There are also Bioreactor Landfills in which superior microbiological processes are used to speed up waste decomposition. The controlling item is the continuous pouring of liquid to maintain optimal moisture for digestion of microbial. The landfill leachate re-circulate the liquid. The liquid waste (e.g., sewage sludge) is used when the leachate is not enough.

Thermal Treatment

This type of waste treatment uses heat to treat waste materials. Some of the most commonly used thermal waste treatment techniques are as follows.

Incineration is commonly used for waste treatments. This method involves the combustion of waste material with oxygen. This thermal treatment method is used as a way of recovering energy for electricity or heating. This approach has several advantages. Transportation costs is lowered due to rapidly reducing waste volume and harmful greenhouse gas emissions is also decreased.

Gasification is similar process to pyrolysis methods, in which organic waste materials are decomposed by exposing waste to low amounts of oxygen and very high temperature. Absolutely no oxygen is used in pyrolysis while a very low amount of oxygen is used in gasification process. Gasification has more advantages as the burning process get recovery of energy without causing air pollution.

Open Burning is an obvious thermal waste treatment causing the environment harmful. Such process does not contain pollution control devices for incinerators. They release substances such as hexachlorobenzene, dioxins, carbon monoxide, particulate matter, volatile organic compounds, polycyclic aromatic compounds, and ash. This method is still practiced by many countries, as it offers an inexpensive solution to solid waste.

Biological Waste Treatment

In this type, the microorganisms break down organic wastes using normal cellular processes. *Composting* is frequently used method. The action of small invertebrates and microorganisms causes controlled aerobic decomposition of organic waste materials. Static pile composting, vermin-composting, windrow composting and in-vessel composting are the most common composting techniques.

2.2 Household Waste Disposal

In an urban area, the population and size of the area are mainly considered in developing proper household waste disposal. An increase in size of these determinants causes complications in the collection and transportation of waste. Improper planning of the cities complicate waste management. Many of industrial clusters in developing countries, which were in the outskirts of cities decades ago, have now at the center of the cities due to eventually increased urbanization and it becomes difficult to haul waste in through dense populated region.

Figure (2.1) The Waste Management Cycle
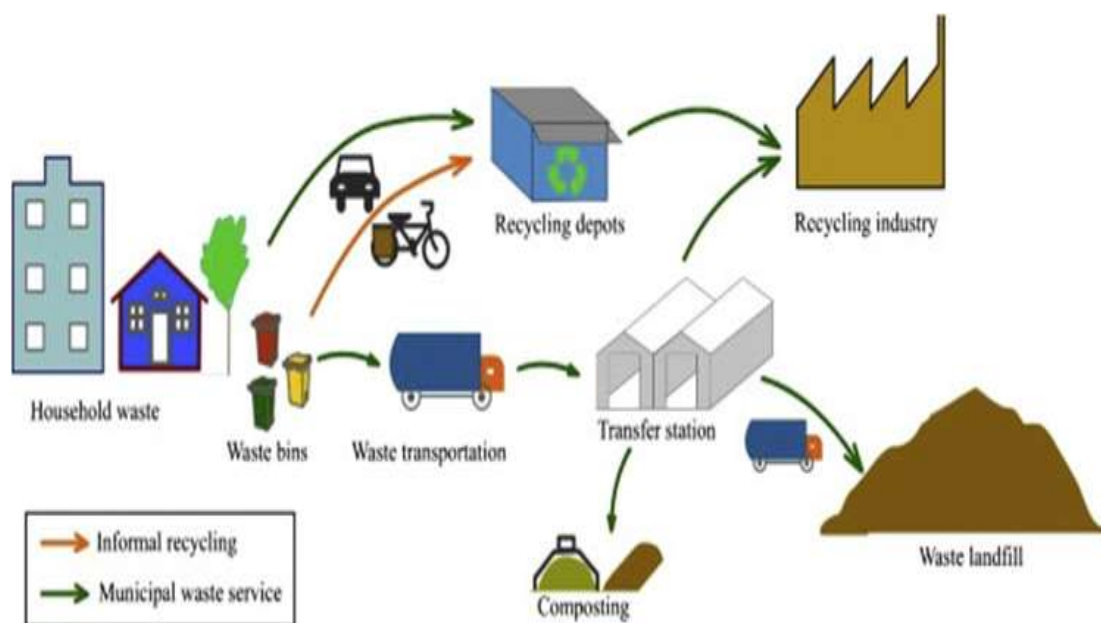
Source: Amasuomo, Ebikapade & Baird, Jim. (2016). The Concept of Waste and Waste Management. Journal of Management and Sustainability.

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The process of waste disposal from the source of waste generation to the final disposal site is illustrated in the figure (2.1). Household waste are usually disposed in one of the two ways, i.e., through municipal waste service or informal recycling. The former one is transported to the storage site or transfer station in which separation of the recyclable wastes are segregated and sent to the recycling industry. Similarly, wastes collected by informal waste pickers are sent to the scrap dealers at recycling depots from which they finally reach into the recycling industry. The municipal services sent the remaining non-recyclable wastes to the final disposal site (FDS). The wastes are dumped at landfill or treated by composting methods.

To ensure sustainable environment, proper household waste disposal is considered starting from prevention or waste reducing, recycling, treatment, and disposal. It is arranged how to dispose solid waste most effectively to the environment and human health. The proper waste disposal covers all the areas such as institutional, financial, economic, social, legal, technical, and sustainable environment.

2.2.1 Integrated Waste Management

The Western world and parts of Asia have mainly used the waste hierarchy principle to approach integrated waste management since the early 1980s (Christensen, 2011). The Waste Hierarchy is a strategic tool, which prioritizes actions for waste management. The approach provides integrated waste management. Its strategy relies on handling waste in a four prolonged approach: waste minimization (reducing), reusing, recycling and energy recovery before final disposal at landfill. It helps in identifying the root cause of waste generation and finding ways and means to reduce such wastage. These are environmentally safe and economically sound.

Figure (2.2) Waste Management Hierarchy
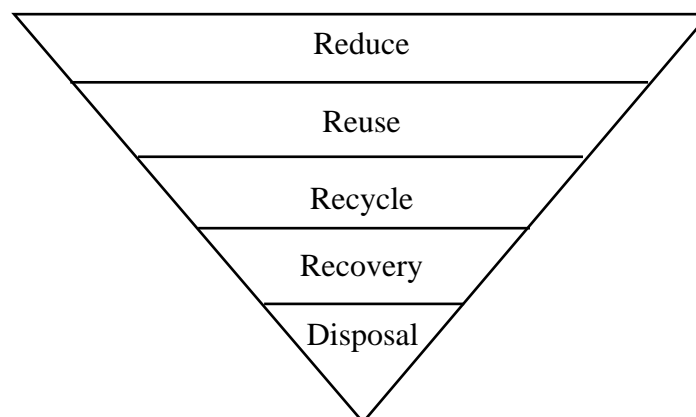
Source: Waste Hierarchy Guidance, U.K (2011)

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The initial step is the source reduction can be done by reducing the amount of waste and reducing the toxicity of waste. e.g., light weighting of packaging, material substitutions, longer product life and reusable products. Reuse is the action and practice of using used materials again. e.g., reusing furniture, clothing, repaired engines. In the recycling process, waste materials are converted into new materials and objects. e.g., Recycling aluminum cans into aluminum cans.

In the case of an unrecyclable waste, waste-to-energy method is used for recovery of electricity and/or heat from the primary treatment of waste. e.g., incineration with heat recovery, anaerobic digestion with methane recovery. The heat generated by incineration is recovered for power generation and the residual heat is used for other purposes. Finally, for proper disposal, the wastes are disposed in a specially designated area by landfilling. It is a cheap method. Landfill gas contributes to renewable energy supply. e.g., sanitary landfills, secure landfills.

These 3R system practice in the community needs public awareness and motivation. Many studies show correlation between the income and education level of waste management practices. The higher income and education level people mostly practice proper waste disposal. Achieving public awareness of waste issues and how it impacts our health and the environment is the most important one. The people have to realize how recycling can save money. The government support is needed for the local green business by finances (from waste taxes) and technical assistance.

2.2.2 Community Behavior towards Household Waste Disposal

Behavior refers to an individual's observable response in a given situation with respect to a given target. If an individual value environmental health, he or she would like to live in clean environment free from any kind of pollution and this will lead to positive behavior complied with household waste management services. Shukor (2011) defined community participation as a process by which communities act in response to public concerns, voice out their opinions about decision that affect them, and take responsibilities for changes to their community.

Determinant factors which are driving force for community to participate in household waste management has influence on an individual to take part in proper household waste management. Poswa (2004) found that woman prefers door-to-door waste collecting system while man prefers dropping off. Knowledge and attitude

towards waste management is related to education of the people (George Mdlozini,2015).

However, awareness only about proper household waste disposal practice is not sufficient to ensure proper disposal practice. Income plays a significant role in recycling practice for household wastes. The amount of municipal cleansing tax is related to willingness to pay. In addition, institutional factors such as provision of adequate facilities of proper waste management are correlated with environmental concern (Kamara, 2009).

Behavior changes programs usually targeted to achieve waste segregation. The municipal usually gives waste campaign talks in the schools and community centers at the wards. The approach is to segregate the wastes into wet and dry wastes. Waste segregation has distinct advantages. It contributes towards reducing quantum of waste to be treated or recycled, thereby reducing cost.

During June, 2000 a waste segregation program was launched in eight pilot cities of China (Beijing, Nanjing, Shanghai, Hangzhou, Xiamen, Guilin, Guangzhou and Shenzhen). In this program, people could sort their waste at home voluntarily and then send the sorted waste to separate containers in the community. Before the pilot program, waste separation was not practiced in household. The Notice on the Announcement of the First Batch of Waste Source Separation Demonstration Cities/Districts was enacted in 2015. The extension to 26 cities (Districts) as waste separation at source had succeeded (Avinash Mishra, 2021).

Applying behavior insights approach, there are three ways to promote more sustainable waste disposal, i.e., reduce littering, increase participation in disposal programs and encourage accurate waste separation.

The first method is to reduce littering. Littering is a bad difficult behavior to give up. Through focusing on the public education campaigns people can be convinced that littering is morally wrong. To reduce littering, people need easy ways to dispose their trash properly. This reduces friction associated with proper disposal (e.g., improving the look and location of trash cans). Changing social norms of a space such as cleaning up a location or modeling proper litter disposal is another proven strategy for reducing littering. Improving public space shows that simple communication nudges can be a cost-effective way to motivate them to bring their buildings into compliance with local regulations.

