ROLE OF WOMEN'S PARTICIPATION IN HOUSEHOLD'S SOLID WASTE MANAGEMENT IN KATHMANDU METROPOLITAN CITY WARD NO. 32, NEPAL

A Thesis

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BY

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DECLARATION

I hereby declare that this MA thesis entitled ROLE OF WOMEN'S PARTICIPATION IN HOUSEHOLD'S SOLID WASTE MANAGEMENT IN KATHMANDU METROPOLITAN CITY WARD NO. 32, NEPAL submitted to the Central Department of Rural Development of Tribhuvan University, is entirely my original work prepared under the guidance of the thesis supervisor assigned by the department. I have made due acknowledgments of all ideas and information borrowed from different sources during the preparation of this thesis. The result of this research work has not been presented, published, or submitted anywhere else for the award of any degree or for any purposes. I assure you that not part of the content has been published in any form before. I shall be solely responsible if any evidence is found against my thesis.

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Anupa KC

Degree Candidate

Date: 2079/08/08

        24th Nov 2022

RECOMMENDATION LETTER

The thesis entitled ROLE OF WOMEN'S PARTICIPATION IN HOUSEHOLD'S SOLID WASTE MANAGEMENT IN KATHMANDU METROPOLITAN CITY WARD NO. 32, NEPAL has been prepared and submitted by Ms. Anupa KC under my guidance and supervision. I hereby forward this thesis to the evaluation committee for final evaluation and approval.

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Associate Prof. Dr. Umesh Acharya

Thesis Supervisor

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        27th Nov 2022

APPROVAL LETTER

This thesis entitled ROLE OF WOMEN'S PARTICIPATION IN HOUSEHOLD'S SOLID WASTE MANAGEMENT IN KATHMANDU METROPOLITAN CITY WARD NO. 32, NEPAL submitted by Ms. Anupa KC to the Central Department of Rural Development, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the Degree of Masters of Arts in Rural Development has been approved by the evaluation committee.

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ABSTRACT

Solid waste management (SWM) has become a major concern for municipalities and the country, the current state of SWM is unknown due to a lack of SWM baseline data, which is required for successful planning. In Nepal, SWM is a prominent problem of administration. The study on the role of women in household solid waste management tries to analyze women's participation in household solid waste management.

This study applied a quantitative research approach and survey method. Required data were collected from 273 respondents women selected randomly. In doing so, a household survey technique with the tools Cornbrach's Alpha (value 0.97) has been used. The validity for Practices of solid waste management scale and level of awareness is 0.701 which means no issue of content validity. This study used SPSS version 20 for organizing, summarizing, describing, and generalizing the data.

This research found that the role of women has a significant impact on solid waste management. The research studied the practice of solid waste management, awareness of solid waste management, and the role of women in solid waste management. 272 (99.6%) knew solid waste management and 196(71.8%) did not have training of the SWM. Households 256(93.6%) produce usually produced kitchen waste and plastics are produced often by 160 households paper and cartoons were produced usually and often and tins, cans fiber bags, and glass are produced rarely. Most of the respondents 228(83.5%) stated that they segregated the waste into sources. The reason for no separation of SWM was municipal does not take waste separately and most of the respondents 154 (56.4%) use the recycled SW and used it for their reuse. 162 (59.3%) of the respondents compost organic waste and about 98(35.9%) of the respondents compost in an old bucket. About 162 (59.3%) respondents were engaged in rooftop gardening and Among 162 respondents 64 respondents were engaged in terrace gardening, 81 respondents were engaged in sack and bucket gardening and 17 respondents are involved in small kitchen gardening.

The findings of the study are women are major clients of solid waste management services. The women are aware of the impact of poor SWM but the government does not have a proper policy for proper disposal. Households are no access to training or awareness programs of SWM. Household women involved in roof toping gardening are more likely to manage SWM properly. Women play a significant role in household SWM and strongly agree SWM is their responsibility.

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ABBREVIATIONS/ ACRONYMS

3R	-	Reduce, Reuse, and Recycle
AD	-	Antonio Domino
ADB	-	Asian Development Bank
ANOVA	-	Analysis of Variance
BS	-	Before Christ
CBO	-	Community-based Organization
GHGs	-	Green House Gases
GRID	-	Grassroots Innovation Database
GTZ	-	German Technical Cooperation Agency
HHs	-	Households
HMGN	-	His Majesty Government of Nepal
IPCC	-	Inter panel climate change
ISWM	-	Integrated solid waste management
MSW	-	Municipal Solid Waste
MSWM	-	Municipal Solid Waste Management
NGO	-	Non- Government organization
SW	-	Solid Waste
SWC	-	Solid Waste Management
SWMRMC	-	Solid Waste Management and Resource Mobilization Center
SWMTSC	-	Solid Waste Management Technical Support Center
UNDFW	-	United Nations Development Fund for Women
UNDP	-	United Nations Development Program
UNEP	-	United Nations Environment Program
USEPA	-	United States Environment protection Agency
WB	-	World Bank

CHAPTER 1: INTRODUCTION

1.1 Background of the study

"The current model is global suicide. We need a revolution. Revolutionary thinking, Revolutionary action. Natural resources are becoming more and more scarce."

- (Ban Ki-moon, former Secretary-General of the United Nations)

Waste is an unwanted and discarded material that has lost value from its original form. Waste includes gaseous, liquid, and solid materials and is produced from anthropogenic activities. Meanwhile, views of what constitutes waste are highly individual and vary from culture to culture. Waste management is one of the major environmental issues in urban areas of many developing countries, including Nepal. Rapid population growth in urban areas and unmanaged urbanization, lack of public interest and awareness, and poor management by municipalities have intensified environmental problems in urban areas of Nepal, including unsanitary waste management and disposal. Therefore, waste management has become a major concern for the municipalities of Nepal.

Urbanization, economic development, and consumption habits are all intricately tied to garbage management. Urbanization is associated with economic progress, which means that living standards improve, incomes rise, and consumption of goods and services rises, increasing waste production. According to World Bank research, almost 1.3 billion tons of municipal solid waste (MSW) are generated annually around the world, or 1.2 kilograms per capita each day (Kaza, Shrikanth, & Chaudhary, 2021). Other trash generated from different sources, such as street waste, waste from parks and gardens, and rubbish brought from the adjacent village development committees, are to be included in the overall amount of MSW specified (ADB, 2013). The Asian Development Bank (ADB) conducted a study that revealed the following: According to data from 2013 AD, the 58 municipalities' total MSW generation was anticipated to be around 1,435 tons per day, or 524,000 tons per year (ADB, 2013) .

Rapid and unregulated urbanization, a lack of public knowledge, and inadequate municipal management have exacerbated environmental concerns in Nepalese cities, including filthy waste management and disposal. While solid waste management (SWM) has become a major concern for municipalities and the country, the current

state of SWM is unknown due to a lack of SWM baseline data, which is also required for successful planning (ADB, 2013).

Waste management is often a municipal government role, and it is frequently a city's largest budget item. Solid waste generation rates are rapidly increasing, particularly in cities with growing populations and increased economic activity, putting pressure on municipal governments to deal with mounting costs and environmental consequences (Cohen, Martinez, & Schroder, 2015). Most developing countries, municipalities cannot cope with the rate of waste generation due to limited financial capacity. Comprehensive solid waste management encompasses a wide range of actions with varied degrees of sophistication, including reduction, recycling, segregation, modification, treatment, and disposal (Zagozewski, Judd-Henrey, Nilson, & Bharadwaj, 2011). Meanwhile, municipal waste is not well collected or processed. All MSW management processes produce GHGs during collection, transportation, composting, digestion, incineration, and landfill. The waste management approaches in most municipalities in Nepal are similar. The three major processes involved in waste management are collection, transport, and landfill disposal of waste (Maharjan, M. K., & Lohani, S. P., 2020).

Waste management also emits a variety of greenhouse gases (GHGs); the most significant sources are landfills, which emit methane as organic waste decomposes. The Intergovernmental Panel on Climate Change estimates that waste management emits less than 5% of the global GHG emissions (and emits 9% of methane released globally), but this estimate is uncertain and variable, as waste management can act as either a net source or sink of GHGs (IPCC, 2007).

Household waste is a considerable proportion of the total municipal waste generated. The success of current waste management systems therefore largely depends on how well such waste is managed. Understanding the creation and management of household waste is particularly important, due to their tremendous capacity for reducing the flow of waste through household consumption, segregation, and recycling practices (UNEP-GRID, 2019).

Because Nepal is an agricultural country, household waste accounts for 50 percent to 70 percent of MSW in Nepal (ADB, 2013). Women are the primary agents of waste generation and management due to gender power relations, gender division of labor, and gender roles. As a result, gender dynamics in waste generation and management should be considered when developing MSW management systems (UNEP-GRID,

2019). Municipal waste management strategies, on the other hand, are either gender neutral or gender blind, as the voices, interests, and needs of women and children, the key actors, are not considered.

In terms of gender roles, a woman is the primary decision-maker in the household and oversees waste disposal practices. Women's contributions are both invisible and noteworthy. A single household's practices, on the other hand, will have an impact on the whole of society. As a result, it is critical that women be educated and aware of the impact of waste disposal. The perception of waste will alter because of increased awareness of solid waste management. All types of waste should not be thrown into the same container. Human activity generates waste, the most significant of which are household kitchen waste and plastic products. The analysis of household waste composition indicated that the highest waste category was organic waste 66%, followed by plastics 12%, paper, and paper products with 9%, others (5%), and glass (3%). Metal, textiles, rubber, and leather each accounted for 2% or less (ADB, 2013). These figures indicate that if all compostable and reusable or recyclable wastes were utilized to the maximum, less than 10% of the waste would have to be disposed of at landfill sites (ADB, 2013).

According to ADB 2013 study in Nepal, around 30% of assessed households in municipalities adopt waste segregation at source, implying that garbage generated by approximately 70% of houses in municipalities is sent to the stream for collection and disposal by municipalities as mixed waste. Households investigated in several municipalities, particularly in rural wards, were discovered to separate kitchen garbage for their use, such as feeding livestock (ADB, 2013). Biodegradable MSW (Municipal Solid Waste) components: (e.g., paper and food waste) breakdown in landfills and release methane, a greenhouse gas 23 times more potent than carbon dioxide and a major environmental hazard (IPCC, 2001)

Plastics are being used increasingly, and there is no single technique for their reuse and disposal (Dhokhikah, Y., and Trihadiningrum, Y., 2012). Plastic garbage is projected to account for 11 to 16 percent of total solid waste in Nepal, according to several studies. According to a World Bank (WB) assessment, Nepal produces around 4,900 tons of solid trash every day, of which 13 percent is plastic waste (ADB, 2013). In 2018, Nepali Times, popular English daily in Nepal, stated that 204 tons of plastic wastes are generated every day in Nepal, with 131 tons ending up in rubbish mounds and disposal sites[i]. Every day, the Kathmandu valley, Nepal's largest urban area, is

expected to utilize between 4,700,000 and 4,800,000 plastic bags (SWMRMC/UN-HABITAT, 2008). According to ADB 2013, a residential waste composition survey found that, excluding organic waste, more than 25% of household garbage and a greater proportion of institutional and commercial waste may be reused or recycled. In most communities, however, there was no organized mechanism for reuse and recycling. While it is good to see people recovering recyclable materials at the source and selling them to the formal or informal sectors, a considerable proportion of recyclable material is still discarded on the streets and ends up in landfills (ADB, 2013).

One of the crucial issues with household solid management is a lack of public knowledge. Several municipalities work together on public campaigns with other parties such as the SWMTSC, NGOs, and CBOs to raise awareness about SWM at a community level. According to studies, community participation is critical for the sustainable management of solid waste in developing countries. People's involvement through NGOs and CBOs has helped to minimize the cost of solid waste management in many developing country cities (Reddy, et, al, 1998). Furthermore, in partnership with educational institutions such as schools and colleges, 33% of municipalities undertook SWM awareness and promotion of 3R activities. In contrast, the poll found that more than 65 percent of families are unaware of the SWM initiatives that local municipalities have launched in the last three years, and just 18 percent of homes have engaged in these programs (ADB, 2013). The study also stresses the importance of children in SWM, which has been overlooked. Children can be taught to care for their environment from an early age through official and informal schooling for long-term outcomes and behavioral change toward SWM. The National Habitat II committee in Kathmandu, Nepal (1996) believed that "Improving the Environment through Best Practices" meant teaching, orienting, and integrating children into environmental activities. The law requires that every educational institution educate the public on solid waste management ideas and techniques. To achieve an institution's Solid Waste Management Program's effective and long-term application of proper waste management procedures, awareness, and involvement are essential.