The second way is to increase participation in disposal programs. People need to remember the time of home pick-up services for their waste disposal. Sending behaviorally-informed mailer to the residents is needed to participate in heavy item pick up program. Frequent timely reminder and social norms messaging by authority increase the uptake of underused waste disposal services. These can reduce the resident who missed recycling collection dates.

The third way is to encourage accurate waste separation. People often have to separate the wastes to dispose into different correct containers. Many cities have various waste separation rules that can be complicated. The key to encouraging waste separation is making it as easy as possible to do. Simple and timely instruction reduce cognitive burden of doing it. Placing graphic instructions on disposal bins highlighting common errors increase the quality of dry waste separation. As an incentive, prize draw awards are behaviorally-informed strategy for proper waste separation.

Most people desire properly disposal of their wastes. But their good intentions meet barriers that prevent them from doing so. Urban planners and other institutions are important to consider the design and waste management infrastructure. It is imperative that people do so with an understanding of how humans behave to maintain sustainable environment. (Marcos Pelenur, 2022)

2.3   Hazardous Household Wastes

Hazardous household waste (HHW) is a subgroup of hazardous waste commonly found in MSW and in wastewater streams. These special wastes originate in households. HHW pose problems in safe handling. They pose human health and environmental hazards. At the dumpsites, land fill sites and incineration plants, HHW from MSW release toxic agents into air and water.

Hazardous household wastes in the domestic waste concern safety issues as they contain: pressurized gas containers, aerosols, waste from electrical and electronic equipment (WEEE), oils, asbestos, paints and adhesives, flammable liquids (e.g., thinners and solvents), agro-chemicals (pesticides etc.), and household chemicals.

Many of these waste materials are categorized as hazardous because they will have any of the following properties: ignitability with flash point less than 140°F, corrosiveness, reactivity with water and other materials, and toxicity to animals and human beings. The simplest way for safe living is: recognize hazards, evaluate hazards, and control hazards.

HHW possess the most toxicity of the waste stream. Health and environmental risks are influenced by household hazardous products (HHPs) during their use and disposal. Ingestion, inhalation, or absorption of the chemicals in HHP can affect health. Some toxic fumes emitted from HHPs can cause headaches, fatigue, eye irritation, runny noses, and skin rashes. Children and aged people are at a much higher risk compared to others.

The improper management of HHW has contributed to specific environmental problems as follows. Additional environmental problems associated with HHW are related to its disposal in landfills, leading to the complication of leachate composition and subsequent treatment.

Impacts on Air, Water and Soil

Under improper waste management practices and uncontrolled systems, waste dumps can cause several health hazards from pathogenic organisms, insects, rodents, and air pollution from dust, accidental burning, offensive odors, as well as ground and surface water pollution. Along with the increased population, waste generation is also rapidly increasing every year and becoming a major issue for the environment and health.

The various impacts due to improper solid waste management include; water and air pollution, problems associated with bad odor, pests, rodents and stray animals, generation of Green House Gases (GHGs), problems associated with aviation due to birds flying above dump site, fires within the waste dump/land fill, and erosion and stability problems in waste dump or land fill.

Health and Safety Issues

Health can be affected due to injury or infection as detailed included: injuries due to handling waste, respiratory sickness due to air pollutants, infections due to direct contact with infectious material injuries due to surface subsidence, fires, and slides, sickness due to anoxic conditions, sickness due to water pollution, attack by stray animals residing in waste dumps, sickness due to increase in vector population, noise, fires, and toxicity.

Solid wastes collected from ditches which were the sole reason for epidemics in Europe in 1348 and 1665 (Alice 2008). Now, it also can be observed in developing countries. The organic fraction the waste not only attracts rodents and vectors; it also forms foul odors as well as unsightliness. Uncontrolled or inefficiently managed waste can contaminate water, air and soil. Many workers who handle waste and individuals

who live near or on disposal area are infected with worms, gastrointestinal parasites and other related organisms (Cal Recovery Inc., 1992).

In 20th century, widespread havoc occurred in India and Vietnam due to widespread plague and, during 1994-2003 confirmed and suspected human cases had reached to 28,530 with 2015 deaths, (Thomas 2009). Plague hits Surath in India in 1994 due to which the city authorities took extensive measures to manage solid waste.

Material like plastic covers generated by improper waste disposal may enter the food chain of many species getting suffocation. The entry of toxins into food would also mean damage to ecology. The combustion in dump yards and other places lead to pollution and Green House Gases. Waste disposal can also lead to accident and traffic disruption wherein the people have thrown the waste at the center of the road as the civic authority have failed to place proper collection system in place.

2.4   Review on Previous Studies

The studies on KAP towards household wastes are important to assess the readiness of the society to change the behavior. KAP studies give valuable facts and requirement for the policy makers to improve the community behavior.

Aria Gusti (2016) worked out the relationship of knowledge, attitudes and behavioral intentions of sustainable waste management on primary school students in city of Padang, Indonesia. His study showed that the knowledge and attitudes had relationship. Knowledge and attitudes towards sustainable waste management also has significant relationship with the intention of sustainable waste management behavior.

George Mdlozini (2015) studied waste management and recycling practices at Durban University of Technology (DUT) and to evaluate knowledge, attitude and practices of the students towards waste management and recycling at DUT. It found that the students' knowledge regarding waste management and recycling is poor and their attitudes and practices towards waste management and recycling may be improved by education and enforcement of policy.

The study of Laor, P., et al (2018) was about knowledge, attitude and practice of municipal solid waste management among Highland Residents in Northern Thailand. It found that 73 percent of respondents had high level of knowledge; 85 percent of respondents showed neutral attitude; and 59 percent of respondents performed moderate practice on MSW management. It was found that there was statistically

significant association between age and education levels with KAP levels on MSW management.

Toe Aung (2008) studied that solid waste management in Yangon City. He describes necessities of solid waste management system such as raising public awareness and participation, implementation of container collection system in marginal areas, improving the final disposal sites and developing new sites, and the implementation of 3Rs and improving scavenger participation.

Roy Je (2015) studied about solid waste management system and working environment of 330 PCCD (now, UECCD) workers in Yangon. They all are known as WA (Work Admit) getting 3000/- kyats as daily wages. By sweeping and collecting waste, they earn extra income from recyclable materials preferring working at night shift. Having worry for next day job, they hope to get a stable work place and they are lack of awareness.

Minn Nay Han (2019) studies about the awareness and behavior on waste management of the Yangon Citizens living in sub-urban area (Thingangyun and South-Okkalapa townships) and identifies willingness to pay of people for solid waste management. Only thirty percent of the respondents have awareness on waste segregation and reduction. Willingness to pay is the highest (89%) at the lowest charge i.e., 1,000/- Kyats per month. It reaches the lowest (44%) at the price of 3000 MMK per month.

Nan Tin Yu Swe (2022) conducted a study on knowledge and practice on waste management of local people near the final disposal sites at Hlaing Thar Yar Township, Yangon City and to investigate the environmental impacts of the surrounding area and to analyze the suggestion of local residents. The study found that the respondents strongly agreed that safe waste disposal is of utmost important to prevent fire incident and infection transmission, without treating at the final disposal site posed a threat to the environment and health. YCDC should make proper management plan to consider with current local residents' perceptive and need to more negotiations for waste collection and enhance the awareness program.

CHAPTER III
WASTE DISPOSAL IN YANGON AND
KYAUKTADA TOWNSHIP

Wastes management in Yangon is under the responsibility of Yangon City Development Committee (YCDC). The headquarter is located in City Hall which is situated in Kyauktada Township. Mayor is the head of the YCDC and leads the overall management of 33 Township Development Offices in Yangon.

3.1   Legal Framework on Waste Management

The ministry of environmental conservation is the responsible ministry for environmental conservation. Legal matters relating to waste management are described in environmental conservation law (2012) and environmental conservation rules (2014).

In the environmental conservation law, it prescribed that the Ministry and the Committee shall establish environmental standards regarding water, air, noise, vibration, and solid and liquid waste. For environmental protection, it prescribed that the Ministry and the Committee shall issue orders regarding use/transfer of hazardous substances and emission of wastes, etc. and obligate disposing parties to perform cleaning and disposal in accordance with the environmental standards. The Environmental Conservation Rules, the detailed enforcement regulations of the Environmental Conservation Law enforced in March 2012, were promulgated on June 4, 2014. It prescribed the matters concerning waste management.

There are some municipal rules that prescribe more detailed rules and systems regarding waste management, including the Cleaning Rules, Order No.3/96 established in 1996 in which disposal of waste is banned in public places and it needs to dispose waste at designated places. Further, the Pollution Control and Cleansing Rules, Order No.10/99) established in 1999 prescribe the responsibilities of restrictions on the municipal government, business operators and citizens regarding collection, transportation, treatment and disposal of waste. The rules also refer to promotion of

recycling (3R). The rules prohibit waste disposal at the places other than designated site including on streets.

Table (3.1) Laws and Regulations Related to Waste Management in Myanmar

Rangoon Development Trust Act	1920
The City of Rangoon Municipal Act 1922	1922
The City of Rangoon Municipal Amendment Act 1961	1961
The City of Rangoon Municipal Amendment Act 1991	1991
City of Yangon Development Law	1990
City of Yangon Municipal Act	1992
Cleansing Rules, Order No. 3/96	1996
Pollution Control and Cleansing Rules, Order No.10/99	1999
Environmental Conservation Law	2012
Yangon City Development Law	2013
Environmental Conservation Rules	2014
Environmental Impact Assessment (EIA) Procedure	2015
National Environmental Quality (Emission) Guidelines	2015
Prevention of Hazard from Chemical and Related Substances Law	2016
Prevention of Hazard from Chemical and Related Substances Rules	2016
Yangon City Development Law	2018

Source: YCDC

The old 1922 City of Rangoon Municipal Act was amended into Yangon Development 2018 and the 2013 YCDC law is supplemented. The law bars the formation of YCDC-run business parties including for construction, the service industry, recreation and others. It makes sure to continue to perform in its original duty of providing services to the public.

In order to enact the laws, training is needed to enforce and manage proper implementation of waste handling. Apart from training the waste generators needs wide awareness for changing their behavior which has been done through posters, handouts, publicity in different mass media like internet, radio, newspaper, television etc. To raise awareness and educate all the stake holders on proper waste practices are essential to achieve waste management policy objectives.

Certain audiences are particularly susceptible to educational programs or delivery of targeted information. Educating children early and building an awareness of the importance of managing waste properly at an individual and family level, and then reinforcing that message throughout the course of schooling, will yield returns over many years and contribute to responsible waste behavior.

3.2   Solid Waste Management in Yangon City

Yangon city is the economic capital of Myanmar. The city is 759 km^2 in area and 5.21 million people are living there. The city is under the administration of Yangon City Development Committee (YCDC). In the city, there are 33 townships and divided into four districts, North, South, East and West. The management of the solid waste service falls under the responsibility of the Urban Environmental Conservation and Cleansing Department (UECCD) under Yangon City Development Committee. Solid waste generation in Yangon is increased from 1,300 tons in 2005 to 2,000 tons in 2015. The amount is expected to increase further in the future due to increase in population and economic growth.

3.2.1   Waste Composition in Yangon

UECCD classify wastes into the following types, kitchen wastes, garden wastes, factory wastes, construction wastes, commercial wastes, general wastes, disguising wastes and hospital wastes.

Kitchen wastes include all useless materials throw away from houses, apartments and kitchens except garden waste. Garden wastes include all waste from pruning and cutting trees, grass, bushes within compound and broken parts of house and furniture. Factory wastes include all useless materials thrown away from factories. Construction wastes include all useless materials thrown away from construction sites.

The commercial wastes include all useless materials thrown away from commercial business factories. General wastes include all useless materials such as kitchen waste and other waste except green waste, factory waste, construction waste and commercial waste. Disguising wastes include dead bodies of animals, excrement, smelling muck from animals, blood, smelling liquid or dirt. Hospital wastes include all useless materials thrown away from State owned hospitals, organizations owned hospitals, private owned hospitals and clinics within the city area.

Classification of waste generated in Yangon

In Myanmar, different proportions of MSW constitutes (60%) from households, (15%) from the markets, (10%) from commercial producers, (2%) from hotels, (5%) from gardens and (8%) from other institutions. That is why household wastes take a major significant role in dealing with MSW. (Premakumara, 2017).

Table (3.2) Types of Waste Generated in Yangon City

Hospital Waste	0.31 %
Household Waste	93.85 %
Industrial Waste	0.85%
Market Waste	2.60%
On Call Collection Waste	0.47%
Other waste	1.92%

Source: YCDC

The types of waste produced in the city are household waste 2,500 to 2700 tons/day, industrial waste 250 tons/day, and medical waste 2.15 tons/day. Among the solid wastes, 76 % of the solid waste is organic, 10 % is plastic, 4 % is textiles and papers, and another 10 % is wood, rubber, leathers, metals, glasses, and crockery and stones.

Both formal and informal system in waste handling are still applied in Yangon. The informal practice includes many actors such as waste-pickers, itinerant buyers, small scrap dealers, and wholesalers, who are lacking of technical support and improper waste handling. It becomes one of the fastest growing problems in the city. Many inefficient practices in solid waste management are still needed to develop. Either wise, it can lead into public health hazards, pollution of air and water.

3.2.2 Flow of Waste Disposal Management

Waste is collected and transported through primary collection and secondary collection. The primary collection is from the source of waste to the collection site/iron container and the second collection is from the mentioned relaying facilities to the disposal site. Generally, solid wastes are collected in these two types.

Primary waste collection includes brick tank system, dumping site system, bell ringing system and door to door collection system. In the brick tank system, wastes are

collected on evening (6 - 11) pm, morning (6 - 10) am. In the dumping site system, wastes are disposed at dust bins of Euro Standard Size and also at brick tanks which are kept in townships at a specific time. In the bell ringing system, wastes are collected with bell ringing truck and cart on the designated date and time after negotiation with ward supervisors. In the door-to-door collection system, public throw wastes at designated time and municipal come to collect at the designated time. The municipal follows the collection time according to the discussion with local ward authorities and conducts the collection with designated carts and vehicles.

Secondary collection is mainly performed with tipper trucks collecting wastes from waste storage sites (temporary waste tanks and iron containers) after the primary delivery to the final disposal sites.

Table (3.3) Final Disposal Sites in Yangon city

Facility Name	Type	Amount of waste accepted (ton/day)	Area (Acre)	In service area (used up)	Year started in service
Htain Bin	Disposal site	1287.75	150	70	2002
Htwei Chaung	Disposal site	1070.50	147	47.4	2001
Dala	Temporary	21.76	1.3	N/A	2003
Seikkyi Khanaungto	Temporary	7.11	0.25	N/A	2003
Total		2387.12			

Source: YCDC

Waste produced in the city of Yangon is finally disposed as landfill directly at the final disposal site managed by UECCD. Waste produced in the city is mainly treated by Htein Bin disposal site to which waste from North and West districts are mainly delivered and Htawe Chaung disposal site to which waste from South and East districts are mainly delivered. These two disposal sites are open-dump type.

Not much acres of land are still left to be dumped in Htein Bin landfill. Researchers calculated that the whole Htein Bin landfill will be filled with rubbish by 2025, thereby resulting in a scarcity of land to waste disposal in Yangon. In 2018, there was even a large fire outbreak at Htein Bin dumpsite. It was due to heat and methane gas emissions from the bottom of the dump.

Rising Issues of Solid Waste Management

The rise in consumption of resources with increasing city population leads into rapid increase in volume of waste generation. Proper treatment for the variety of waste is needed because there is shortage of landfill space and difficulties in finding suitable lands within Yangon. The current solid waste collection is labor-intensive and ineffective way of dealing with waste issues.

Local policies to promote 3R and reinforcements are urgently required to develop proper waste management system. Strategic planning is needed to implement and execute. There is weak enforcement of existing laws and regulations. Wastes are needed to apply as a valuable resource and contribute environmental sustainability and clean. Either wise, Yangon's landfill sites will be completely covered in the a few years without a proper waste management system.

3.2.3 Urban Environmental Conservation and Cleansing Department

Waste generated in Yangon city is managed by Environmental Management Authority, the Urban Environmental Conservation and Cleansing Department (UECCD) of Yangon City Development Committee. The department undertake collection and transportation of waste, management and administration of waste disposal sites and cemeteries, recycling activities and community awareness activities.

UECCD Organization Set-up

The following chart shows the organization chart of UECCD. It has approximately 5,300 employees in total and 4,200 of them are waste collection workers. Under the head of the department, there are two deputy heads each responsible for two districts for their assigned duties and responsibility.

The department performs a variety of duties/responsibilities for waste management regulated in cleaning rules such as collection, transportation and recycling of waste. It is responsible for installation and management of waste collection sites, waste collection and management of disposal site. It collects paying fees for cleaning/disposing of waste generated by the people living in Yangon city. The followings are services given by UECCD.

The routine daily duty is the collection daily waste (collected the waste from Dust bins and brick tanks designated by PCCD with collection fee.). It gives service of On-Call Collection system for construction waste, industrial waste, garden waste and collected from non-service areas. Depending on public request, it also gives Backstreet

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Waste Collection (Collection vehicles provided by UECCD. Oil and workers are cost by disposer.)

Figure (3.1)   Organization Chart of Urban Environmental Conservation and Cleansing Department, Yangon City Development Committee
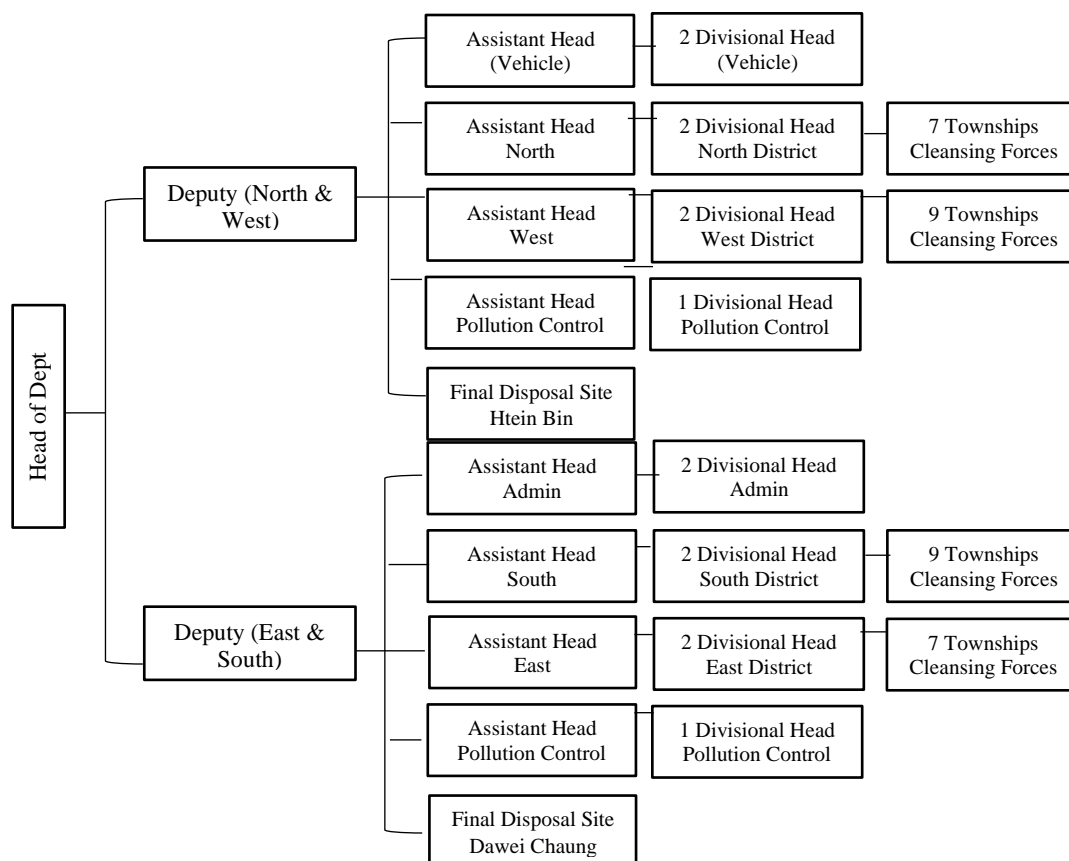
Source: YCDC

Medical Waste Collection is done with designated Box Type Container Vehicle. The expired medicines, hazardous waste are destroyed based on volume systematically. Medical Waste Incineration Plant is located at Htein Bin Final Disposal Site., Hlaing Thar Yar township. For Collection commercial waste, waste from hotels, motels, inns, guest houses and collection industrial waste from industrial zones through Industrial Zone Supervisor are collected. Another public service is for mobile public toilet and service for public toilets with B.O.T system. Moreover, several solid waste awareness programs are collaborated between community, government, private organization.

Finally, UECCD provides funeral service for the people in Yangon.