1.2   Problem of the Statement

Reduce the negative consequences of solid waste on public health and the environment by enacting the Solid Waste Management Act, which the government of

Nepal put into effect on June 15, 2011 (ADB 2013). Despite this act, the municipality still faces obstacles in trying to address the issue of waste management. The municipal waste consist considerable amount of household solid waste. It is inadequate data about household solid waste management and research focuses on household solid waste management practices.

Gender relationships are equally important. Women make up the majority of society globally and are among the population groups that are most vulnerable to improper service system designs, particularly solid waste collection systems. Even though women make up the majority of service recipients, one of the problems with the current solid waste collection systems is their male bias. While economic theory (and much municipal planning work) views the household as an indivisible unit, men and women have different access to and control of resources inside the household (Kabeer, 1994). As a result, it is not always clear whether women recognize and decide what is useful and what should be thrown away. It is unclear whether a woman who chooses to extract an item from the waste stream for use in her areas of responsibility can pre-empt a claim to that item claimed by another household member with more – or different – power and status. Hence, the research focuses on women's participation in household solid waste management

Women in many cultures are responsible for keeping the home and its immediate environment cleaning; therefore garbage disposal is one of their regular tasks. Furthermore, women are the primary users of urban services such as water, sanitation, and garbage collection, making them ideal beneficiaries of SWM projects. Women's cooperation, according to Aunshitx (1996), is critical for long-term success in any initiative involving urban services. He goes on to say that while they may not be interested in solid waste projects as a service, they may be interested in the employment and income-generating side. This study analysis household waste management practices by women's regarding waste reduction, recycling, composting, and reuse. This research focuses on how waste can economically benefit the women

Even though much has been done to recognize the contributions of various community organizations to SWM initiatives in metropolitan areas, the co-operation and potential of women pushing this agenda have not been evaluated.

1.3   Objectives of the study

The general objective of the study is identification the participation of women in household waste management

Specific Objectives:

1. To assess the practice of household solid waste management in the study area.
2. To examine the level of awareness of women and their participation in household solid waste management.
3. To analyze the role of women in solid waste management in the study area.

1.4   Significant of the study:

Kathmandu, Lalitpur, and Bhaktapur are the three main cities of historic and cultural significance in the Kathmandu valley. Kathmandu is Nepal's most important cultural and commercial center, with the most advanced infrastructure of all the country's cities. In addition, Kathmandu is a significant city in Nepal from of tourism, economy, and cultural history view. Proper Solid waste management is one of the needs of the tourism sector.

There are some studies (ADB, 2013; SWMRMC, 2004, 2008) conducted in developing countries and 58 municipalities of Nepal and these studies considered only one-day waste generation data and did not cover all the municipal wards. In Nepal, the Kathmandu valley is the site of the majority of SWM-related studies; however, these studies have not examined the socioeconomic factors and role of women that may have an impact on waste creation and management techniques.

Women appear to 'had to' handle waste in their households throughout cultures: it is part of their identity and what they do, and it may be related to their lower socioeconomic standing. Solid waste management is a severe problem in urban areas of developing countries like Nepal. Women's roles in household SWM are not identified. The behaviors and attributes towards waste generation, handling, collection, and separation are different between men and women. While making the policy, the government needs to identify women's participation and role in integrated SWM. The study focuses on household waste management practices. The research focuses on women's participation in household solid waste management. The study identified the level of awareness level of women in household solid waste management.

1.5   Limitation and Delimitation of study:

This research is conducted for academic purposes. The study focused on women's engagement in SWM in the home. Meanwhile, the study does not view the opinions of men and children. The study could not cover the entire Kathmandu area, only concentrated on Ward no 32. The result of the current research may not give accurate results due to limited respondents and different results. Every category of waste of household cannot be studied, as it will cover up the solid waste.

Since solid waste has various environmental and health risks, there is a need for research on this topic. Knowledge of proper solid waste management is a basic need of today. Hence women are the primary mangers of solid waste, the role should be identified and payback. The self-help cooperatives and CBOs: informal and informal have a significant role to aware women of proper waste management. The role of self-help cooperatives, NGOs, and CBOs has not been studied.

1.6   Organization of the Study

The thesis is divided into five chapters excluding preliminary sections and Annexes. The preliminary section will include a title page, approval page, acknowledgment, table of contents, list of tables and figures, and abstract.

Chapter 1: It includes an introduction, a statement of the problem, an objective of the study, limitations of the study, and organization of the study.

Chapter 2: This chapter is about the review of related literature. It includes a thematic review, theoretical review, policy review, and conceptual framework

Chapter 3: This chapter is about research methodology. It includes an introduction, research design, study site description, and rationale behind the selection of study area, study population and sampling, nature, and sources of data, and methods of data organization, processing, and analysis.

 Chapter 4: Data Analysis and Presentation

Chapter 5: This wraps up the study with findings, Summarizing of findings, Discussion of findings conclusion, and recommendations.

CHAPTER 2: LITERATURE REVIEW

This chapter reviewed relevant literature; it describes a conceptual review regarding the relationship between women's participation in household Solid Waste Management as well as theories regarding the study. In addition, the chapters are arranged based on the specific objectives of the study presenting views and findings of other a study as well as the study identifying the gaps therein.

2.1 Thematic Review

Wastes are substances or items that are disposed of, planned for disposal, or mandated for disposal by national law; according to UNEP, 2015 Waste is a solid concept that has multiple definitions (Pongrácz, Eva, 2009). Most of the time, the definition of waste is based on the kind or category of trash being considered. Municipal, solid waste, hazardous waste, and electronic trash are a few of the most prevalent waste categories. In cities in many developing nations, including Nepal, solid waste management (SWM) is one of the most pressing environmental problems.

The process of collecting, transporting, eliminating, or treating waste is known as solid waste management. Solid waste management discusses the results of human activity as well as the general precautions needed to fend against its negative effects on one's health, the environment, and aesthetics. Learning how to appropriately handle the garbage produced in today's polluted world is crucial (Marello, Marta & Helwege, Ann, 2014). Environmental issues are neglected in developing Asia to attain economic development; protection has frequently been disregarded resulting in pollution, hygienic issues intensified urban congestion and resource depletion.

2.1.1 Solid Waste Management in developing countries

Waste management systems in developing nations are identical to those in the industrialized world in the past (McAllister, 2015) . SWM services in developing nations have usually been provided by municipalities (Ogawa, 2008). Municipalities are in charge of organizing and managing household waste, which provides the structure for the collection, transportation, treatment, and disposal of waste. Municipal administrations in developing countries, however, are unable to offer the fundamental waste management service (Guettero, 2013).

2.1.2   Solid waste management problem in a developing country.

In developing nations, waste management has been an issue for the government. The most prevalent issues in Municipal Solid Waste Management (MSWM) in developing nations include insufficient waste collection coverage areas, operational inefficiencies in public services, a lack of recycling opportunities, inadequate landfill disposal, and insufficient management of hazardous and hospital waste (Zurbrugg, 1998). Insufficient service coverage, inconsistent garbage collection, waste spilling from bins and storage containers, people's careless attitudes toward careless disposal on public property, and waste littering are all prevalent issues with solid waste in developing nations (Odure-Kwarteng, 2011).

The number of family members and monthly income has a significant impact on how much waste a household produces (Guerrero, 2013). The level of knowledge and training also affects how aware households are of waste management and trash segregation. In developing nations, it is typical for collection, transfer, and transport procedures to be impacted by improper bin placement, poor collection techniques, route planning, a lack of knowledge about collection schedules, insufficient infrastructure, a poor road network, and a severe lack of vehicles for waste collection (Moghadam, 2009). Different sectors' solid waste is processed separately in industrialized nations, however, there is no such thing as separate trash treatment in developing nations (Jin, 2006).

Solid trash produced by various industries is treated separately in industrialized nations, but it is not dealt with separately at all in developing nations (Jin, 2006). However, the informal sector is present in developing nations and makes a significant contribution to waste minimization (Wilson, 2006). Extending available waste collection services at a reasonable cost can also be managed by organizing the unorganized sector and fostering microbusinesses (Sharholy, 2008). On the other hand, inadequate treatment system expertise among waste management authorities is identified as one reason affecting proper waste treatment (Chung, 2008).

2.2   Theoretical Review

2.2.1   Integrated Solid waste management approaches

Integrated solid waste management (ISWM) refers to the strategic approach to sustainability of solid waste management that addresses all sources and all aspects,

including generation, segregation, transfer, sorting, treatment, recovery, and disposal, with a focus on maximizing resource use efficiency. A strategy known as integrated solid waste management (ISWM) integrates different waste management procedures. In other words, integrated solid waste management uses a variety of alternative methods in addition to technological ways. Every stakeholder involved and impacted by waste management is included in this integrated strategy (Memon, 2010). Social, environmental, and economic restrictions are taken into account while designing an integrated waste management project (Gupta, C. B.and Gupta, V., 2015). The United States Environment protection Agency (USEPA) outlined three managerial techniques for integrated municipal waste management approaches that is Waste reduction, recycling, including composting, and incineration (USEPA, 1993a) (USEPA, 1994). Additionally, USEPA categories and introduces and defines five main activities in the hierarchy under integrated solid waste management waste reduction, recycling, composting, incineration, and landfilling and there is a clear correlation between the earlier components and later activities classified (USEPA, 2002).

Waste reduction: Waste reduction, sometimes referred to as waste minimization design, manufacture, purchase, or use of components and products to lessen the quantity and/or toxicity of disposing of waste. Simply put, waste minimization also refers to "reducing trash by not producing it" (USEPA, 2002). According to the USEPA, waste reduction at source is the ideal method for managing municipal solid waste since it lowers the amount of waste that a community can manage (USEPA, 2002)

Waste recycling: Recycling is the practice of reusing things that may otherwise be thrown away and instead reprocessing the material into useful resources. Recycling has several benefits, to reduce landfill waste which reduces greenhouse gas emissions. Recycling lessens the need for new resources, which helps to promote sustainable development. Materials including paper, glass, steel, plastic, and aluminum can be recycled so that they can be recovered and then utilized again rather than being disposed of. Additionally, waste recycling can be refurbishing products to extend their shelf lives is another crucial component of the circular economy paradigm

Waste composting: Composting means transforming organic material, such as food scraps and plant matter, into humus, a substance resembling soil, under-regulated aerobic biological conditions. Compost acts as a natural fertilizer by supplying nutrients to the soil, boosting beneficial soil organisms, and controlling some plant

diseases, which reduces the need for chemical fertilizers and pesticides in agricultural and landscaping practices. To manage their garbage and cut down on greenhouse gas emissions, communities can benefit greatly from composting (USEPA, 2002)

Incineration: Incineration is the methodical burning of garbage in a specific location to lessen its volume and, in some cases, to produce power. When there is a lack of landfill disposal, municipalities can use combustion as an ISWM alternative for waste that cannot be recycled or composted. Although the incineration process can produce harmful air pollutants, they can be reduced by adding control devices in combustion, such as fabric filters and acid gas scrubbers. Solid waste combustion can help cut down on the amount of garbage dumped in landfills. Additionally, it can lessen reliance on coal, one of the fossil fuels that when burned, create greenhouse gases (USEPA, 2002).

Landfilling: Wastes that are not properly disposed of can contaminate soil and groundwater and attract disease and pests and even cause fires. Landfills that have been properly planned, built, and managed offer a secure alternative for unmanaged disposal. A properly designed landfill should have a method to evacuate, combust, or collect methane to prevent fires. Operators of landfills can also recover this methane, so lowering emissions and producing power from the recovered gas (USEPA, 2002)

Traditional and integrated solid waste management hierarchy

Figure 1 Traditional and integrated solid waste management hierarchy

Source: (Fagarib, 2017)

All of these issues can be dramatically reduced by implementing an intensive waste management system that allows for proper waste collection, transportation, and systematic waste disposal—as well as attempts to decrease waste generation and enhance waste recycling. Even if it is nothing new, an ISWM strategy provides an opportunity to combine the best available waste management techniques to manage waste as effectively as possible.

2.2.2   Structural Functionalism Theory

The study tries to describe how social structures and institutions might be reinforced to provide quality SWM services to a society based on Emile Durkheim's structural functionalism theory. Human society, according to this view, is structured by institutions that serve a variety of purposes for the survival of the community. According to Durkheim, human society is an organism made up of interconnected structures and social organizations. According to the hypothesis, this interdependence allows for one organ to have an impact on the other organs and the entire body.

The goal of the study is to determine how women may contribute to SWM in Ward-32 of Kathmandu in residential areas to improve the general SW condition in the community. This is predicated on the knowledge that women represent a certain institution in society, whose role has an impact on SWM practices in this town. The municipal government represents the entire community, whereas women individually represent a social structure whose actions could have an impact on how services are delivered in the municipality and vice versa. By offering potential actions aimed at bolstering the current societal structures and organizations that feature women, the study is anticipated to offer solutions to SWM through this theory.

2.2.3   Postmodernism Feminism Theory

Postmodern feminists allow gendered inequalities to be conceptualized as "a constitutive aspect of social relationships based on perceived differences to a consequence of gendered structures," using the analytical category of "gender" as their main tool. Therefore, postmodern feminism emphasizes an understanding of "reality" as situational and acknowledges the position of women in society, institutionally enabling the idea of equality and "justice" as centered on reconstructing gendered systems of power (Tong, 2009). The concept of empowerment is the redressing of gendered inequalities, which shall be described as discriminatory

practices, perceptions, and opportunities for individuals based on their socially constructed gender (Tickner, 1992).

Women's responsibilities have changed to include earning a living, while men's roles have also changed to include "leading" the household. Because of this, "even when [he] is not working, man is still recognized as the head of the household. Women are still subordinate to their husbands as the primary head of the household in the home, and despite their growing involvement, women's issues are still ignored in the political system that is dominated by men. As gendered inequalities are based on the social construction of "reality" on unequal gender hierarchies and power relations, one needs to use a postmodern view of feminism to better understand how to address these structural and institutional gendered inequalities (Parpart, 2003).

Men and women both participate (or do not) in managing household waste, but how they react to waste may be more or less influenced by who they are than by what they do. In particular, women's overall access to and control over resources may be impacted by their subordinate status. Meanwhile, some women have cultural and religious barriers and are unable to leave their homes which is challenging for delivering waste to a local collection. As a result, it's critical to consider women's unique requirements while formulating and implementing regulations to guarantee that they have fair and accessible access to facilities and services (UNDFW, 1998)

2.3   Policy review

2.3.1   *Solid waste management policies in Nepal*

The research shows that policies in Asian developing countries are not comprehensive and well established. Although solid waste management is a major concern of government and public sectors there is a lack of long-term strategy solid management goals. The major constraints are a lack of awareness, technical knowledge, legislation, policies, and long-term strategy (Hwa, 2007) . The SWM-related policies can be interpreted analogously in Nepal. Before the 1980s, MSW posed little of a problem because it was jointly controlled by municipalities and city dwellers, employed 'kuchikars,' or laborers, to gather and dispose of the leftover waste (Pokhrel, 2005). Only after the 1980s did the Kathmandu Valley experience the first signs of the SWM crisis, and then the government began to develop and execute SWM policies to deal with the growing issue. Furthermore, the Solid Waste Management and Resource

Mobilization Center (SWMRMC), supported by the German Technical Cooperation Agency (GTZ), was given the responsibility of managing the valley of Kathmandu's solid waste in 1981 (Pokhrel, 2005).

The important environmental legislation of Nepal is the Environmental Protection Act of 1996 and the Environment Protection Regulations of 1997. They place a strong emphasis on environmental conservation and management by integrating the environmental assessment system, preventing pollution, preserving the natural world, and managing environmental money (Hwa, 2007).

2.3.1.1 Environment Protection Act, 1997

The Environment protection Act mentioned the following term in the gazette:

Section 2 (h): "Wastes" means the liquid, solid, gas, slurry, smoke, dust, radiated element or substance, or similar other materials disposed of in a manner to degrade the environment.

Section 2 (I): "Disposal" means the act of emission, storage, or disposal of sound, heat, or waste (HMGN, 1997)

2.3.1.2 Solid Waste Management and Resource Mobilization Act 1987

To provide waste collection, transportation, storage resource recovery, and disposal services within the three municipal areas of Kathmandu, Lalitpur, and Bhaktapur the Solid Waste Management and Resource Mobilization Center (SWMRMC) was established as the first authorized body under the provisions of the Solid waste Management and Resource Mobilization Act, 1987. Other districts did not have any notable MSWM-related issues; therefore the government did not intervene. The act outlined several terminologies, such as solid waste and disposal sites, and defined the functions and responsibilities of SWMRMC to provide guidelines for properly carrying out SWM services.

Section 1.2.1.8: "Solid Waste means materials which are in a state of disuse, or which have been disposed of or such other materials which are declared as solid waste by the center from time to time"

Section 1.2.1.10: "sites for dumping solid wastes means the place of an area prescribed by the center for throwing, keeping or dumping solid wastes"

Section 1.2.1.9, "harmful solid wastes mean solid wastes which are harmful to health through infectious or contaminative disease or otherwise"

Additionally, it was the function of SWMRMC to formulate and implement these policies and to perform SWM services, such as recycling collected trash into briquettes, compost fertilizer, or bio-gas (SWMTSC, 1987)

2.3.1.3 Solid Waste Management Act, 2011

In Nepal to maintain a clean and healthy environment by minimizing the adverse effects of solid waste on public health and the environment, the Solid Waste Management Act Of 2011 was effective from 15 June 2011 (ADB, 2013). The municipalities are responsible for the construction, operation, and management of infrastructure for the collection, treatment, and final disposal of Municipal solid waste (MSW) (ADB, 2013). The act mandates local bodies to take the necessary steps to promote reduce, reuse, and recycling (3R), including segregation of MSW at the source. In addition, the act authorizes the imposition and collection of service fees against solid waste Management SWM services and prescribes the basis for fixing such fees and procedures for their collection and usage (ABD, 2013). It also authorizes the local bodies to formulate rules, by-laws, and guidelines, with the approval of the municipal board. As provisioned in the act, the SWM Technical Support Center (SWMTSC) under the Ministry of Urban Development shall provide technical support to all local bodies for effective and sustainable SWM and advance research and development in this sector (ADB, 2013).

2.3.2 *Women's Empowerment Policies*

2.3.2.1 Women's Rights of Nepal: Constitution of Nepal 2007 and 2015

In the Nepalese context, equality between men and women in every aspect such as access to resources and property, participation in decision-making levels, and representation in various governmental structures has become a vision since they are constrained by social norms and values (Nepal R. S., 2009). Last few years governments are concerned about empowering women which have improved the condition of women. Women's equality and empowerment have received a lot of attention since the 2006 People's Revolution. On May 30, 2007, the Interim Parliament passed a resolution ensuring 33 percent female representation in all state structures (ibid). Similarly to this, Nepal's interim constitution protected women's

fundamental rights in 2007. Significant women's rights have been highlighted, for example.

There shall be no discrimination because of being women. Every woman shall have the right to reproductive health and reproduction.

No physical, mental, or other kind of act of violence shall be done against any woman.

There shall be equal rights to the parental property for son and daughter

The Constitution of Nepal, 2015 mentioned the following rights of women

Every woman shall have equal lineage right without gender-based discrimination.

Every woman shall have the right to safe motherhood and reproductive health.

No woman shall be subjected to physical, mental, sexual, psychological, or other forms of violence or exploitation on grounds of religion, social, cultural tradition, practice, or on any other grounds. Such an act shall be punishable by law, and the victim shall have the right to obtain compensation following the law.

Women shall have the right to participate in all bodies of the State based on the principle of proportional inclusion.

Women shall have the right to obtain special opportunities in education, health, employment, and social security, based on positive discrimination.

The spouse shall have the equal right to property and family affairs.

2.4 Empirical Review

There have been numerous studies and explorations about the role of women's participation in solid waste management. The majority of studies have been conducted using the following criteria

Mehra's 1996, article, discusses how gender differences and inequalities can affect waste disposal systems and how waste disposal projects can contribute to gender equality. Women's primary responsibility for household tasks like cleaning, food preparation, and family health can lead to different views and priorities related to waste disposal. Women do not always have equal input into the allocation of family finances, and men and women can assign different values to time spent on waste disposal. Women may also face obstacles in participation in community decision-making about waste disposal and employment in sewage systems. The article provides

examples of gender-related findings from studies conducted in different countries to highlight the implications for the design and implementation of waste disposal programs (Mehra, 1996)

Mani Nepal 2022, studies the role of gender in garbage management in underdeveloped nations, including Nepal. The article discusses how gender effects household waste segregation and recycling, waste disposal decisions, and responsibility allocation. According to the study, women separate garbage more regularly and compost biodegradable waste more frequently at home. The article discusses the necessity for gender-sensitive waste management regulations that take into consideration men's and women's differing behaviors. It also highlights the need of raising awareness and providing financial incentives to encourage effective waste management techniques. The paper also discusses how gender conflicts with environmental issues and how environmental dangers disproportionately impact women. Ultimately, the paper examines the waste management issues that municipalities in developing nations face, as well as how they might enhance their garbage collection services. Overall, the paper sheds light on the significance of gender in waste management and the necessity for gender-sensitive policies to enhance waste management practices (Nepal M. a., 2022).

JK Debrah 2021 studies on environmental education and sustainable waste management (SWM) in developing countries. The article finds that there is a lack of environmental education in most developing countries, which is related to a deficiency in teachers' practical experience in sustainable waste management. The article suggests that environmental sustainability education should be integrated into schools at all levels within developing countries to bridge the knowledge gap between the youth and older people in sustainable waste management. The article discusses various studies that highlight the challenges of SWM sustainability in schools, such as the lack of resources, trained teachers' and students' commitment, interest, and sustainability awareness. The article also highlights the importance of practical environmental education to help teachers develop curricula and shape students' attitudes toward sustainability. The article concludes that formal environmental education is necessary for early childhood education to create awareness for efficient

and effective sustainable development, which is essential for behavior change in developing countries. (Debrah, 2021)

The RC Bhattarai 2010 seeks to address the role of community-based NGOs and commercial organizations in municipal solid waste management in Kathmandu Valley. Generally, NGOs and CBOs facilitated community development through awareness creation and campaigns. The local NGOs and CBOs are part of civil society that are aware local community and identify the gap need for new policy and implementation of policy. It is based on secondary data obtained from various sources. According to studies, private institutions, Community-Based Organizations (CBOs), and Non-Governmental Organizations (NGOs) collect around 60% of the entire trash created inside the Kathmandu Valley from generators' doors. These institutions also contribute to a 40% reduction in municipal garbage collection costs. According to the findings of the study, home segregation and compositing are the best options for the effective management of municipal solid waste in developing-country towns such as Kathmandu. The role of NGOs, CBOs, and the private sector has an impactful role to intervene in proper solid waste management (Bhattarai, 2010).

Muller and Scheinberg (1997) observe that community participation in waste management decision-making is gendered. They argue that, despite women's relatively high participation in both private and public settings, males are more likely to have access to organizations that define priorities and make choices about waste management infrastructure. Women's roles and responsibilities for cleanliness extend to the community level, and as a result, women are actively involved in removing and dumping domestic garbage at community collection and disposal sites, as well as maintaining the community area clean, however, all of this is unpaid volunteer work. When waste collecting and dumping jobs becomes commercialized, there is frequently a change, with men taking charge and women being driven out. Women who engage in trash operations as paid laborers are frequently allocated to the lowest rung, are underpaid, and work in dangerous social and human situations; hence, they are considered low-class individuals (Muller, 1997).

2.5 Conceptual Framework

The conceptual framework is the mind map of the study developed by the researcher on basis of a literature review. This mind map helped to develop study variables based on researching issues