Table (3.4) Classification of Townships According to Districts in order to Perform Funeral

Townships	Designated Cemetery
South Okkalarpa, Tamwe, Pazuntaung, Botahtaung, Bahan, Mingalar Taung Nyunt, Mingalardon, Mayangone (East), North Okkalarpa, Yankin, Shwe Pyi Thar, Hlaing (East), Thingangyun, Insein(East), Dagon (North- North Side).	**Yeway Cemetery**
Kyauktada, Kyinmyintaing, Kamaryut, Sanchaung, Dagon, Pabetan, Mayangone (West), Hlaing (West), Lanmataw, Latha, Hlaing Thar Yar (West), Insein (West), Alone.	**Htein Bin Cemetery**
Dagon (Seikkan), Dagon (South), Dagon (North-South Side), Dagon (East), Tharketa, Dawpon.	**Kyi Su Cemetery**
Shwe Pyi Thar.	**Kyu Chaung Cemetery**
Dala.	**Dala Cemetery**
Seikkyi Kha Naungto.	**Seikkyi Kha Naungto Cemetery**
Kyi Myin Taing (the other side of Yangon river), A Lat Chaung Village.	**Seikkyi Cemetery**

Source: YCDC

The dead body keeping in mortuaries of cemetery can be taken outside only with permission of the department. If the townships designated to cremate in Htein Bin cemetery wanted to keep dead body in mortuaries in Yeway cemetery in order to cremate, there must be paid (100000) kyats as a charge. Cremation of the dead body in designated cemetery does not need to pay the charge. The dead body keeping in mortuaries of cemetery cannot be taken outside without permission of the department.

Cleaning and Collection of tax and revenue according to townships

Waste collection fee is collected quarterly in 33 townships in the boundary of YCDC. Waste collection fee is also collected by on-line receipt since October 2014. Collection fee is 20 kyats per day in (25) townships with development and collect (1800) Kyat pet quarter every three month. Collection fee is 15 Kyat per

day in (8) townships adjacent to (15) townships with development and collect (1350) Kyat per quarter every three month.

3.2.4 Waste to Energy Plant (WtE) Project

YCDC is collaborating with JFE Engineering Corporation from Japan for the country's first waste to energy plant. The first waste to energy model plant project in Yangon city is developed with funding of 16 million USD, half of which came from the YCDC and half from the Japanese Government under its financial support scheme, the Joint Credit Mechanisms (JCM). The JCM assists Myanmar in transfer of Japanese low carbon technologies.

The model waste incineration plant is constructed in Shwe Pyi Thar Township. It is designed and constructed by JFE Engineering Corporation (JFE). The plant operations were started from April 2017 on a trial basis with a capacity of 60 tons/day (1 unit), jointly with the YCDC and JFE. The plant is estimated to contribute to the reduction of 4,800 tons of Carbon Dioxide (CO_2) a year. It targets to generate 700 KW and use 300 KW for its own operations, and the rest being sent to the national grid.

Technical Cooperation and Technical Transfer Project by using Semi-aerobic Landfill Method, project size is 1 ha (2.2 acres) in Htein Bin Final Disposal Site, Hlaing Thar Yar township by collaborating between Yangon City Development Committee (YCDC), Urban Environmental Conservation and Cleansing Department and Fukuoka City (Japan).

There are many advantages of applying Semi-aerobic sanitary Landfill Technology. They are as follows; reduction Air Pollution of Methane Gas Releasing from Final Disposal Sites; protection Soil and surface/underground water damaging from dumping waste on the ground illegally; reduction Land Scare Problem of dumping waste and by using Landfill Technology, surface ground could reuse after conducting treatment process; and protection surface and underground water damaging from releasing leachate from waste dumping illegally.

Another WtE project is intended in Htawai Chaung. Htawai Chaung is chosen for construction of WtE plant. The purpose of the WtE plant is to prolong the life of Htawai Chaung Final Disposal Site, and it is supposed to treat all waste delivered to Htawai Chaung Final Disposal Site. The plant will be established in PPP and it is considered to be operated by the BOT scheme, YCDC intends to engage in the project as organization that controls waste in the city of Yangon. It is expected to be the off-

taker of the project and the main party to execute the project at the same time. The plant is intended to treat all waste delivered to Htawai Chaung final disposal site. The treatment capacity of WtE plant is 500 [ton/day] x 2 lines, 1000[ton/day] in total. The waste treatment fee will be charged and sale of electric power will be the main source of income.

Table (3.5) Specs of Waste-to-Energy Plant

Item	Specs
Amount of general waste treated	1,000 tons/day
	310,000 tons/year
Days of operation per year	310 days
Output of power generator	20 MWh
Electricity used in the plant	4 MWh
Electricity sold	16 MWh/day
	119,040 MWh/year

Source: YCDC

Moreover, YCDC is planning and promoting more waste-to-energy projects in dealing with increasing solid wastes to tackle the issues of scarcity of land filling area. In order to extent remaining number of years to receive solid waste in the existing disposal sites before opening the new final disposal sites, YCDC has a plan to build four new incineration power plants (including in one pilot plant) in Yangon City. YCDC plans to install three medium scale (600-800 tons/day) plants in three zones; north-east, south, and west taking into consideration of optimization of collection and transportation, available land. The estimated total capacity of the plants is 2,000 tons/day which may be able to cover receiving municipal wastes in 2025.

There are several collaborated projects for transfer of low carbon technology, solid management and other environmental management formulation through MoU with many institutions, such as, MOEJ (Ministry of Environment, Japan), JICA & Nippon Koei Co., Ltd, Kawasaki City and Fukuoka City from Japan, Royal Haskoning DHV from Netherlands and UN-Habitat.

Moreover, many technical trainings, workshops and projects are collaborated with many international organizations from the Royal Kingdom of the Netherlands, Poland, Sri Lanka, China, Republic of Korea, Netherlands, Norway and International Centre for Integrated Mountain Development from Nepal (ICIMOD).

3.2.5   Awareness Activities for Solid Waste Management (SWM)

Solid wastes pick up campaign is conducted instructed by Yangon Regional Government (YRG) and public awareness programs are promoted in 33 townships once per month. "Yangon Regional Waste Pick up Campaign" conducts on 23.11.2018 as first time, 23.12.2018 as second time and 27.1.2019 as third time with the collaboration of YRG, YCDC, NGOs and volunteers directed by Yangon Regional Government (YRG). However, public awareness programs could not be held as planned during Covid-19 pandemic period and during the unstable political situations.

3.3   Household Waste Disposal in Kyauktada Township

Total wastes 30.6 tons is collected every day in Kyauktada township. Two types of waste collecting system is practicing in the township, i.e. collecting waste bag system and dumping system. Household wastes are collected two times daily. The household waste collection and cleansing of the public area are under the duty and responsibility of Township Cleansing Force of Kyauktada Township.

Waste Separation

Wastes are separated into wet and dry types. Wet wastes can be discarded in safely tight blue bags and collected daily. Dry wastes can be discarded safely tight with green bags and collected weekly on Wednesday and Sunday.

Informal Waste Pickers

Informal waste pickers play a role in waste separation. They regularly come to garbage bins and select recyclable waste. They then bring to recycling dealers and sell it. Since recent years, license for recycling business are no more allowed to renew for their shops in the six downtown townships. However, they continue doing their work in some way.

Cleaning and collection of backstreet

For the waste in the backstreets which is discarded irresponsibly by the public, the municipal does not collect them with the designated systems and only the responsible residents living in the street/ward have to collect them. However, public can rent garbage truck by paying diesel fees for collecting the wastes. The responsible street/ward shall collect the waste and lift up them to the garbage truck with their own.

Table (3.6) Waste Disposal Status of Kyauktada Township

Wastes Management Status of Kyauktada Township	
Household wastes	18.41 tons/day
Business wastes	11.59 tons/day
Market wastes	0.6 tons/day
Total wastes	30.6 tons/day
Collecting system	Dumping and Collecting
No. of collecting trolley	48
No. of collecting vehicles	7
No. of garbage bins	660 L (169); 240 L Green (13), Orange (19), 660 L Night market (20)
Business wastes fees	2099 shops (7,495,000/ Ks)
Clinic wastes	42 clinics (143,500)
Cleansing fees (Collected by UECCD)	372 (669,000/Ks) Quarterly
Cleansing fees (EO Office)	5619 (10,114,200/Ks) Quarterly

Source: YCDC

The table (3.6) show status of waste generation and waste management activities in Kyauktada township. Among the wastes generated by the whole township, household wastes are the major source of wastes being 18.41 tons/day. The majority of residents living in the Kyauktada township follow proper waste disposal practice. Some people prefer dumping at the designated garbage bin while others prefer door-to-door collecting.

However, some people are still littering and neglecting the environmental conservation rules. Littering is a disgusting behavior in urban environment. Some residents living in high story apartment, residents living alone or having very few family members and several vendors have bad habit of littering to the backstreet lane, to the ground and sewage drain. Compliance of people become worse by witnessing the nature of water in sewage drains. Last three decades ago, many small fishes can be seen

surviving well in the sewage drain water of the township. These are no more observable in the present years.

During the period between 2015 and 2020, YCDC had achieved some improvement concerning waste prevention at the backstreet lane in Kyauktada Township. Three backstreet lanes were renovated for the purpose of public recreation area and playground for the kids. In upper block of 33rd street, Cinema backstreet lane could be opened. The wall of the backstreet lane was painted with very beautiful pictures. Many visitors came and enjoyed it. It was an exemplary model for waste prevention. After that several similar renovated backstreets were successively risen in other streets.

3.4 Cleansing Activities in Kyauktada Township

Cleansing activities are labor intensive work and sufficient manpower is needed to achieve proper cleansing activity of the whole township. Cleansing work force in Kyauktada consists of 118 staffs totally. They wear their pink colored uniform during working hour. They do household waste collection daily and also do sweeping and cleansing the rubbishes on the ground in public area.

The following tables show manpower of Kyauktada Township Cleansing Forces in terms of payment method and duty ranks respectively.

Table (3.7) Manpower of Township Cleansing Forces in Kyauktada Township (in Payment Terms)

Manpower of Township Cleansing Forces	
Permanent staffs	6
Daily pay staffs	5
Fixed pay staffs	1
Work Admit (WA)	104
Total	118

Source: YCDC

Table(3.8) Manpower of Township Cleansing Forces in Kyaukada Township

(in Terms of Designation)

Manpower	
Office staffs	7
Tax collecting staffs	6
Garbage collecting staff supervisors	7
Day/Night garbage collecting and cleansing staffs	61
Transport staffs	12
Drivers	7
Garbage carry vehicle guard	2
Attached staffs	2
Sewage cleansing staffs	10
Compliance staffs	2
Total	116

Source: YCDC

Daily Work Schedule

The work forces are divided into two sections, day and night operation sections having 13 groups for day operation section and 15 for night operation section. Each group has 1 to 5 Work Admit (WA) supervised by one supervisor for each group. Night operation section uses more labor force. They do sweeping, collecting, transporting of wastes in the township using carts and trash vehicles.

On Call (Separated waste charge)

Apart from the kitchen waste, construction waste, factory and plant waste, garden, park, and yard waste can be dumped by renting the following trash vehicles rate for disposal. Medical wastes are collected two days per week.

Collection of tax for commercial waste

The enterprises such as Hotel, Motel, Inn, Guesthouse, hospitals and clinic and in the area of Yangon City Development Committee are collected for tax based on the kind and size of the enterprises as: 2000 MMK to 1500000 MMK for business; 5000 MMK to 3000000 MMK for hospital /clinic; and 20000 MMK to 3000000 MMK for Hotel, Motel, Inn, Guest house.

Table (3.9) Rental Fees for Each Type of Trash Vehicle

Sr.	Type of Trash Vehicle	Rental Fees (MMK)
1	1 Ton (TA TA Hopper)	20000
2	4 Ton (Compactor 7m3)	80000
3	5 Ton (Compactor 9m3)	100000
4	5 Ton (Cheng Long)	100000
5	7.5 Ton (10 Wheel Dump Truck)	150000
6	8 Ton (Compactor 14m3)	160000
7	8 Ton (Arm Roll Truck)	160000
8	240 L Dust Bin	1500
9	660 Dust Bin	3000
10	1 Collection Cart	3000
11	Waste (1) Ton	20000
12	Carrying more than the specified tonnage	20000

Source: YCDC

School Awareness Programs

Based on students' capacity and absorbing skills, school awareness programs are divided into (3) levels such as primary, middle and high level categories. It is planned to conduct awareness programs (2) or (3) times a week. In the program, it is included about solid waste explanation, waste sorting, waste discharging systematically and 3Rs. programs sustainably. However, the school awareness programs could not be held as planned in the last two years due to Covid-19 pandemic and unstable political situation.

CHAPTER IV
SURVEY ANALYSIS

4.1   Survey Profile

This survey was conducted during December 2022 and January 2023 in Kyauktada township, a major downtown township in Yangon City. Raw data collected were organized in MS Excel 2016.

Kyauktada township residential area is 88% of the total township. Number of household in Kyauktada Township (2014) is 6120 and population is 29853. Concerning waste collecting system, both dumping and door to door collecting system are used in Kyauktada township. Kyauktada township is composed of nine wards. The total 395 respondents of households in these nine wards are selected for the survey.

Table (4.1) Kyauktada Township Profile

Kyauktada Township Profile	
Area	0.275 mile^2
Total number of wards	9
No. of roads	8
No. of streets	11
Population	29853
No. of wards under service	9
No. of households	6078
No. of market	1
No. of schools	1 high school, 1middle school, 5 primary schools
No. of hotels	9
No. of guest house	32
Shopping mall	2
Hospital	1
Clinics	42
Backstreet lane	32

Source: YCDC

4.2   Survey Design

The survey is designed to assess KAP of the respondents about household waste disposal. The respondents are randomly selected from nine wards of Kyaukada township. The sample size of the respondents are calculated using Yamane's formula:

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

where n = sample size, N = population of the ward and e = margin of error.

The interview questions were adapted from the published research papers. The questionnaire is composed of four parts. The first part is the sociodemographic profile of the respondents. The remaining three parts were about survey on KAP on household waste disposal. It was determined in four aspects such as household wastes disposal, municipal services, environmental impact and recycle of household wastes.

Knowledge for household waste management (HWM) was assessed using 14 items using correct and incorrect responses. The knowledge items were scored as either "0" or "5" for the correct or incorrect response, respectively. The total knowledge score for each respondent could range from 0 to 70. Attitude towards HWM was assessed using 18 items. A 5-point Likert scale was used to respond to the items in the attitude section where "strongly agree," "agree," "neutral", "disagree" and "strongly disagree" were scored as 5,4,3, 2, and 1, respectively. The total attitude score for each respondent could range from 18 to 90. Practice in respect of HWM was assessed with 13 questions. The participants were asked to respond to these questions based on a 5-point Likert scale, where "always," "often," "sometimes", "rarely" and "never" were scored as 5,4,3,2, and 1 respectively. The total practice score for each respondent could range from 13 to 65.

The aggregated KAP scores were classified into eight possible groups as described by Aluko et al.

Table (4.2) Interpretation of Mean KAP Item Scores in the Study

Questionnaire	Interpretation Method
Part A: Socio demographic characteristics	(i) Checklist: a list of items to-tick-off
Part B: Knowledge of HWM	(i) High if scores > 80%
Part C: Attitude towards HWM	(ii) Positive if scores > 69%
Questionnaire	**Interpretation Method**
Part D: Practice in respect of HWM	(iii) Good if scores > 73%

Table (4.2) Interpretation of Mean KAP Item Scores in the Study (Continued)

Categorization of Scores for KAP	
High K, positive A, and good P	(+,+,+)
Low K, negative A, and poor P	(−,−,−)
High K, positive A, and poor P	(+,+,−)
High K, negative A, and poor P	(+,−,−)
High K, negative A, and good P	(+,−,+)
Low K, positive A, and good P	(−,+,+)
Low K, negative A, and good P	(−,−,+)
Low K, positive A, and poor P	(−,+,−)

4.3   Survey Results

In this section, the survey finds out the Knowledge, Attitude and Practice towards Household Waste Disposal of the respondents in Kyauktada Township.

4.3.1   Characteristics of the Respondents

Table (4.3) Sociodemographic Characteristics of the Respondents

Sociodemographic Characteristics	Total (n=395)	
	Respondents	Percent
Gender		
Male	176	44.56
Female	219	55.44
Age (year)		
< 20 years	11	2.79
20 to 39 years	139	35.19
40 to 59 years	188	47.59
Above 60 years	57	14.43
Marital Status		
Single	87	22.03
Married	225	56.96
Divorce	10	2.53
Others	73	18.48

Table (4.3) Sociodemographic Characteristics of the Respondents (Continued)

Sociodemographic Characteristics	Total (n=395)	
	Respondents	**Percent**
Education		
Primary	0	0
Middle school	65	16.46
High school	83	21.01
Graduate	247	62.53
Family Members		
1 to 4	180	45.57
5 to 8	142	35.95
Above 8	73	18.48
Family Income (per month)		
< 1,000,000 MMK	163	41.27
Between 1,000,000 and 3,000,000 MMK	183	46.33
Above 3,000,000 MMK	49	12.40
Employment Status		
Student	9	2.28
Government Staff	35	8.86
Retired	32	8.10
Housewife	60	15.19
Company/Private	60	15.19
NGO/Non-profit	33	8.35
Vendor	103	26.08
Business	39	9.87
Unemployed	24	6.08
Number of Story of the Building		
3 Story	40	10.13
4 Story	54	13.67
5 Story	59	14.94
6 Story	97	24.56
7 Story	39	9.87
8 Story	89	22.53
10 Story	17	4.3

Table (4.3) Sociodemographic Characteristics of the Respondents (Continued)

Sociodemographic Characteristics	Total (n=395)	
	Respondents	Percent
At which Floor of Building		
Ground floor	79	20.00
1st Floor	90	22.78
2nd Floor	107	27.09
3rd Floor	26	6.58
4th Floor	35	8.86
5th Floor	16	4.05
6th Floor	19	4.81
7th Floor	18	4.56
8th and above	5	1.27
Presence of Lift		
Present	16	4.05
Absent	379	95.95
Garbage Bin Distance from Home		
< 100 yards	144	36.45
Between 100 and 500 yards	113	28.61
Above 500 yards	138	34.94
Collecting System		
Dumping	242	61.27
Door-to-Door Collection	153	38.73
Time of Waste Disposal		
Morning	148	37.5
Night	267	62.5
Frequency of Waste Disposal (Daily)		
One	340	86
Two	55	14
Assigning a Definite Person for Waste Disposal		
Assigned	213	53.92
Not Assigned	182	46.08

Table (4.3) Sociodemographic Characteristics of the Respondents (Continued)

Sociodemographic Characteristics	Total (n=395)	
	Respondents	Percent
Availability of Municipal Trash Bin		
Enough	228	57.72
Not Enough	167	42.28
Receiving Sound Municipal Services		
Yes	301	76.21
No	94	27.79
View on Effectiveness of Education for Avoiding Household Waste Disposal at Backstreet		
Effective	0	0
Not Effective	395	100
Awareness on Improper Disposal of Betel Chewing and Cigarette Remnants in the Streets		
Yes	100	100
No	0	0

Source: Survey Data (2023)

Table (4.3) shows the collected data of respondents categorized into gender, age, marital status, level of education, family size, family income, employment status, the number of stories of the buildings the respondents live, residing level of the building, and presence of lift.

It also consists of common characteristics nature concerning household waste disposal such as garbage bin distance from home, collecting system, time and frequency of household waste disposal, assigning whether a definite person for waste disposal or not, availability of municipal trash bin, opinion on receiving sound municipal services or not, respondents' view on effectiveness of giving education by municipal for avoiding household waste disposal to backstreet, awareness on improper disposal of betel chewing and cigarette remnants in the streets.

Among the 395 survey respondents, 176 (44.56%) were male and 219 (55.44%) were female. In terms of age groups, majority 188 (47.59%) were between 40 to 59 years of age, 2.79% were below 20 years, 35.19% were between 20 to 39 years and 14.43% were above 60 years.

Majority of respondents 56.96% were married, 22.03% were single, 2.53% were divorce and 18.48% are others. The study found that 247 (62.53%) respondents are graduates, 65 (16.46%) respondents have middle school level and 83 (21.01%) respondents have high school level.

The number of family members of the respondents between 1 to 4 were 180 (45.57%), between 5 to 8 people were 142 (35.95%) and above 8 people were 73 (18.48%). Majority of the respondents 183 (46.33%) has income level between 1,000,000 and 3,000,000 MMK; and 163 (41.27%) has income level below 1,000,000 MMK; and the rest 49 (12.4%) has above 3,000,000 MMK. Among the respondents, 103 (26.08%) are vendors, 60 (15.19%) are housewife and 35 (8.86%) are working in government, 32 (8.1%) are retired, 9 (2.28%) are students, 24 (6.08%) are unemployed and 60 (15.19%) are in the company and 33 (8.35%) are in NGOs.