Conceptual Framework:

```
┌─────────────────────────────┐          ┌─────────────────────────────┐
│ Research philosophy         │          │ Research Methods            │
│ Ontology: Objective truth   │  ───────▶│ Data: Primary dominant      │
│ Epistemology: Deductive     │          │ secondary                   │
│                             │          │ Techniques:   Household     │
│                             │          │ survey, observations        │
└─────────────────────────────┘          └─────────────────────────────┘
              ⇓                                         ⇓
┌───────────────────────────────────────────────────────────────────────┐
│       Role of women participation in household solid waste Management   │
└───────────────────────────────────────────────────────────────────────┘
                                      ⇓
┌───────────────────────────────────────────────────────────────────────┐
│ Research Objectives                                                     │
│                                                                         │
│ To scrutinize the practice of household solid waste management in       │
│ study area                                                              │
│ To examine the level of awareness of women and their participation in   │
│ household solid waste management                                        │
│ To inspect role of women in solid waste management                      │
└───────────────────────────────────────────────────────────────────────┘
          ⇓                        ⇓                        ⇓
┌──────────────────────┐  ┌──────────────────────┐  ┌──────────────────────┐
│ Household solid waste │  │ Level of Women       │  │ Level of women       │
│ management practices  │  │ participation        │  │ awareness            │
│ Waste generation      │  │ Waste Reduction      │  │  Health hazard       │
│ Waste disposal        │  │ Waste Recycle        │  │ Environment Hazard   │
│ Waste period          │  │ Waste Reuse          │  │ Condition of landfill│
│ Waste collection      │  │ Waste compost        │  │ Climate Change       │
│                       │  │ Roof top gardening   │  │                      │
└──────────────────────┘  └──────────────────────┘  └──────────────────────┘
          ⇓                        ⇓                        ⇓
┌───────────────────────────────────────────────────────────────────────┐
│ **Through women's proper management of household solid waste, there are │
│ environmental benefits, a decrease in health risks and economic         │
│ benefits.**                                                             │
└───────────────────────────────────────────────────────────────────────┘
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Figure 2 Conceptual Framework

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Research philosophy

The researcher beliefs that philosophy is a perspective on the way to collect, analyze, and interpret evidence regarding a topic. In contrast to doxology which refers to what is believed to be true, the term epistemology refers to what is known to be true and includes a range of research methodology theories. So, the process of changing what is believed into what is known—from doxology to epistemology—is the goal of the study (Galliers, 1991). More specifically, this study will apply a quantitative approach even though some qualitative or narrative information also will be triangulated during data interpretations.

Research Paradigm: The research paradigm is a conceptual lens for viewing events under study. It is a fundamental set of beliefs for guiding the researcher's interaction and actions while conducting a field study (Creswel, 2009). There are two types of paradigms applied in social science viz. positivist and non-positivistic. The post-positivist and post-modernist research paradigms will both be used in this study. The post-positivist paradigm is a standard approach to study that uses quantitative techniques to analyze absolute truth or objective reality. This is a deterministic perspective that focuses on experimental data to create numerical measurements of the behavior of participants outside the field. According to this paradigm, respondents are significant to the researcher because they provide data that is used to examine the correlations between various variables (Creswell, 2012)

Research Design: Research design explains the methodology used in the study and helps to construct appropriate methods to address research questions that are established to examine social phenomena (Scotland, 2012). Researchers knew that one of the goals of the quantitative research approach is to investigate objective knowledge. Therefore, based on my research philosophy and paradigm, researchers have been planning to follow a quantitative approach and survey methodology to address research issues. A survey simply means a numerical description of relevant aspects of a study population. It is a method of collecting data in which a specifically defined group of individuals are asked to answer questions (Gupta, C. B.and Gupta, V., 2015). The researcher will apply a trend survey method that will follow a quasi-experimental research design which assumes the conditions of the true experiment in

different settings without controlling and manipulating the studied variables (Sharma, 2007).

3.2 The Field and Rationale

This study selected Kathmandu ward No. 32 as a field of study. It shares borders with Gothatar in the north, Madhyapur Thimi municipality of Bhaktapur District in the east, and Lalitpur metropolitan city in the south. It is bordered by the Manohara River in the east and south and the Bagmati River in the west. Kathmandu ward no. 32 includes urban cities like Koteshwor, teenkune, Palpakot, Gairr Gaun, Narephant Jadibuti and Sinamangal. Almost every residence in the ward has access to electricity when it comes to essential utilities, but the same cannot be true for drinking water. Various pull factors like schools and colleges, job opportunities, and well-facilitated infrastructure cause migration from the country in Kathmandu ward 32. The study areas have mixed communities consisting of both migrants from rural areas and others cities all over the country. Kathmandu Ward No. 32 is highly populated, with various group of age groups, caste groups, and educated and uneducated inhibited. These areas have mixed communities consisting of both migrants from rural areas and others cities all over the country. Further, the areas were inhibited by low- and medium-income earners.

3.3 Sampling Procedures and sample size

As it is not always possible to reach the population of the study, samples are a proportionate subset of the population. A sample is a small representative proportion of the population that will select for observation and analysis of data information (Best, 1994).

In developing countries, the household survey is an important source of data, as well as an important indicator to inform and monitor development policies, which are often derived from such surveys. In developing countries like Nepal, local administration does not have housing information for all of the HHs residing within the municipality. Hence, the Total household population of ward no. 32 is 20792[ii]. The clustered simple random sampling technique used to choose the sample size and population groupings resulted. The sample population is taken from three places in Ward 32: Sahayoginagar, Palpakot, and Sinamangal. The sample distribution was chosen so that it would reflect both the representative sample size and the socioeconomic diversity of

the research population. Also, only female member who is actively involved in rooftop gardening is representative of survey.

Table 1 Population Size, Theoretical Population and Sample Population

Population size	20792 households
Theoretical Population	632
Sample Population	273

Table 2 Sample Population selection

	Sample Frame	Sample size
Sahayoginagar	134	103
Palpakot	86	73
Sinamangal	124	97
Total	344	273

Collecting primary data that is generated with a 95% confidence level and 5% marginal error by using the sample size determination formula (Krejcie, 1970).

Sample size (n) $= \frac{x^2 * N * (1-p)^2}{ME^2(N-1) + (x^2 * P * (1-P))}$

Where,

n = required sample size

x^2 = Chi-square for the specified confidence level at 1 degree of freedom (Value* 3.841 for

5% confidence level with 1 degree of freedom)

N = Population size

ME = Desired Marginal error (expressed as a proportion)

P = Probability of success (0.5 value for unknown population)

Q= (1-P, i.e. 0.5 value for unknown population)

3.4 Data collection Techniques and tools

This study will apply both primary and secondary sources of data. The primary data and information are collected from the structured questionnaire, interview guidelines, and observation checklist as well as personal communication. Likewise, required

secondary data are collected from books, international journals, published and unpublished reports, theses, and seminar papers as well.

Survey questionnaire: A survey is a method of collecting data in which a specifically defined group of individuals are asked to answer several questions. A questionnaire survey is a most commonly used method in every kind of research, especially in researching social issues. They are mused to gain primary information from people or respondents who answer questions about themselves, their knowledge of a particular subject, and their opinion. The questions in the questionnaires will be structured so that each respondent answers in the same way. This enables the research to compare the quantities ways.

3.5 Reliability and validity

Reliability refers to precision and accuracy in measurement during the study. For achieving consistency in measurement, researchers will develop reliable data collection tools such as; questionnaire sheets, interview guidelines, and representative sampling procedures (Cohen L. M., 2007). The researcher will apply an internal consistency measure or Cronbach alpha measurement that provides a coefficient of inter-item correlations that measures the internal consistency among the items. In this attempt, researchers will use the given formula (Cohen L. M., 2007).

Alpha= nrii /1+ (n−1) rii

n=the number of items in the test or survey (e.g. questionnaires)

rii =the average of all the inter-item correlations.

Let us imagine that the number of items in the survey is ten and that the average correlation is 0. 738. Therefore, researchers will use the Cronbach alpha test through pilot testing 6 before collecting data from the field just for confirming the value. When researchers found the alpha value as weaker internal consistency or less than 0.8, then the researcher will revisit the tools. Similarly, validity refers to applying a valid process during the whole research process. Validity can be improved through content, construct, and criterion validity (Cohen L. M., 2007). In this study, researchers will employ both types of validity during the researching process. More so, content validity helps researchers to attempt careful sampling and measure significance tests between variables. Similarly, construct validity helps researchers to triangulate my literature review, field data information, and statistical tools like factor

analysis. And finally, criterion validity helps researchers to use reliable tools for data collection.

Table 3 Reliability and Validity

Reliability Statistics			
Cronbach's Alpha		N of Items	
.970		22	
Correlations			
		Awarness_SWM_Index	Practice_SWM_Scale
Awarness_SWM_Index	Pearson Correlation	1	.701[**]
	Sig. (2-tailed)		.000
	N	273	273
Practice_SWM_Scale	Pearson Correlation	.701[**]	1
	Sig. (2-tailed)	.000	
	N	273	273
**. Correlation is significant at the 0.01 level (2-tailed).			

Table 3 shows Pearson product correlation of variable, Solid waste management practice scale with Awareness of SWM index found to be strongly positive and statistically significant (r =.970 and p<0.05). This shows that there is content validity. It also portrays Cronbach's Alpha is .970 for 22 items, which means the variables are moderately reliable.

3.6 Methods of Data Analyses

Responses to questions in the questionnaires will first be checked for errors and coded. This will involve allocating numerical values to the answers given by respondents for ease of data

entry and analysis. Descriptive data will be summarized into frequencies and histograms. A computer software package SPSS was used for the analysis of the data concerning the relationship between solid waste management and women.

3.7 Ethical consideration

The researcher will adhere to ethical norms in research because norms promote the aims of the research, such as knowledge, truth, and avoidance of error. The ethics framework is essential and focused on observing, the voluntary informed consent of the participants. Participants' informed consent will be obtained through a better introduction of the researcher to respondents/superiors who specified what the research involves, including laid down procedures and explained how their confidentiality was assured. The respondents' names will be withheld to ensure anonymity and confidentiality in terms of any prospects and also informed that data will be shared, including results, ideas, tools, and resources. Respect for intellectual property will be adhered to and no use of unpublished data, methods, or results without permission. Proper acknowledgment or credit for all research contributions will be prioritized to avoid plagiarism.

CHAPTER 4: DATA ANALYSIS AND PRESENTATION

Data Analysis is the process of systematically applying statistical and/or logical techniques to describe and illustrate, condense and recap, and evaluate data. According to Shamoo and Resnik 2009 various analytic procedures "provide a way of drawing inductive inferences from data and distinguishing the signal (the phenomenon of interest) from the statistical fluctuations present in the data" (Shamoo, 2009). While data analysis in qualitative research can include statistical procedures, many times analysis becomes an ongoing iterative process where data is continuously collected and analyzed almost simultaneously. Indeed, researchers generally analyze for patterns in observations throughout the entire data collection phase (Savenye, 2004).

1 Demographic and Socio-economic Information

Table 4 Demographic Characteristics

		Frequency	Percentage
Age	<15	1	.4
	16-25	26	9.5
	26-35	96	35.2
	36-45	99	36.3
	>46	51	18.7
Marital status	Single	45	16.5
	Married	187	68.5
	Divorce	18	6.6
	Widow	23	8.4
Religion	Hindu	221	81
	Buddhist	18	6.6
	Christian	34	12.5
Caste	Brahmin	34	12.5
	chettri	158	57.9
	Janajati	81	29.7
Family system	Joint	122	44.7
	Unitary	151	53.7
	Total	273	100

Source: Field Survey, 2022

Table 4 represents the demographic characteristics of respondents. The respondents are female and are 273 in number. Out of 273 respondents below 15 are 4 percentages; age groups 16-25 are 9.5 percentages; age groups 26-35 are 35.2 percentages; age groups 36-45 are 36.3 percentages and above 46 are 18.7 percentages. The single respondents are 16.5 percentages; married are 68.5 percentages; divorces are 6.6 percentages; Widow is 8.4 percentages. Most of the respondents are Hindu (81) followed by Christian 12.5% and Buddhist 6.6%. There is no presence of Muslim respondents in the study area. Similarly, most of the respondents are Chettri with 57.9%. There are 12.5% of respondents are Bramin, and 29.7% are Janajati. Respondents living in a joint family 44.7% are slightly lesser than those living in a unitary family 53.7%.

Table 5 Education of Respondent

		Frequency	Percent
Education of Respondents	Illiterate	17	6.2
	Primary	84	30.8
	Secondary	76	27.8
	Graduates	96	35.2
	Total	273	100.0

Source: Field Survey, 2022

Table 5 demonstrates that most of the respondents are graduated and the least are illiterate. Women who studied Primary and secondary level is nearly equal. Out of 273 respondents, 6.2 percent are illiterate; 30.8 percent are primary level education; 27.8 percent are secondary level education, and 35.2 percent are graduates.

27

Table 6 Occupations and Annual Family Income

		Frequency	Percent
Occupation of Respondents	Housewife	145	53.1
	Service holder	51	18.7
	Business	26	9.5
	Private job	51	18.7
Annual Family Income	50000-99999	17	6.2
	100000-149999	101	37.0
	150000-199999	86	31.5
	200000-249000	62	22.7
	Above300000	7	2.6
	Total	273	100.0

Source: Field Survey, 2022

When analyzing Table 6, it is found that most of the respondents were housewives with a percentage of 53.1% followed by service holders, private jobs, and businesses with percent 18.7%, 9.5%, and 18.7% respectively. The data are collected mainly in city areas and daytime respondents are mostly housewives. The annual family income of 6.2% of household are 50000-99999, 37 % of household are 10000-149999 and 31% of household are 150000-199999, 22.7% of household are 20000-249000 and 2.6% of household are above 30000.

Table 7 Home ownership and Head of Home

		Frequency	Percent
Home ownership	Own	230	84.2
	Rent	43	15.8
Head of Home	Yes	88	32.2
	No	185	67.8
	Total	273	100.0

***Source**: Field Survey, 2022*

Table 7 exemplifies that the respondents live in their own houses or rented houses, the data shows that 84.3 percentages live in their own houses and only 15.8 percent live

in a rented house. Additionally, the data represents that 32.2 percentage respondents are head of the home and 67.8 percentages are not head of the house.

Table 8 Knowledge and Training on Solid Waste Management

		Frequency	Percent
Knowledge	Yes	272	99.6
	No	1	.4
Training	Yes	77	28.2
	No	196	71.8
	Total	273	100.0

Source*: Field Survey, 2022*

Table 8 indicates respondent have the knowledge and take training about solid waste or not. In response to the data, 99.6 know solid waste management and 0.4 does not know about solid waste management. Only 28.2 percentages had taken training and 71.8 have not taken training about solid waste management.

Table 9 Type of Solid waste produce within Households

		Frequency	**Percentage**
Kitchen waste	Usually	256	93.8
	Often	17	6.2
Paper and cartoon	Usually	81	29.7
	Often	86	31.5
	Sometimes	72	26.4
	Rarely	34	12.5
Plastics	Usually	62	22.7
	Often	160	58.6
	Sometimes	31	11.4
	Rarely	20	7.3
Tins Cans	Usually	17	6.2
	Often	68	24.9
	Sometimes	85	31.1
	Rarely	103	37.7

Type Fiber Bags	Usually	17	6.2
	Often	34	12.5
	Sometimes	103	27.7
	Rarely	119	43.6
Type Glass	Usually	17	6.2
	Often	17	6.2
	Sometimes	102	37.4
	Rarely	137	50.2

Table 9 describes the type of waste collected in the household. Kitchen waste is the most produced waste and glass is the least produced waste in households. According to data 93.8 % produce kitchen waste usually, 22.7 % of households produce plastic waste usually, 58.6% of households often produce plastic waste, 11.4 % of households sometimes produce plastic waste and 7.3% produce rarely produce plastic waste. Likewise, paper and cartoons are produced by 29.7%, 31.5%, 26.4%, and 12.5% usually, often, sometimes, and rarely respectively. In response to data, tins in the household are produced 6.2% usually, 12.5% often 37.7 % sometimes, and 43.6% rarely. Glass in the household is produced 6.2% usually, 6.2 often 37.4 % sometimes, and 50.2 % rarely.

Table 10 Collections and Disposal of Waste at Home

		Frequency	Percent
Container of waste	Cartoon	17	6.2
	Waste Basket	140	51.3
	old bucket	54	19.8
	Tins & Cans	60	22.0
	Plastics bag	2	.7
Place of Disposal	Inside House Premises	170	62.3
	Outside house premises	103	37.7
	Total	273	100.0

Table 10 discloses the type of materials used for waste disposal and the place of waste disposal in households, 6.2% of household disposal waste in the cartoon, 51.3% household disposal waste in the waste basket. 19.8 % of households' waste is in tins and cans and 0.7 % of households' disposal is in plastic bags. 62.3 % of household place waste inside house premises before the municipal take the waste and 37.7% of household place waste outside house premises before the municipal take the waste.

Table 11 Role of Municipality on Waste Management

		Frequency	Percent
Period of waste collection	once a day	34	12.5
	once a week	205	75.1
	once a month	34	12.5
Evaluation of waste Collection	Good	88	32.2
	Neutral	89	32.6
	Bad	95	34.8
	Very Bad	1	.4
Type of Waste Collection	Mixed	257	94.1
	Sorted	16	5.9
	Total	273	100.0

Source: Field Survey, 2022

Table 11 represents the role of the Municipality in waste management. The role of a municipality is to check on the basic period of waste collected and how the waste is collected and evaluate the waste collection method. 75.1 % of respondents stated waste was collected once a week, 12.5% of respondents said waste was collected once a day and 12.2 % of respondents said once a month. According to the respondents, 32.2% think that the waste collection method is good and 32% think that waste collection is neutral. 34.8 % think that the waste collection method is bad and 0.4 % people think the waste collection method is very bad. According to 94.1% of respondents, the government collected waste in mixed methods and 5.9% of respondents stated government collect waste sorted.

Table 12 Effects and challenges of Solid Waste

		Frequency	Percent
Effects	Air pollution	61	22.3
	Diseases	55	20.1
	All of Above	157	57.5
Challenges	Lack of SWM infrastructure	47	17.2
	Lack of knowledge	66	24.2
	Proper of waste collection	139	50.9
	Lack of Capital	21	7.7
	Total	273	100.0

Source: Field Survey, 2022

Table 12 indicates the effects and challenges of solid waste management. Solid waste management produces air pollution and odor in the city. 22.3 % of respondents stated that the method of solid waste management produces air pollution and 20.1 % of respondents stated the methods of solid waste produce diseases and 57.5% of respondents stated that solid waste has produced air pollution and diseases. Most of the respondents stated that proper waste collection method is a problem in the city. About 50.9% of respondents stated that proper waste collection service is a major challenge, 24.2 % stated that lack of knowledge is challenging and 17.2% stated lack of solid waste management infrastructure is a challenge, and 7.7 % listed lack of capital as the challenge.

Table 13 Segregation of Waste

		Frequency	Percent
Separation of Waste	Yes	228	83.5
	No	45	16.5
	Do not have	26	9.5
Reason for No Separation	Municipal	170	62.3
	No space for	26	9.5
	Time-	51	18.7
	Sell	106	38.8
	Own reuse	154	56.4
Recycle Process	Give to needy	8	2.9
	others	5	1.8
	Total	273	100.0

Source: Field Survey, 2022

Table 13 indicates if the respondents segregated the waste or not. 83.5% of households segregated the waste and 16.5% does not segregate the waste. The reason

for not separation the waste are mainly municipal are does not collected the waste separately. Accordingly, the 62.3% respondents listed that main reason for not separation of waste is municipal does not collected waste separately and 9.5 % respondents stated that there is no space for separate the waste and 18.7 % stated, it is time consuming to separate the waste. The respondents are asked about their recycle process about 56.4% respondents use recycle waste for different purpose 38.8% sell the waste and 2.9 % give to the needy people and 5% recycle waste for different purpose.

Table 14 Composting Organic Solid waste

		Frequency	Percent
Composting Organic waste	Yes	162	59.3
	No	111	40.7
Method of Composting	In a pit	64	23.4
	In an old bucket	98	35.9

Source: Field Survey, 2022

The Table 14 indicates if the organic solid wastes are made compost or not. About 59.3% household make the compost and 40.7% does not make the compost from organic solid waste. The household those who make the compost in a pit are 23.4% in total respondents and 35.9% make the compost in an old bucket in total respondents.

Table 15 Rooftop Gardening and Its Type

		Frequency	Percent
Rooftop Gardening	Yes	162	59.3
	No	111	40.7
Type of Gardening	Terrace gardening	64	23.4
	Sack and bucket gardening	81	29.7
	Small Kitchen Gardening	17	6.2

Source: Field Survey, 2022

The Table 15, the 59.3 respondents have rooftop gardening and 40.7% does not have rooftop gardening. Those who have rooftop gardening they have different type of

gardening, 23.4% in total respondents have terrace gardening, 29.7 in total respondents have sack and bucket gardening and 6.2% in total respondents have small kitchen gardening.

Table 16 Economic Benefit of Solid Waste Management