Regarding the number of stories of the buildings the respondents live, 24.56% are 6 stories buildings, 22.53% are 8 stories building, 14.94% are 5 stories buildings, 13.67% are 5 stories buildings, 10.13% are 3 stories buildings, 9.87% are 7 stories buildings and 4.3% are 10 stories buildings. Regarding floor level of the respondents, the study found that the majority of respondents 107 (27.09%) are living in 2nd floor, 79 (20%) are in ground floor, 90 (22.78%) are in 1st floor, and the rest are living in 3rd and above floor. Only 16 (4.05%) respondents are living in the building having lift and the rest buildings are without lift.

Concerning common nature of household waste disposal, 144 (36.45%) respondents are living less than 100 yards far from the garbage bin, 113 (28.61%) are between 100 and 500 yards; and 138 (34.94%) are above 500 yards far from garbage bin. The study found that 242 (61.27%) respondents use dumping method of waste collection and 153 (38.73%) respondents use door-to-door collection.

Regarding waste disposal practice, 148 (37.5%) respondents do waste disposal in the morning and 267 (62.5%) do at night. Majority of respondents 340 (86%) dispose household waste once a day and 55 (14%) respondents dispose twice a day. Regarding assigning a definite person for waste disposal, 213 (53.92%) respondents assign a definite person for waste disposal while 182 (46.08%) do not assign.

Regarding availability of municipal trash bin, 228 (57.72%) respondents think municipal trash bins are available enough and 167 (42.28%) think that the available trash bins are not enough. Regarding on receiving sound municipal services, 301 (76.21%) respondents accept that they receive sound municipal services, and 94

(27.79%) respondents do not accept it. All the respondents have a view on education campaign giving by municipal to the community for not disposing household waste at backstreet is not effective. All the respondents have awareness about the presence of improper disposal of betel chewing and cigarette remnants in the streets.

4.3.2 Knowledge towards Household Waste Disposal

To gauge the knowledge of the respondents on household waste disposal, the respondents were enquired 14 items on the knowledge of household wastes, proper waste disposal methods, municipal services, environmental impacts and awareness of recyclable wastes using correct and incorrect responses. The knowledge items were scored as either "0" or "5" for the correct or incorrect responses.

Table (4.4) Perceptions of Respondents about Knowledge towards Household Waste Disposal

Sr.	Particulars	Mean	S.D
	Knowledge on Household Wastes		
1	Knowing proper disposal of construction wastes.	3.1	2.4
2	Knowing the responsibility of cleansing waste in the backstreet lane.	3.6	2.2
	Knowledge on Municipal Services		
3	Knowing the rental fees 20,000 MMK of municipal trash vehicle	3.1	2.4
4	Knowing that improper waste disposal is the act of violation of environmental conservation rules.	3.1	2.4
5	Knowing quarterly fees for municipal cleansing tax.	5	0
	Knowledge on Environmental Impacts		
6	Knowing that polythene bags are harmful to environment.	5	0
7	Knowing impact of improper waste disposal at backstreet lane.	3.1	2.4
8	Knowing health impact due to sewage block.	5	0
9	Knowing that improper disposal of kitchen wastes can attract rodents.	5	0
10	Knowing that rodents can destroy interlock pavements.	3.1	2.4

Table (4.4) Perceptions of Respondents about Knowledge towards Household Waste Disposal (Continued)

Sr.	Particulars	Mean	S.D
	Knowledge on Recycle		
11	Knowing the separation of household wastes.	3.1	2.4
12	Knowing recycle dealers buying for recyclable items.	5	0
13	Knowing waste reduction by reusing of containers for water and oils.	5	0
14	Knowing the way of reducing waste generation.	5	0
	Overall Mean	4.2	1.1

Source: Survey data (2023)

Table (4.4) assess knowledge of the respondents on household waste disposal. The respondents have high knowledge towards household waste disposal having the overall mean is (4.2) and standard deviation is (1.2). The respondents have poor knowledge towards proper disposal of construction wastes and towards the responsibility of cleansing wastes in the backstreet lane having.

Regarding the municipal services for household wastes, all the respondents have high awareness quarterly municipal cleansing tax. However, they have low knowledge on the rental fees 20,000 MMK of municipal trash vehicle for construction wastes having 3.1 (M) and 2.4 (SD). The respondents also have low knowledge that improper waste disposal is the act of violation of environmental conservation rules.

Regarding the environmental impacts, all the respondents have high awareness towards harmfulness of polythene bags and towards health impact due to sewage drain block. They all have high knowledge that the improper disposal of kitchen wastes attracts rodents. However, the respondents have low knowledge towards impact of improper waste disposal at backstreet lane and towards that rodents can destroy interlock pavements.

Regarding the recycle knowledge, the respondents have low knowledge on separation of household wastes. They have good knowledge towards recyclable wastes; and they also have good knowledge about recycle dealers buying the recyclable items. The respondents know well about wastes reduction by reusing of containers for water and oil; and have high knowledge towards the way of reducing wastes generation.

4.3.3 Attitude towards Household Waste Disposal

To access the attitude of the residents of Kyauktada township towards household wastes disposal, the participants were enquired about the views on waste disposal behavior, municipal services for household wastes disposal, environment concern due to improper wastes disposal and their attitude on recycling for sustainable environment.

Table (4.5) Perceptions of Respondents about Attitude towards Household Waste Disposal

Sr.	Particulars	Mean	SD	Meaning
	Wastes Disposal Behavior			
1	Attitude on waste separation waste.	3.5	0.9	**Positive**
2	Attitude on avoiding waste disposal at backstreet.	1.7	1.3	**Negative**
3	Attitude on own initiation of properly waste disposal	4.1	1.2	**Positive**
4	Attitude on keeping container for spitting betel chewing	4.3	0.8	**Positive**
	Municipal Services			
5	Attitude on paying construction waste tax before disposal	1.7	1.2	**Negative**
6	Attitude on municipal as main responsibility for proper waste disposal	2.5	0.9	**Negative**
7	Attitude on setting fine charges against improper waste disposal	3.5	0.9	**Positive**
8	Attitude on paying quarterly cleansing tax	4.8	0.4	**Positive**
	Environmental Concern			
9	Attitude on environmental pollution concern	3.7	0.4	**Positive**
10	Attitude on concern of street flood due to drainage blocked by wastes	4.1	1.2	**Positive**
11	Attitude on avoidance of improper waste disposal that can lead into mosquito breeding in case of drainage block	4.3	0.8	**Positive**
12	Attitude on avoidance of improper waste disposal due to rodent coming to eat remaining kitchen wastes	4.3	0.8	**Positive**
13	Attitude on attention of pavement destruction due to rodents that destroys its foundation soil	4.1	1.2	**Positive**

Sr	Particulars	Mean	SD	Meaning
	Attitude on Recycling			
14	Attitude on importance to do all methods to reduce waste generation	4.3	0.8	**Positive**
15	Attitude on reducing the use of polythene bags	1.9	1.2	**Negative**
16	Attitude on importance of bringing bags and containers during shopping	4.3	0.8	**Positive**
17	Attitude on ever putting things in the polythene bags from the shop during shopping	4.1	1.2	**Positive**
18	Attitude on importance of bringing containers when buying hot soups.	4.3	0.8	**Positive**
	Overall Mean	3.6	0.9	**Positive**

Source: Survey Data (2023)

Table (4.5) shows mean scores in attitude of the respondents towards household waste disposal. The respondents have positive attitude towards household waste disposal having average mean (3.6) and standard deviation (0.9). Regarding waste disposal behavior, the respondents have positive attitude on wastes separation. They have negative attitude on avoiding waste disposal at backstreet. They have positive attitude towards self-responsibility for properly dispose of waste and towards keeping container for spitting betel chewing.

Regarding municipal services for household waste disposal, the respondents have negative attitude on paying construction waste tax before disposal. They also have negative attitude on municipal having main responsibility for proper waste disposal. The respondents have positive attitude on setting fine charges against improper waste disposal. They also have positive attitude on billing monthly cleansing tax 600 MMK by municipal.

Regarding environmental conservation, the respondents have positive attitude on environmental pollution concern due to improper household waste disposal. They also have positive attitude on flood concern due to drainage block by household wastes. They also have positive attitude on avoidance of improper household wastes disposal that can lead to increased mosquito breeding in blocked sewage drainage. The respondents have positive attitude on avoidance of improper household wastes disposal that can lead to attracting rodents to remaining kitchen wastes. They also have positive

attitude on attention of interlock pavement destruction due to rodents burrowing the pavement foundation soil.

Regarding on the view of recycling wastes, the respondents have positive attitude on doing all methods to reduce waste generation. They have negative attitude on reducing polythene bags. The respondents have positive attitude on wastes reducing by bringing bags and containers during shopping. They have positive attitude for not always putting things in the polythene bags from the shop during shopping. The respondents also have positive attitude on bringing containers when buying hot soups to reduce wastes by reusing containers.

4.3.4 Practices towards Household Waste Disposal

The respondents were asked about their actual practice towards household waste disposal. The questionnaire includes several items on their daily routine practice towards household wastes disposal, utilization of municipal services, practices towards environmental pollution and recycling for sustainable environment. The study found that the respondents have good practice towards household waste disposal. The overall mean is (3.0) and standard deviation is (1.3). The respondents having scores of 3 and above have good practice towards household waste disposal and those having less than 3 have poor practice.

Table (4.6) Perceptions of Respondents about Practice towards Household Waste Disposal

Sr.	Particulars	Mean	SD	Meaning
1 2	**Household Wastes Disposal** Practice on disposing waste at the garbage bin Practice on disposing waste at backstreet lane	4.5 4.2	0.5 0.9	**Good** **Good**
3	**Municipal Services** Participate in removal of wastes blocked in the sewage drain	2.7	0.9	**Poor**
4 5 6	**Environmental Pollution** Practice on avoidance of disposing household waste into sewage drain Practice on using polythene bags given from the shop during buying foods Proper disposal of wastes into the streets.	4.2 2.3 3.3	0.9 0.9 0.9	**Good** **Poor** **Good**

Table (4.6) Perceptions of Respondents about Practice towards
Household Waste Disposal (Continued)

Sr.	Particulars	Mean	SD	Meaning
	Environmental Pollution			
7	Practice on keeping bottle/container for spitting betel chewing or telling not to spit improperly of betel chewing.	3.3	0.9	**Good**
8	Practice on disposing remnants of cigarettes at trash bin or telling not to do improper waste	4.3	0.8	**Good**
9	disposal.	2.3	0.9	**Poor**
	Practice on telling anyone for not improperly disposing at backstreet lane.			
	Practice towards Recycle			
10	Practice on properly disposing tissue paper and plastic bags at the trash bin	4	0	**Good**
11	Practice on recyclable waste separation	2.6	1.6	**Poor**
12	Practice on selling of paper and newspaper etc. to recycling dealers	2.7	1.7	**Poor**
13	Practice on using disposable drinking water bottle	2.0	0.7	**Poor**
	Overall Mean	4.29	0.85	

Source: Survey data (2023)

Table (4.6) shows the study results of practices towards household waste disposal of the respondents. The respondents are asked their actual practices related to their daily household waste disposal, utilization of municipal services, environmental pollution and practice towards recycle behavior.