		Frequency	Percent
Income	Less than999	23	8.4
	1000-2999	55	20.1
	3000-4999	29	10.6
	5000-6999	23	8.4
	Total	130	47.6
Economic Benefit	Yes	145	53.1
	No	34	12.5
	Total	179	

Out of the 273, total respondents only 179 people respondents either there are benefitted from proper solid waste management. 53.6 % of respondents indicated that they benefitted from solid waste management and 12.5% in total are not economically benefitted from solid waste management. The respondents are asked whether they can get income from solid waste management or not. Among 273 respondents, 130 about 47.6% can gain income from solid waste management.8.4% of respondents gain less than 999 yearly, 20.1% of respondents gain 1000-2999, 10.6 % gain 3000-4999 and 8.4 % gain 5000-6999 in the total respondents.

Table 17 Descriptive Table on Awareness of Solid Waste Management

Awareness	N	x̄	Range	Min.	Max.	Skewness
Household solid waste management	273	1.45	2	1	3	.273
Rule and Regulation	273	1.64	2	1	3	.318
Composting of Solid Waste	273	1.59	2	1	3	.293
Impact of SW on the Environment	273	1.37	1	1	2	.542
Impact of Solid Waste on Health	273	1.37	2	1	3	.686
Impact of SW on Economics	273	1.43	2	1	3	1.217
Effect of Burning Waste	273	1.49	2	1	3	.850
Municipal Disposal	273	1.83	3	1	4	.687
3R Techniques of SWM	273	1.56	2	1	3	.633
The situation of the Landfill Site	273	1.83	2	1	3	.292

Table 17 indicates the Likert scale table of awareness levels among women in solid waste management. The mean of each variable is nearly equal to 1-2 which means respondents were aware of solid waste management. Most respondents are aware of the impact of solid waste on health and the environment. Respectively, respondents are aware of household solid waste management; rules and regulations of SWM; Composting of solid waste can reduce SWM; the Impact on the environment, health, and economics; burning waste can have a negative impact; 3R techniques of SWM; and situation of a landfill site.

Table 18 Descriptive Tables on the Role of Women in Solid Waste Management

Awareness	N	x̄	Range	Min.	Max.	Skewness
Proper SWM is Important	273	1.59	2	1	3	.293
Household SWM is Female Responsibility	273	1.58	2	1	3	.266
Use of Reusable items Reduced SW	273	1.53	2	1	3	.506
Segregation is better Way for SWM	273	1.64	2	1	3	.495
Need to Produce Less Garbage	273	1.65	2	1	3	.489
Old Clothes Recycling helps Reduce SW	273	1.86	3	1	4	1.86
Composting Reduce SW	273	1.74	3	1	4	1.21
SW is Useful in Rooftop Gardening	273	1.75	3	1	4	1.36
Rooftop Gardening has economic and health benefits	273	1.68	3	1	4	1.148
My way of handling SW can reduce landfill	273	1.58	2	1	3	.266

Source: Field Survey, 2022

Table 18 reveals the Likert scale table of the role of women in household waste management in the ten different variables. The mean of variables lies nearly equally

to 1-2 which means respondents somehow agree with the statements of the variable. The respondents strongly agree and agree with the statements. The respondents believe that proper SWM is important; Household Solid waste management is the responsibility of the female. Respondents agree that the reuse of waste can reduce solid waste. The respondent thinks segregation, composting, and recycling are the best method for Solid waste management. According to respondents, Composting solid waste and using it on the rooftop are economic and health benefits. The respondents also agree with the statement that their way of handling SW can reduce landfill.

Chi-Square test

The problem: To identify the association between the Family system and Composting organic solid waste management.

Hypothesis:

Null Hypothesis (H$_0$): There is no significant association between the Family system and Composting organic solid waste management.

Alternative Hypothesis (H$_1$): There is a significant association between the Family system and Composting organic solid waste management.

Table 19 Chi-Square of the Family System and Composting Organic solid waste Cross Tabulation

			Composting organic Solid waste		Total
			Yes	No	
Family system	Nuclear	Count	102	49	151
		Expected Count	89.6	61.4	151.0
	Joint	Count	60	62	122
		Expected Count	72.4	49.6	122.0
		Count	162	111	273
		Expected Count	162.0	111.0	273.0

Source: Field survey, 2022

Table 20 Chi-Square Value of the family system and composting organic solid waste

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9.437[a]	1	.002
Continuity Correction[b]	8.691	1	.003
33Likelihood Ratio	9.454	1	.002
Fisher's Exact Test			
Linear-by-Linear Association	9.40	1	.002
N of Valid Cases	273		

0 cells (0.00%) have an expected count of less than 5. The minimum expected count is 49.60.

Computed only for a 2*2 table

Source: Field survey, 2022

Tables 19 and 20 show that Chi-Square tests of 2*2 categorical variable. This table shows no cell has an expected count of less than 5. So it meets the requirement for Chi-Square tests. The significance value is less than 0.05, which means the relationship between these variables have statically significant and Pearson Chi-Square (9.437) is greater than a critical value, so there found an association between the two variables. Hence null hypothesis (H_0) is rejected and the alternative hypothesis (H_1) is supported.

ANOVA Test

Table 21 Two-Way ANOVA of Caste, Family Type, and Separation of Solid Waste in Household

Variable	Brahmin		Chhetri		Janajati		Two Way ANOVA		
	$\bar{x}$	σ	$\bar{x}$	σ	$\bar{x}$	σ	Effect	F	Sig.
Separation of SW in household									
Nuclear	1.4706	0.5145	1.0917	.2900	1.00	0	Family	5.030	0.026
Joint	1.5882	0.5073	1.1633	0.37344	1.16	0.37059	Caste	21.875	0.000
							Family*caste	.391	0.677

a. R Squared = .057 (Adjusted R Squared = .141

b. The error term is Mean Square (Error) = 7.777

Source: Field survey, 2022

The two ways ANOVA compares the mean differences between groups that have been split into two independent variables. The primary purpose of a two-way ANOVA is to understand if there is an interaction between the two independent variables on the dependent variable. In Table 21, two-way ANOVA is calculated between two categorical independent variables family type and caste on the dependent variable business start time. Variance is homogeneous and normally distributed dependent variable of each group combination of the groups of the two independent variables.

Table 21 shows the mean, standard deviations, and F ratio for the separation of SW in the household. Results indicated a significant mean difference in separation of SW in a household in caste with F= .21.875 MSE=7.777, p=0.000, on family type with F=5.030, MSE=7.777, p=0.026 and on family*caste with F=.391, MSE=7.777, p=0.677. The finding revealed that the joint family of Brahmin (M=1.5662, SD=0.50730) exhibited a higher mean in comparison to others and the nuclear family of Brahmin (M=1.4706, SD=0.507) exhibited a lower mean in comparison with other groups. A two-way ANOVA was conducted that examined the effect of family type and caste on the separation of SW in the household. There was a statistically significant interaction between the effects of family type and caste on the separation of SW in a household.

Multiple regression model of Awareness of SWM index

Table 22 Model Summaries and ANOVA Test

	SS	Df	Mean Square	F	Sig	R=.900[a]
						R Square=.809
Regression	5626.741	15	375.116	72.488	.000[b]	**Adjusted R Square=.798**
Residual	1324.7734	256	5.175			
Total	6951.515	271				**Std. Error of the Estimate=2.27484**
						Durbin Watson=1.553

This ANOVA table 22 of Dependent Variable: Awareness of SWM index shows that the group of independent variables has a statistically significant relationship with the dependent variable Age, Marital status, Religion, Caste, Family system, Education level, Family occupation, annual family income, rental, and own housing, head of a family, knowledge of households training of household Training of SWM, type of kitchen waste. Awareness of the SWM index as the significance value is .000 which is less than 0.05.

The multiple correlation coefficient between the independent variables and the dependent variable Awareness of SWM index, r = 0.900, shows there is a positive correlation between the variables. The R^2 = 0.809 shows that 80.9% of the movement in the dependent variable can be explained by the independent variables and the rest 19.1%% remains unexplained. The adjusted R= 0.789 gives the idea of how well the model generalizes. The difference between the R and adjusted R is .0.900-0.809= 0.091; it means if the model was derived from the population rather than a sample, it would account for approximately 9.1% less variance in the outcome.

Table 23 Coefficients for Awareness of SWM Index

Coefficients ᵃ					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-1.966	3.730		-.527	.599
Age	.063	.435	.011	.146	.884
Marital Status	1.885	.379	.279	4.971	.000
Religion	.687	.357	.093	1.927	.055
Caste Group	-1.442	.292	-.179	-4.946	.000
family system	-1.629	.620	-.160	-2.626	.009
male	.442	.234	.081	1.888	.060
Female	2.439	.287	.540	8.502	.000
Education level	-5.572	.298	-1.049	-18.697	.000
Family Occupation	3.366	.268	.781	12.564	.000
Annual Family Income	-.330	.188	-.062	-1.751	.081
Rent or House	7.409	1.264	.530	5.861	.000
Head of Family	1.706	.614	.157	2.780	.006
Knowledge Of Household	2.798	2.743	.033	1.020	.309
Training of SWM	.418	.857	.037	.488	.626
Type Kitchen waste	3.897	1.236	.187	3.154	.002

Source*: Field survey, 2022*

Table 23 shows the causal effect of Age, Marital status, Religion, Caste, Family system, Education level, Family occupation, annual family income, rental and own housing, head of the family, knowledge of households training of household Training of SWM, type of kitchen on Awareness of SWM index. This table also displayed the unstandardized (B) and standardized (Beta) regression coefficients, and the value of statistic and its associated p-value for Dependent Variable: Awareness of SWM index.

Histogram of Awareness of SWM index
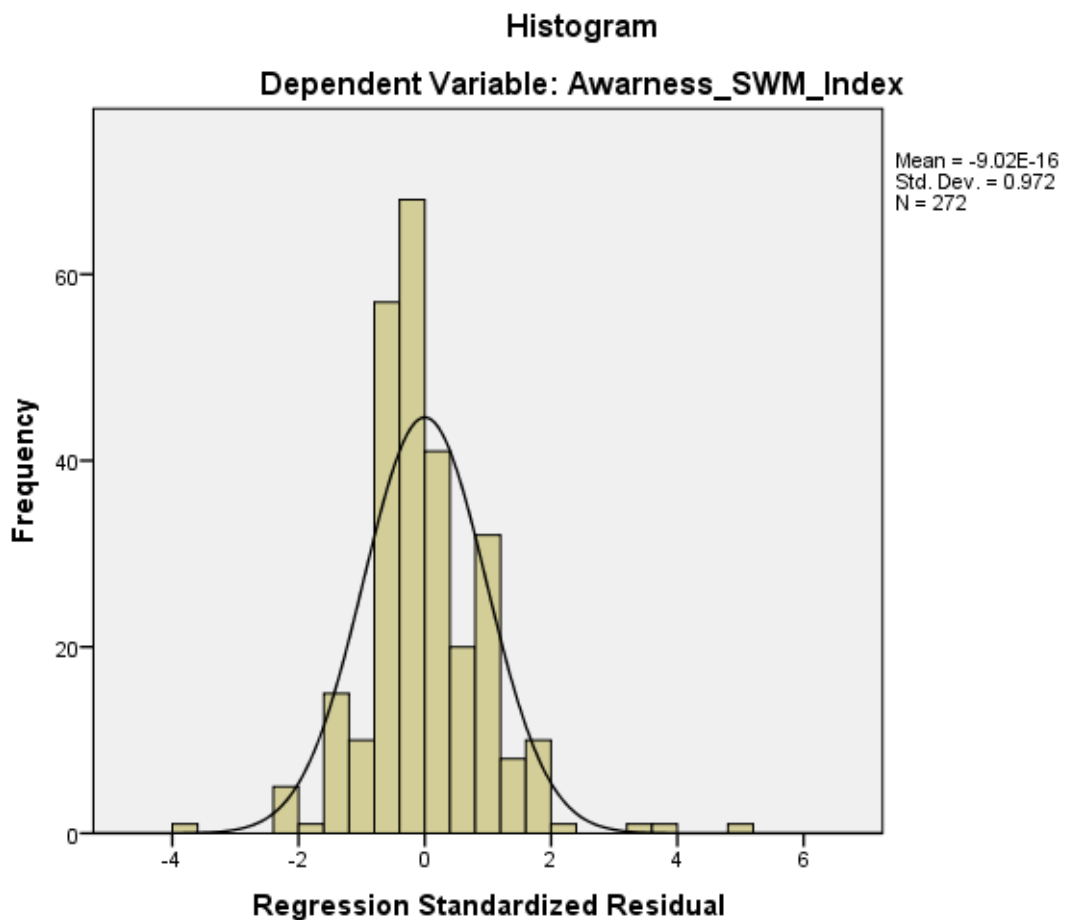
Figure 3 Histogram of Awareness of SWM Index

The x-axis displays the values of regression standardized residual and the y-axis shows the frequency of each value. The histogram represents the awareness SWM index whose mean is -9.02 and the standard deviation is 0.92. The regression standardization residual value in a histogram is bell shape. A histogram is bell-shaped if it resembles a "bell" curve and has one single peak in the middle of the distribution.

40

The most common real-life example of this type of distribution is the normal distribution.

Normal P-P plot of Regression Standardized Residual of Awareness of SWM index

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: Awarness_SWM_Index
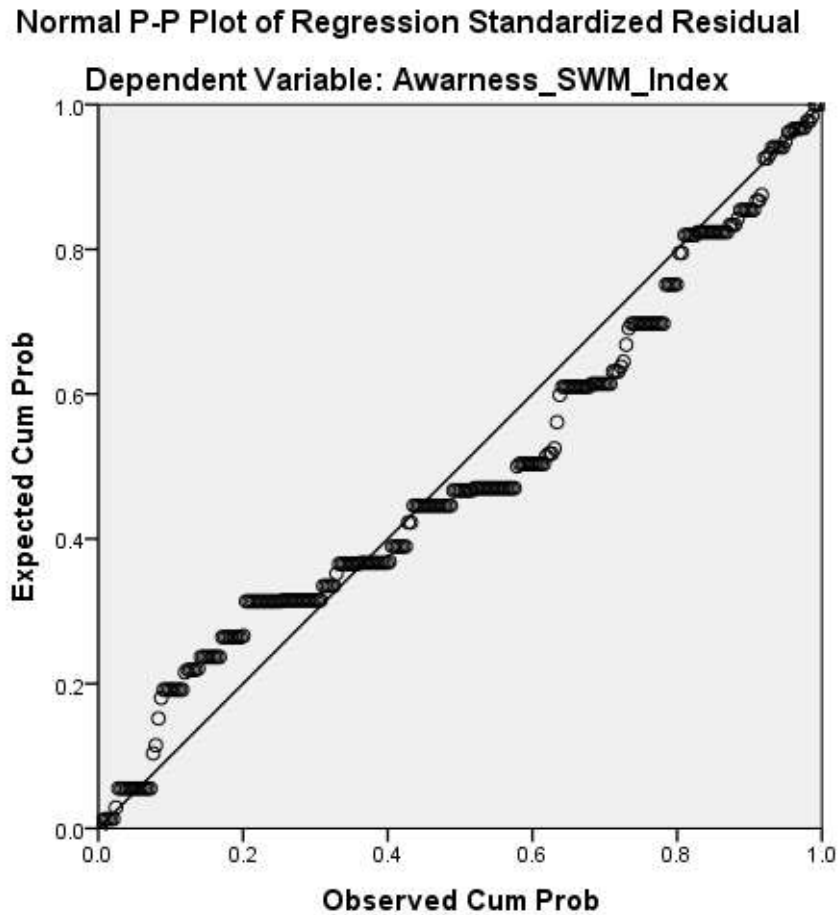
Figure 4 Normal P-P plot of Regression Standardized Residual of Awareness of SWM Index.

The normal probability plot, a percentile-percentile plot (P-P plot), or the cumulative probability plots of residuals (P-P plot) of the standardized data versus the standard normal distribution are all visual tools for evaluating normality. The P-P plot's points for normal data should roughly fall on a straight line, suggesting a high positive correlation (Tharu, 2019) Figure 5 shows that the scatters of the residuals fall straightly on the normal distribution line, indicating a normal distribution of residual. The above graph shows that there is no huge deviation of residuals from the normal

line Also, it can be seen that the data set is going through the origin. So, it indicates that the residuals are approximately normally distributed. Hence, it may conclude that the observed data is normally distributed.

Table 24 Model Summary and ANOVA Test of SWM Practice Scale

	SS	Df	Mean Square	F	Sig	R=.925[a]
						R Square=.856
Regression	12692.985	15	846.199	101.800	.000[b]	**Adjusted R Square=.846**
Residual	2127.986	256	8.312			**Std. Error of the Estimate=2.88311Durbin Watson=1.575**
Total	14820.941	271				

Source: Field survey, 2022

Table 24 depicts the multiple correlation coefficient between the independent variables and the dependent variable, Practice of SWM scale r = 0.925, which shows there is a positive correlation between the variables. The R^2= 0.856 shows that 85%% of the movement in the dependent variable can be explained by the independent variables and the rest 15% remains unexplained. The adjusted R= 0.846 gives the idea of how well the model generalizes. The difference between the R^2 and adjusted R is 0.856-0.846= 0.001; it means if the model was derived from the population rather than a sample it would account for approximately 1% less variance in the outcome.

This ANOVA table of Dependent Variable: Practice of SWM scale shows that the group of independent variables has a statistically significant relationship with the dependent variable Heritage management index as the significance value is .000 which is less than 0.05.

Table 25 Coefficients for Practice of SWM Scale

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-27.057	4.727		-5.723	.000
Age Group	-.129	.551	-.016	-.235	.814
Marital Status	5.648	.481	.573	11.753	.000
Religion	.346	.452	.032	.765	.445
Caste Group	-1.976	.370	-.168	-5.346	.000
family system	4.417	.786	.297	5.618	.000
male 5.1	-2.203	.297	-.277	-7.424	.000
Female 5.2	4.056	.364	.615	11.155	.000
Education level	-4.441	.378	-.572	-11.759	.000
Family Occupation	4.375	.339	.695	12.888	.000
Annual Family Income	.416	.239	.053	1.740	.083
Rent or House	19.506	1.602	.955	12.175	.000
Head of Family	3.292	.778	.208	4.233	.000
Knowledge Of Household	-4.257	3.476	-.035	-1.225	.222
Training of SWM	.336	1.086	.020	.309	.757
Type Kitchen waste	2.938	1.566	.096	1.876	.062

*p < .05, **p < .01

a. Dependent Variable: Practice SWM Scale

Source: Field survey, 2022

Table 25 displayed the unstandardized (B) and standardized (Beta) regression coefficients, the value of the statistic, and its associated p-value for each variable entered in the model. The table shows the causal effect of Age, Marital status, Religion, Caste, Family system, Education level, Family occupation, annual family income, rental and own housing, head of the family, knowledge of households training of household Training of SWM, type of kitchen on Practice of SWM scale. It indicates that using one variable and holding others constant. This table shows it also

tests whether the unstandardized (or standardized) coefficients are equal to 0 (zero) in the population. If $p < .05$, it can be concluded that the coefficients are statistically significant.

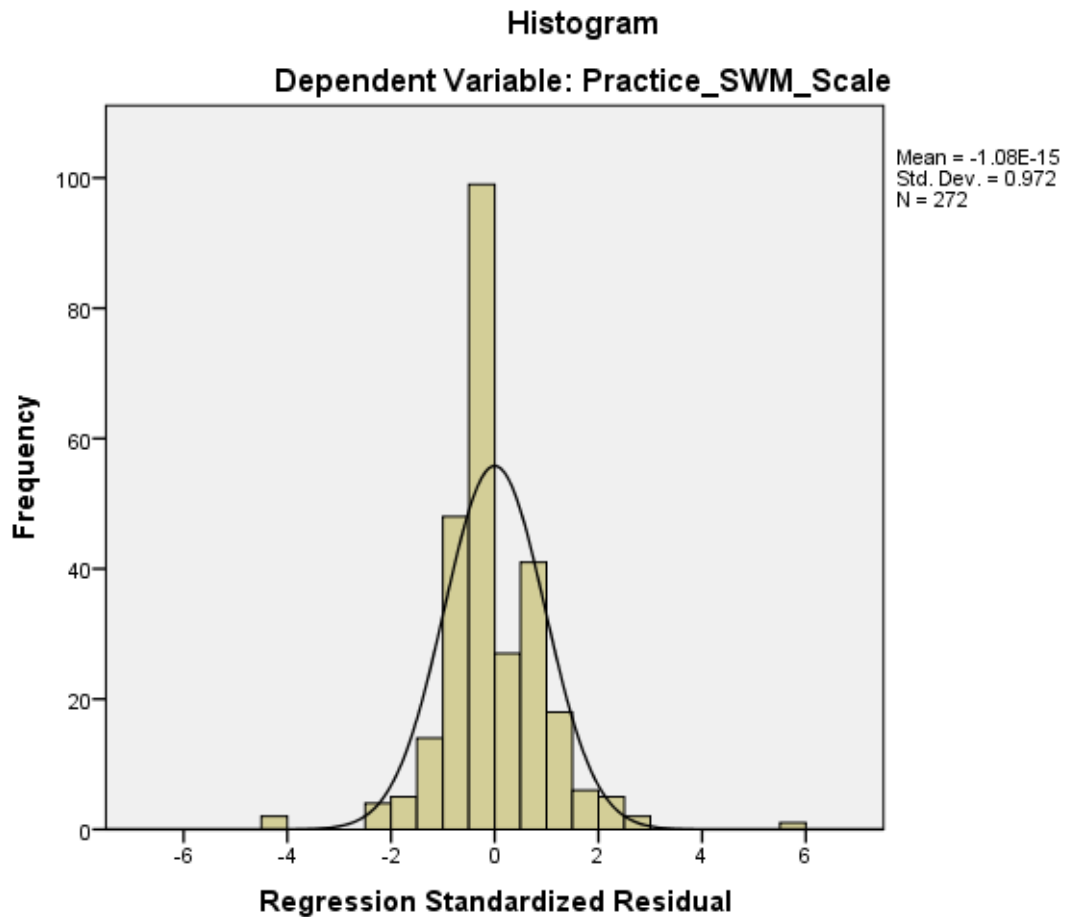*Histogram of Dependent Variable on Practice of SWM Scale*

Histogram
Dependent Variable: Practice_SWM_Scale

Mean = -1.08E-15
Std. Dev. = 0.972
N = 272

Figure 5 *Histogram of Dependent Variable on Practice of SWM Scale*

The x-axis displays the values of regression standardized residual and the y-axis shows the frequency of each value. The histogram represents the practice of the SWM scale whose mean is -9 -1.08E¨-15 and the standard deviation is 0.972. The regression standardization residual value in a histogram is bell shape. A histogram is bell-shaped if it resembles a "bell" curve and has one single peak in the middle of the distribution. The most common real-life example of this type of distribution is the normal distribution

Normal P- P Plot of Regression Standardized Residual of Practice of SWM Scale
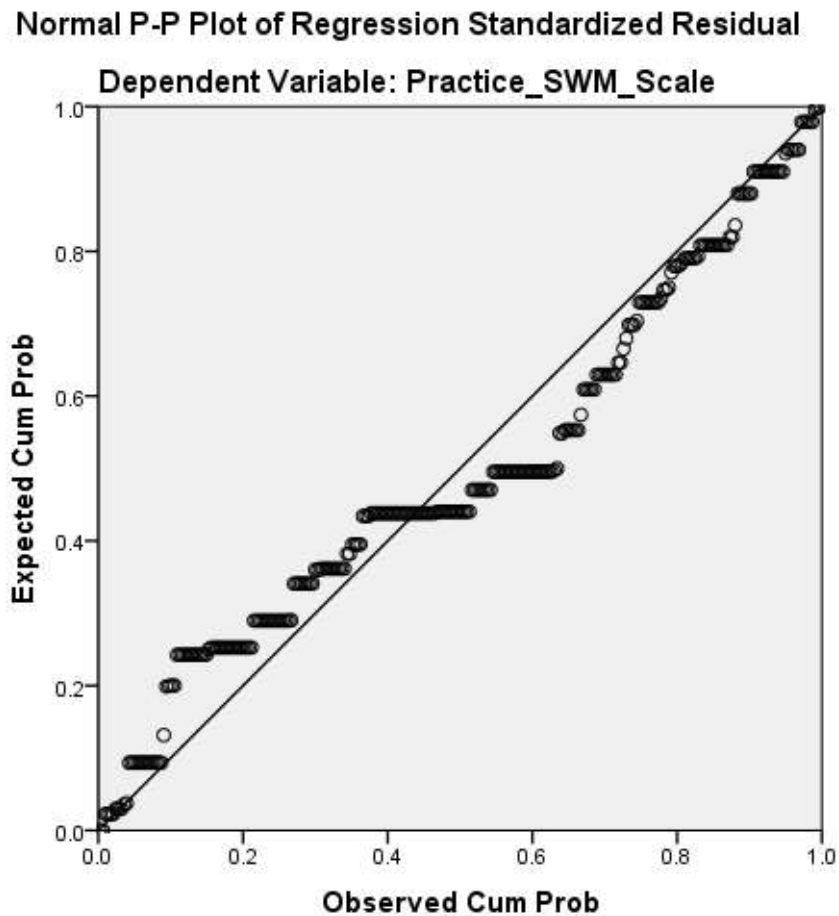
Figure 6 Normal P- P Plot of Regression Standardized Residual of Practice of SWM scale.

Figure 6 shows that the scatters of the residuals fall straightly on the normal distribution line, indicating a normal distribution of residuals. The above graph shows that there is no huge deviation of residuals from the normal line Also, it can be seen that the data set is going through the origin. So, it indicates that the residuals are approximately normally distributed. Hence, it may conclude that the observed data is normally distributed.

CHAPTER 5: SUMMARY OF FINDINGS, DISCUSSION OF FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Summary of Findings

Demographic and Socio-economic Information

- 273 respondents are female and 221 (81%) respondents are Hindu.

- Out of the total 273 respondents, 158 (57.9%) were Chhetri and more than fifty percent (55.73) lived in the nuclear family.

- The primary respondents are found to be married 187 (68.5%). and almost 96 respondents (35.2) of the total respondents are graduates.

- The average age of respondents was 26-35 and 36-45 with respondents number 96(35.2%) and 99 (36.3%).

- Most of the respondents 145 (53.1%) were housewives and most of the respondents 101(37%) family incomes were 100000-149999.

- More of the respondents live in their own house i.e. 230 (84%) and most of the respondents 185(67.8) are not head of the family.

The practice of Solid Waste and Management in household

272 (99.6%) knew solid waste management and 196(71.8%) did not have training of the SWM.

Households 256(93.6%) produce usually produced kitchen waste and plastics are produced often by 160 households paper and cartoons were produced usually and often and tins, cans fiber bags, and glass are produced rarely.

140 of the respondents use the waste basket for waste collection and 170 respondents place the SW inside house premises before the municipal takes it.

Municipality collected the waste once a week according to 205 (75.1%) respondents and 95 (34.8%) respondents who evaluated the waste collection as bad.

According to the 257 (94.1%) respondents, municipal collected the waste mixed.

Most of the respondents 157 (57.5) listed that SWM in their community caused air pollution and diseases. 139 (50.9%) of respondents listed that the challenges for SWM in the community were proper waste collection services.

Most of the respondents 228(83.5%) stated that they segregated the waste into sources. The reason for no separation of SWM was municipal does not take waste

separately and most of the respondents 154 (56.4%) use the recycled SW and used it for their reuse.

162 (59.3%) of the respondents compost organic waste and about 98(35.9%) of the respondents compost in an old bucket.

About 162 (59.3%) respondents were engaged in rooftop gardening and Among 162 respondents 64 respondents were engaged in terrace gardening, 81 respondents were engaged in sack and bucket gardening and 17 respondents are involved in small kitchen gardening.

About 145 (53.1%) respondents economically benefited from the proper Solid waste management and only 130 respondents received benefits in monetary value whereas 55 (20.1%) total respondents earned Rs1000-2999.

Awareness of solid waste management

The highest mean value in awareness of SWM is 1.83 and the lowest is 1.37. The value indicates that respondents are aware of solid waste management.

Role of Women in Solid waste management

Although women play a significant role in solid waste management, their role is not recognized by the patriarchal society. The highest mean value is 1.86, which means that respondents strongly agree with the statement.

5.2 Discussion of Findings

The issue of solid waste management is a critical environmental problem that affects both developed and developing countries. In many parts of the world, including Kathmandu ward-32, Nepal, women are often responsible for managing household waste. Therefore, this thesis explores the role of women in household solid waste management in Kathmandu ward-32 from three perspectives: the practice of solid waste management, the awareness level of women in solid waste management, and the role of women in solid waste management.

The practice of solid waste management in Kathmandu is an essential aspect of the study. Kathmandu has a rapidly increasing population, which results in a corresponding increase in solid waste production. Women in Kathmandu are the primary caretakers of the household, and they are responsible for managing waste generated within their homes. They segregate and store the waste until it is collected

by the municipality. However, the practice of solid waste management in Kathmandu is far from ideal. Many households do not have access to proper waste storage systems, or proper waste collection services, leading to improper waste disposal, which ultimately harms the environment and leads to the spreading of diseases. However, the household that practices rooftop gardening is likely to practice biodegradable SWM segregation and composting and recycle and reuse old buckets, bottles, and sacks. Municipal does not facilitate collecting the segregated, so the household women are unwilling to segregate waste at source. Generally, households mixed the waste which increases landfills and causes environmental degradation. The Municipal of Kathmandu metropolitan city has tried to implement a policy to segregate waste in the household but the practice seems to be minimal. Although household women know the SWM, they have no access to training facilities for compositing rooftop gardening and 3R. In some households, the women practice rooftop gardening and can gain monetary value through SW. Therefore, it is crucial to identify the challenges that women face in managing household solid waste and the measures that need to be taken to improve solid waste management in Kathmandu.

Solid waste management awareness is critical in ensuring that women take an active role in managing household waste. It is vital to understand the knowledge and attitudes of women towards waste management, their understanding of the environmental, health, and economic impact of improper waste disposal, and the measures that they take to reduce waste. The studies explored the level of awareness of women in Kathmandu regarding waste management and identify the factors that contribute to their level of awareness. Studies have shown that women have good awareness and knowledge of waste management in Kathmandu, but are ignorant of proper solid waste management which affects their ability to manage waste effectively. Household women are aware of the rule and regulations, composting and municipal disposal, and 3R Techniques of SWM but are little unaware of the situation of the landfill site. Improving the awareness level of women can be done through various initiatives, such as training and awareness campaigns.

The role of women in solid waste management is perhaps the most important aspect. Women play a critical role in managing household waste in Kathmandu. They are the primary caregivers in households and are responsible for managing household waste.

However, their role in waste management is often overlooked and undervalued. The formal recognition of women's role in waste management can be improved by integrating them into waste management programs and decision-making processes. Women play a significant role in creating awareness among family members, segregating waste, and promoting sustainable waste management practices. They are not given adequate support in managing household waste.

In short, the role of women in household solid waste management in ward-32 Kathmandu is a critical issue that needs to be addressed. The study of the practice of solid waste management, the awareness level of women in solid waste management, and the role of women in solid waste management are crucial in identifying the challenges faced by women and promoting their active participation in sustainable waste management practices. The study provided valuable insights into the role of women in managing household waste and help policymakers and relevant stakeholders in developing effective strategies to promote sustainable waste management practices in Kathmandu.

5.4 Conclusion

In conclusion, the role of women in household solid waste management in Kathmandu Metropolitan city ward- 32 is crucial for promoting sustainable waste management practices and addressing the city's solid waste management issues. The study has shown that the current solid waste management system in Kathmandu is inefficient and lacks proper infrastructure, leading to adverse effects on human health, the environment, and the economy of the country.

The study has also highlighted that women in Kathmandu ward-32 have a good understanding of the importance of solid waste management and are willing to contribute to it. However, their knowledge is limited to the basic concepts of waste segregation, rooftop gardening, and 3R and they lack knowledge about the proper disposal of hazardous waste.