The respondents have poor practice on dry and wet household waste separation. They do well in practicing of fundamental household waste disposal such as proper disposal method of municipal service either dumping or door-to-door collection. They have good practice on disposal household waste at the trash bin and avoiding disposal of wastes at backstreet.

Concerning municipal services, the respondents have poor practice on proper disposal of construction wastes by paying special fees for it. All the respondents pay quarterly municipal cleansing fees. However, they have poor practice in participation for removal of wastes blocked in the sewage drain.

Regarding practice towards environmental pollution due to household wastes, the respondents have good practice in avoidance of disposing wastes into sewage drain. However, they have poor practice on using polythene bags given from the shop during buying foods. The respondents have good practice on proper disposal of waste in the streets and also have good practice on keeping bottle/container for spitting betel chewing and telling not to spit improperly of betel chewing. They have good practice on disposing remnants of cigarettes at trash bin and telling not to do improper waste disposal. However, they have poor practice on telling anyone for not disposing household wastes into backstreet lane.

Regarding practice on recycling behavior, the respondents have good practice on disposing tissue paper and plastic bags at the trash bin. However, the respondents have poor practice on recyclable waste separation and practice on selling paper and newspaper to recycling dealers. They also have poor practice towards using disposable drinking water bottle.

4.3.5 KAP Distribution in Relation to Different Variables

The study found that there are relationships among the level of education of the respondents and the practice towards household waste disposal; the level of attitude and the practice towards household waste disposal; and the level of education of the respondents and attitude towards household waste disposal.

Table (4.7) Level of Education in Relation to Practice towards Household Waste Disposal

	Good Practice	Poor Practice	Total
Middle School	16	49	65
High School	6	77	83
Graduate	171	76	247
Total	193	202	395

Source: Survey Data

Table (4.7) shows level of education in relation to practice towards household waste disposal by the respondents. Among the 193 respondents having good practice, 193 respondents have good practice towards household waste disposal. Regarding their education level, 171 graduates (88.60%, n=193) do proper practice towards household

waste disposal whereas 6 (3.11%, n=193) in high school respondents and 16 (8.29%, n=193) in middle school respondents respectively. It was found that graduate respondents have highest and middle school have lowest practice towards household waste disposal.

Table (4.8) Level of Attitude in Relation to Practice towards Household Waste Disposal

	Good Practice	Poor Practice	Total
Positive Attitude	154	69	223
Negative Attitude	39	133	172
Total	193	202	395

Source: Survey Data

Table (4.8) shows level of attitude in relation to practice towards household waste disposal by the respondents. The majority of respondents having positive attitude with frequency of 154 (69.06%, n=223) do good practice towards household waste disposal whereas those with negative attitude of 133 (77.32%, n=172) are poor practice towards household waste disposal. It was found that positive attitude respondents have more good practice towards household waste disposal.

Table (4.9) Level of Knowledge in Relation to Attitude towards Household Waste Disposal

	Positive Attitude	Negative Attitude	Total
Good Knowledge	223	24	247
Poor Knowledge	0	148	148
Total	223	172	395

Source: Survey Data

Table (4.9) shows relationships of the respondents' knowledge and attitude towards household waste disposal. Among the respondents, 223 respondents with good knowledge have positive attitude and 148 respondents with poor knowledge have negative attitude. It was found that good knowledge relates to positive attitude towards household waste disposal.

Table (4.10) Level of Family Income in Relation to Practice towards Household Waste Disposal

	Good Practice	Poor Practice	Total
Less than 1,000,000 MMKs	70	93	163
Between 1,000,000 & 3,000,000 MMKs	95	88	183
More than 3,000,000 MMKs	28	21	49
Total	193	202	395

Source: Survey Data

Table (4.10) shows level of income in relation to practice towards household waste disposal. Among the respondents, 70 respondents with family income less than 1,000,000 MMKs have good practice towards household waste disposal (42.94%, n=163), 95 respondents with family income between 1,000,000 and 3,000,000 MMKs have good practice towards household waste disposal (51.91%, n=183), and 28 respondents with family income more than 3,000,000 MMKs have good practice towards household waste disposal (57.14%, n=49). It was found that percentage of good practice was increased with increasing family income.

Table (4.11) Types of Employment in Relation to Practice towards Household Waste Disposal

Types of Employment	Good Practice	Poor Practice	Total
Company/Private	41 (68.3%)	19 (31.4%)	60
Government Staff	32 (91.4%)	3 (8.6%)	35
Housewife	22 (36.7%)	38 (63.3%)	60
NGO/Non-Profit	18 (54.6%)	15 (45.4%)	33
Own Business	12 (30.8%)	27 (69.2%)	39
Retired	21 (65.6%)	11 (34.4%)	32
Student	0	9 (100%)	9
Unemployed	6 (25%)	18 (75%)	24
Vender	41 (39.8%)	62 (60.2%)	103
Total	193 (48.9%)	202 (51.1%)	395

Source: Survey Data

Table (4.11) shows employment types of employment in relation to practice towards household waste disposal. Among these, government staffs took the role of highest percentage (91.4%) in performing good practice towards household waste disposal, company/private staffs as the second highest (68.3%) and retired respondents as the third highest percent (65.6%) in performing good practice towards household waste disposal. Students and unemployed respondents have the poorest practice towards household waste disposal.

Several backstreets of downtown are often messed up with household wastes due to improper waste disposal practice. Some people in the community commit littering into backstreet instead of properly disposing wastes into municipal garbage bin.

Table (4.12) Garbage Bin Distance in Relation to Household Waste Disposal at Backstreet

Garbage Bin Distance	Mean	Meaning
Less than 100 yards	4.31	Good
Between 100 and 500 yards	4.32	Good
More than 500 yards	4.22	Poor
Overall Mean	4.28	

Source: Survey Data

Table (4.12) shows garbage bin distance in relation to waste disposal at backstreet. The total mean score of respondents living within the distance between the apartment and garbage bin is (4.28). Among the respondents living in the apartments having distance less than 100 yards far away from the garbage bin have an average mean score of (4.31). Their mean score was above the total mean score and they have good practice concerning waste disposal at backstreet. The respondents living in the apartments having distance between 100 and 500 yards far away from the garbage bin have an average mean score of 4.32. Their mean score was above the total mean score and they also have good practice concerning waste disposal at backstreet. The respondents living in the apartments having distance more than 500 yards far away from the garbage bin have an average mean score of 4.22. Their mean score was below the total mean score and they have poor practice concerning waste disposal at backstreet.

Table (4.13) Six Composites of KAP Distribution

KAP Categories	Frequency	Percentage
K+A+P+	154	38.99%
K+A+P-	69	17.47%
K-A-P-	126	31.90%
K-A-P+	22	5.57%
K+A-P+	17	4.30%
K+A-P-	7	1.77%
Total	**395**	100%

Source: Survey Data

Table (4.13) shows six patterns of Knowledge, Attitude and Practice composites. Their frequencies were 154 (38.99%) for High Knowledge, Positive Attitude, Good Practice (K+A+P+), 69 (17.47%) for High Knowledge, Positive Attitude, Poor Practice (K+A+P-), 126 (31.90%) for Low Knowledge, Negative Attitude, Poor Practice (K-A-P-), 22 (5.57%) for Low Knowledge, Negative Attitude, Good Practice (K-A-P+), 17 (4.3%) for High Knowledge, Negative Attitude, Good Practice (K+A-P+) and 7 (1.77%) for High Knowledge, Negative Attitude, Poor Practice (K+A-P-). The study finds that respondents having good practice towards household waste disposal were mainly found in those with both high knowledge and positive attitude (K+A+P+) with frequency of 154 (38.99%). The respondents having both poor knowledge and negative attitude mainly have behavior of poor practice towards household waste disposal with frequency of 126 (31.9%).

Table (4.14) Level of Income of Respondents in Relation to Practice towards Household Waste Disposal

	Good practice	Poor Practice
Less than 1,000,000 MMKs	70 (43%)	93 (57%)
Between 1,000,000 and 30,000,000 MMKs	95 (52%)	88 (48%)
Above 30,000,000 MMKs	28 (57%)	21 (42%)

Source: Survey Data

Table (4.14) shows the respondents' income level in relation to recycle practice. It shows that respondents from two higher family income groups, i.e. the respondents

having family income between 1,000,000 MMKs and 30,000,000 MMKs and family income above 30,000,000 MMKs have relatively better practice towards recycle of the wastes. The respondents with family income below 1,000,000 MMKs have relatively less practice towards recycle of household wastes.

Table (4.15) Level of Floor the Respondents living in Relation to Practice towards Household Waste Disposal

	Mean	SD	Meaning
Below 3rd Floor	4.30	0.84	Good
3rd Floor and Above	4.24	0.86	Poor
Overall Mean	4.29	0.85	

Source: Survey Data

Table (4.15) shows relationship between the level of floor the respondents living in their resident buildings and practice towards household waste disposal. The mean score of respondents living below 3rd floor is above the overall mean and the mean score of those living at 3rd floor and above is below the overall mean. This shows that respondents living below 3rd floor have good practice than those living at 3rd floor and above.

CHAPTER V
CONCLUSION

The study assessed the level of knowledge, attitude and practice towards household wastes disposal in Kyauktada Township, Yangon Region. The study population is 395 households at 9 wards in Kyauktada Township. A survey using structured questions to assess the level of knowledge, attitude and practices towards household wastes disposal and descriptive method was used to analyze survey results.

5.1   Findings

The study found out that the majority of the respondents 242 (61.27%) use dumping method for waste collection and 213 (53.92%) respondents assign a definite person for daily household waste disposal. The majority of respondents 228 (57.72%) think municipal trash bins are available enough and 223 (56.46%) respondents strongly agree that they receive sound municipal services. All the respondents view education campaign by municipal for not disposing household waste into backstreet is not effective.

The study found that the respondents have high knowledge towards household waste disposal. The respondents have highest knowledge on household wastes constituents, proper disposal methods, waste collecting system, monthly fees for municipal cleansing tax and also on recycle knowledge. These are fundamental for proper waste disposal and sustainable environment.

However, the respondents have lowest knowledge in the areas such as responsibility of cleansing wastes in the backstreet, rental fees of municipal trash vehicle, improper waste disposal as the act of violation of environmental conservation rules, and knowledge on necessity of dry and wet separation of household waste. These issues are necessary to promote awareness by the municipal.

The study found that the respondents have positive attitude towards household waste disposal that is lower than those of knowledge scores. The respondents have highest attitude towards paying monthly municipal cleansing tax 600 MMK. This is the

good indicator of willingness to pay. The second highest attitude are found in the aspects of environmental concern and recycle that favors clean and sustainable environment. The respondents have lowest negative attitudes in the area of avoiding waste disposal into the backstreet and reducing the use of polythene bags is still needed to change.

The study found that the respondents have good practice towards household waste disposal but it is the lowest among other variables such as knowledge and attitude. The respondents have highest practice towards using proper household waste disposal method and paying quarterly municipal cleansing fees. The second highest practice towards disposing household wastes into municipal trash bin. These two practices are the most important practices required to keep the Kyauktada Township clean. There are 202 respondents (51.14%) with poor practice. The respondents have lowest practices concerning dry and wet waste separation and on paying special fees for disposing construction wastes. The respondents also have poor practices towards using disposable drinking water bottle and using polythene bags. That reflects urgent need for recycling practice to achieve sustainable environment.

The study found that respondents having increased family income behave better practice towards household waste disposal. Regarding employment status, government staffs took the best performing towards household waste disposal and students and unemployed do least practice towards household waste disposal. The study also found that respondents living below 3rd floor have good practice than those living at 3rd floor and above.

Regarding municipal garbage bin distance, the respondents living in the apartment less than 500 yards distance from the municipal garbage bin have good practice in waste disposal at backstreet and those living more than 500 yards have poor practice in waste disposal at backstreet.

The study also found that there are relationships between the studying variables i.e., education, attitude and practice towards household waste disposal. It was found that graduate respondents have highest practice in household waste disposal. The graduate respondents have highest positive attitude and those with positive attitude have highest practices. The majority of respondents having good practice towards household waste disposal were found in those with high knowledge and positive attitude with frequency of 154 (38.99%). The majority of respondents having poor

practice were found in those with low knowledge and negative attitude with frequency of 126 (31.9%).

5.2   Recommendations

Concerning waste disposal in Kyauktada Township, the study concluded that although the majority of respondents having high knowledge and positive attitude have good practice towards household waste disposal, there is still significant number of respondents not practicing proper waste disposal. They are still weak in proper waste disposal practices. All the stakeholders have to convince and bear the "responsibility as emitters of waste".

For the sustainable environment, wide spread awareness and implementation of 3R policy (Reduce, Reuse and Recycle) is needed to promote public participation. People have to cultivate good practice starting from reducing the source of waste generation and then separation of household wastes as daily practices. To reduce improper waste disposal at backstreet, provision of municipal garbage bin within 500 yards of resident buildings is required. It is advisable that well-organized waste education campaigns are needed to promote 3R behavior change for sustainable environment.

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APPENDIX

A Study of Knowledge, Attitude and Practice towards Household Waste Disposal

(A Case Study in Kyauktada Township, Yangon Region)

Interview Questions

1. Gender - ☐ Male ☐ Female

2. Age (in years):

    ☐ Less than 20   ☐ 40 to 59

    ☐ 20 to 39   ☐ 60 and above

3. Marital status:

    ☐ Single   ☐ Divorce

    ☐ Married   ☐ Others

4. Education:

    ☐ Primary   ☐ High school

    ☐ Middle   ☐ Graduate

5. Family members living together:

    ☐ 1 to 4   ☐ 5 to 8   ☐ More than 8

6. Family monthly income:

    ☐ < 1,000,000/K ☐ 1,000,000/K to 3,000,000/K   ☐ > 3,000,000/K

7. Occupation:

    ☐ student   ☐ housewife   ☐ vendor

    ☐ government staff   ☐ company/private staff   ☐ own business

    ☐ retired   ☐ NGO/Non-profit staff   ☐ unemployed

8. Number of stories in the building (_____)

9. In which floor living

    ☐ Ground Floor   (0)   ☐ _____ Floor

10. Lift

    ☐ Present ☐ Absent

11. Garbage distance from apartment living:

    ☐ Less than 100 yards   ☐ 100 yards to 500 yards   ☐ More than 500 yards

12. Municipal waste collecting system at your ward:

    ☐ Dumping in a designated garbage bin   ☐ Collecting door-to-door

13. When do you usually dispose household waste?

☐ Morning ☐ Afternoon ☐ Evening ☐ At night

14. How many times do you discard household waste?

☐ 1 ☐ 2 ☐ 3 ☐ 4

15. How do you assign for daily waste discard?

☐ One of the family members is assigned for discarding waste.

☐ Not definitely assigned and anyone, who is available, shall discard waste.

16. Is there enough garbage bin at your ward?

☐ Enough ☐ Not Enough

17. Is there sound municipal service for waste disposal at your ward?

☐ Yes ☐ No

18. Is it effective municipal awareness education and campaign for ceasing the throw away practice of wastes into the backstreet?

☐ Effective ☐ Not effective

19. Do you notice there are improper disposal of betel chewing and remnants of cigarettes at your ward?

☐ Yes ☐ No

	Knowledge Concerning Household Waste Disposal	True	False
	Knowledge on Household Wastes		
1	Construction wastes such as unused sand, cement produced from repairing your building can be disposed at the garbage for household waste.	☐	☐
2	People residing in the quarter are responsible for cleansing of improper wastes disposed at backstreet lane.	☐	☐
	Knowledge on Municipal Services		
3	Construction wastes can be disposed by giving fees of 20,000 kyats/ton of wastes for renting vehicle (TA TA Hopper) from municipal.	☐	☐
4	Improper waste disposal is the act of violation of environmental conservation rules.	☐	☐
5	Municipal wastes tax is 600/Ks /month and collected 1,800/Ks quarterly.	☐	☐
	Knowledge on Environmental Impacts		
6	Polythene bags can harm environment.	☐	☐
7	Improper wastes disposal in the streetback lane can block sewage drainage and lead to flood over the street.	☐	☐
8	Mosquito breeds can rise from sewage block and have impact on health due to mosquitos.	☐	☐
9	Improper kitchen wastes disposal attracts rodents.	☐	☐
10	Interlock pavements can be destroyed due to rodents digging the foundation ground.	☐	☐
	Knowledge on Recycle		
11	It is better not to separate dry and wet wastes for disposal.	☐	☐
12	Recycle dealers buy back the paper, newspaper, journals, books, cards, cast irons, plastics for recycle.	☐	☐
13	Reuse of containers such as water and oil bottles can reduce waste products.	☐	☐
14	To prevent waste production in buying food from the food court, food box, basket or container can be brought without using polythene bags.	☐	☐

	Attitude concerning waste management	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
	Wastes Disposal Behavior					
1	It is necessary to separate dry and wet kitchen waste before disposal.	☐	☐	☐	☐	☐
2	It is more convenient to throw away the food remnants, kitchen wastes and containers into the back lane.	☐	☐	☐	☐	☐
3	For your environment clean, you have to start practicing proper waste disposal.	☐	☐	☐	☐	☐
4	For those with betel chewing habit, it has to bring along waste bag or bottle to keep the spitting of betel chewing.	☐	☐	☐	☐	☐
	Municipal Services					
5	Special tax for construction wastes such as bricks, cements and sands produced from repairing your apartment and building, should be paid ahead.	☐	☐	☐	☐	☐
6	For your environment clean, municipal has the main responsibility.	☐	☐	☐	☐	☐
7	It should charge fine as a penalty to get rid of improper wastes disposal.	☐	☐	☐	☐	☐
8	Monthly tax 600/Ks for pollution cleansing collected by the municipal is suitable.	☐	☐	☐	☐	☐

	Attitude concerning waste management	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
	Environmental Concern					
9	There is concern for environmental pollution due to improper waste management.	☐	☐	☐	☐	☐
10	There is concern for the flood due to blockage of sewage drains caused by improper disposal of wastes.	☐	☐	☐	☐	☐
11	Improper waste disposal should be avoided because stagnation of sewage flow blocked by the wastes in the drains can lead into the breeding of mosquitos.	☐	☐	☐	☐	☐
12	Improper disposal of kitchen wastes should be avoided because rodents coming for the kitchen wastes can cause infections.	☐	☐	☐	☐	☐
13	Pavement destruction due to rodents digging the underlying foundation ground is an issue worth of paying attention.	☐	☐	☐	☐	☐
	Attitude on Recycling					
14	It is important to do all the ways to reduce waste production.	☐	☐	☐	☐	☐
15	Using of plastic bags, plastic container and plastic bottles should be reduced.	☐	☐	☐	☐	☐
16	Carrying along the bag, basket and box, etc. is important when going out from the home to the groceries.	☐	☐	☐	☐	☐
17	Foods always should be bought by keeping in the plastic bags given at the food court.	☐	☐	☐	☐	☐
18	It is important to bring along the lunch boxes when buying hot soup.	☐	☐	☐	☐	☐

	Practice towards Waste Disposal	Never	Rarely	Sometimes	Often	Always
	Household Wastes Disposal					
1	Do you dump household wastes into the municipal garbage bin?	☐	☐	☐	☐	☐
2	Do you throw away household wastes into the backstreet?	☐	☐	☐	☐	☐
	Municipal Services					
3	Do you participate in removal of wastes blocking in the sewage drain?					
	Environmental Pollution					
4	Throw away household wastes into the sewage drain.	☐	☐	☐	☐	☐
5	Using polythene bags given from food court in buying food and drinks.	☐	☐	☐	☐	☐
6	Littering wastes into the streets.	☐	☐	☐	☐	☐
7	If you have habit of betel chewing, are you used to bring bag or bottle for putting betel chewing spits? (or) If you meet someone having habit of improper spitting of betel chewing, do you tell him to dispose betel spit properly?	☐	☐	☐	☐	☐
8	If you have smoking habit, do you dispose cigarettes into the garbage? (or) If you meet someone having habit of improper disposal of cigarette, do you tell him to discard cigarettes properly?	☐	☐	☐	☐	☐
9	Telling to the people who improperly discard waste into the backstreet for not doing such that.	☐	☐	☐	☐	☐

	Practice towards Recycle					
10	Discarding tissue paper and plastic bags into the municipal garbage bin	☐	☐	☐	☐	☐
11	Separation of recyclable paper, newspaper, journal, book, card, iron pieces and plastics among household wastes.	☐	☐	☐	☐	☐
12	Selling the recyclable items to recycling dealer.	☐	☐	☐	☐	☐
13	Using of disposable drinking water bottles.	☐	☐	☐	☐	☐