Women have a significant role to play in solid waste management by promoting sustainable practices in their households and communities. Women's involvement in waste management can lead to positive social and economic outcomes, such as improved health, increased income, and reduced environmental degradation. To

enhance women's participation in household solid waste management in ward-32, Kathmandu, there is a need for targeted programs to increase their awareness and involvement in waste management activities. These programs can have a significant impact on the overall waste management system in the city, leading to better health and environmental outcomes.

In conclusion, women's participation in household solid waste management is essential for promoting sustainable waste management practices

5.5 Recommendations

Based on the findings and the conclusions of the study, the following recommendations were drawn so that they can be put into consideration for the enhancement of better domestic solid waste management practices within households.

- Awareness programs: There is a need for targeted awareness programs to increase women's knowledge about proper waste management practices, including waste segregation, proper disposal of hazardous waste, and the impact of solid waste on human health and the environment. These programs can be organized in collaboration with local NGOs, community-based organizations, and the government.

- Capacity building: Women need to be trained and capacitated to actively participate in household solid waste management. They can be trained in composting, recycling, waste reduction, and rooftop gardening techniques. The training can be provided by the involvement of local government, NGOs, and CBOs.

- Infrastructure development: The government needs to invest in proper infrastructure and facilities for solid waste management, including waste collection and disposal sites. The informal waste collectors need to be regulated, and proper waste disposal sites need to be identified and developed.

- Women's empowerment: Women's empowerment should be a key focus in waste management programs. Women should be involved in decision-making processes related to waste management and should be provided with opportunities to participate in waste management committees.

- Behavior change communication: Behavior change communication campaigns can be organized to encourage households to adopt sustainable waste

management practices. These campaigns can be conducted through various channels, including mass media, social media, and community-based outreach programs.

Overall, these recommendations can help enhance the role of women in household solid waste management in Kathmandu ward- 32 and promote sustainable waste management practices in the urban area.

REFERENCES

ADB. (2013). *Solid waste management in Nepal:Current Status and Policy recommendations.* Mandaluyong City, Philippines: Asian development Bank.

Best, J. W. (1994). *Research in Education.* New Delhi: Prentice Hall of India.

Bhattarai, R. (2010, Dec). Role of NGOs, CBOs and Private Organizations for Efficient Management of Municipal Solid waste in Kathamandu Valley. *Tribhuvan University Journal, XXVII.*

Chung, S. S. (2008). Local waste management constraints and waste administrators in China. *28*, 272--281.

Cohen, L. M. (2007). *Research method in education .* London: Taylor & Francis Group.

Cohen, S. A., Martinez, H., & Schroder, A. (2015). *Waste Management Practices in New York City, Hong Kong and Beijing.*

Creswel, J. W. (2009). *Research design: Qualitative, quantitative, and mixed methods approaches* (Third edition ed.). University of Nebraska-Lincoln: SAGE Publications Ltd.

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (Fourth edition ed.). USA: Pearson Education Inc.

Debrah, J. K. (2021). Raising Awareness on Solid Waste Management through Formal Education for Sustainability: A Developing Countries Evidence Review. *Recycling, 6*, 6.

Dhokhikah, Y., and Trihadiningrum, Y. (2012, july). Solid waste management in Asian developing countries: Challenges and opportunities. *Journal of Applied Environmental and Biological Science, 2*, 329/335.

Fagarib, C. a. (2017, 12 05). Assessment of Impediments and Factors Affecting Waste Management: A Case of Accra Metroplis. *10.15413/ajes.2016.0125*.

Galliers, R. D. (1991). Choosing Appropriate Information Systems Research Approaches: a revised taxonomy in Information Systems Research: Contemporary Approaches and Emerging Traditions.

Guerrero, L. A. (2013). Solid waste management challenges for cities in developing countries. *Waste management, 33*, 220-232.

Guettero, L. M. (2013). Solid waste management challenges for cities in developing counitries. *Waste Management, 33(1)*, 220-232.

Gupta, C. B.and Gupta, V. (2015). *An Introduction to Statistical Methods* (23rd ed.). Delhi: Vikas Publishing House.

HMGN, H. M. (1997). *Environment Protection Act: Act No. 24 of the Year 2053 (1997).* Kathmandu: Ministry of Information and Communications.

Hwa, J. T. (2007). *Overview of solid-waste management in Asian countries. In Solid waste management: Issues and challenges in Asia.* Tokyo: Asian Productivity Organization. .

IPCC. (2007). Climate Change 2007: Impacts, adaptation, and vulnerability. (O. C. ML Parry, Ed.) . *In Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*.

Jin, J. a. (2006). Solid waste management in Macao: practices and challenges. *Waste management, 26*, 1045-1051.

Kabeer, N. (1994). *Reversed Realities: Gender Hierarchies in Development Thought* . London, New York: Verso.

Kaza, S., Shrikanth, S., & Chaudhary, S. (2021). *More Growth, Less Garbage.* Washington, DC: World Bank Publications.

Krejcie, R. V. (1970). Determining sample size for research activities. Educational and Psychological Measurement. *30*, 607-610.

Maharjan, M. K., & Lohani, S. P. (2020). Municipal Solid Waste Management in Nepal: Opportunities and Challenges. *Journal of the Institute of Engineering, 15*(3).

Marello, Marta & Helwege, Ann. (2014). Solid Waste Management and Social Inclusion of Wastepickers: Opportunities and Challenges. *Latin American Perspectives, 45*(1), 108-129.

McAllister, J. (2015). *Factors Influencing Solid-Waste in the Developing World.*

Mehra, R. N. (1996). Women in Waste Collection and Recycling in Hochiminh City. *Population and Environment,*, 187-199.

Memon, M. A. (2010). Integrated solid waste management based on the 3R approach. *Journal of Material Cycles and Waste Management, 12*, 30-40.

Moghadam, M. A. (2009). Municipal solid waste management in Rasht City, Iran. *Waste Management, 29*(1), 485-489.

Muller, M. a. (1997). Gender and Urban Waste Management.

Nepal, M. a. (2022). *Household Waste Management and the Role of Gender in Nepal.* Taylor \& Francis.

Nepal, R. S. (2009). *Women's Political Participation: Survey Report and Strategic Action Plan.* Bhakatapur: Renaissance Society Nepal,Women's Democratic Network, Central Committee; United Nations Development fund for women (UNIFEM).

Odure-Kwarteng, S. (2011). *Private Sector Involvement in Urban Solid Waste Collection: UNESCO-IHE PhD Thesis.* CRC Press.

Ogawa, H. (2008). *Sustainable Solid Waste Management.* Kuala Lumpur, Malaysia: WHO Western Pacific Regional Environmental Health Centre (EHC).

Parpart, J. L. (2003). *Rethinking Empowerment, Gender and Development: A introduction.* London and New work: Routledge .

Pokhrel, D. a. (2005). Municipal solid waste management in Nepal: practices and challenges. *Waste Management, 25*, 555-562.

Pongrácz, Eva. (2009). Through waste prevention towards corporate sustainability: Analysis of the concept of waste and a review of attitudes towards waste prevention. *Sustainable Development*, 92-101.

Reddy, S.S., & Galab, S. (1998). An Integrated Economic and Environmental Assessment of Solid waste System in India. *The Case of Hydrabad.*

Savenye, W. &. (2004). *Qualitative research issues and methods: An introduction for educational technologists.* Handbook of Educational Communications and Technology.

Scotland, J. (2012). Exploring the Philosophical underpinning of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive and Critical Research Paradigm. *English Language Teaching, 5*(9), 9-16.

Shamoo, A. E. (2009). *Responsible conduct of research.* Oxford University Press.

Sharholy, M. a. (2008). Municipal solid waste management in Indian cities--A review. *Waste Management, 28*, 459--467.

Sharma, P. (2007). *A handbook of social science research methodology* (3 ed.). Kriti Prakashan.

Silpa Kaza, L. Y.-T. (2018). *What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.* World Bank Publications.

SWMRMC/UN-HABITAT. (2008). Ten Steps for a clean city technical guideline for solid waste management in Nepal (draft). *Solid waste managment and resource mobilization center.*

SWMTSC. (1987). Solid Waste Management and Resource Mobilization Act, . *Solid Waste Management Technical Support Center*.

Tickner, J. A. (1992). *Gender in International Relations: Feminist Perspectives on Achieving Global Security.* New York: Columbia University Press.

Tong, R. (2009). *Feminist Thought : A More Comprehensive Introduction* (3rd ed.). University of North Carolina, Charlotte: Westview Press.

UNDFW, U. N. (1998). *Gender and Telecommunications: An Agenda for policy.* A Documented prepared for the United Nations University for New Technologies (UNU/INTECH) and the.

UNEP-GRID. (2019). *Gender and waste nexus: experiences from Bhutan, Mongolia and Nepal.* United Nations Environment Programme.

USEPA. (1993a). *Criteria for Solid waste Disposal Facilities. A Guide for Owners/Operators.* Washington D.C: Solid Waste and Emergency Response.

USEPA. (1994). *Joining Forces on Solid Waste Management: Regionalization Is Working in Rural and Small Communities.* Washington D.C.: Solid Waste and Emergency Response.

USEPA. (2002). *Solid Waste Management:A Local Challenge with Global Impacts.* Washington D.C: Solid Waste and Emergency Response.

Wilson, D. C. (2006). Role of informal sector recycling in waste management in developing countries. *Habitat international, 30*, 797--808.

Xiaoping Jia, S. W. (2018). Pinch analysis of GHG mitigation strategies for municipal solid waste management: A case study on Qingdao City. *Journal of Cleaner Production*.

Zagozewski, R., Judd-Henrey, I., Nilson, S., & Bharadwaj, L. (2011). Perspectives on Past and Present Waste Disposal Practices: A Community-Based Participatory Research Project in Three Saskatchewan First Nations Communities. *Environmental health insights, 5*.

Zurbrugg, c. &. (1998). Main Problem and Issues of Municipal Solid Waste Management in Developing Countries with Emphasis on Problems Related to Disposal by Landfill. *Water and Sanitation in Developing Countries(SANDEC)*.

Annexes

Annex 1

ROLE OF WOMEN'S PARTICIPATION IN HOUSEHOLD SOLID WASTE MANAGEMENT IN KATHMANDU METROPOLITIN WARD- 32, NEPAL

Questionnaire Date:

Name of the Respondent: Cell number:

Code No:

Dear Respondent

This is completely a dissertation work of master's level of rural development. It does not carry an official record. Your participation in the research through the responses you give will be highly appreciated while I promise to treat everything you say with utmost confidentiality for more details do not hesitate to contact with the researcher Ms. Anupa KC (9861943986). Thank you!

Group A: Demographic and Socio-economic Information

1. **Age groups**: Below 15 ☐ 16-25 ☐ 26-35 ☐ 36 -45 ☐ Above 46 ☐

2. **Marital Status**: Single ☐ Married ☐ Divorce ☐ Widowed ☐ Separated ☐

3. **Religion:** Hindu ☐ Buddhist ☐ Christian ☐ Muslim ☐ Others ☐

4. **Caste groups:** Brahmin ☐ Chhetri ☐ Jana Jati ☐ Dalits ☐

5. **Family System:** Joint Family ☐ Nuclear Family ☐

   a. How many male members are there in your family? ☐

   b. How many female members are there in your family? ☐

6. **Education level**: Illiterate ☐ Primary ☐ Secondary ☐ Graduates ☐ Post graduates ☐ MPhil/PHD ☐

7. **Family Occupation:** Agriculture ☐ Housewife ☐ Service holder ☐ Wage labor ☐ Business ☐ Private job ☐ Others ☐

8. **Annual Family Income:** Less than 9999 ☐ 10000-49999 ☐ 50000-99999 ☐ 100000- 149999 ☐ Above 150000 ☐

9. **Do you own a house or rent?** Own ☐ Rent ☐

10. **Are you head of the family? Yes** ☐ No ☐

Group B: Practice of household solid waste management

12. Do you have knowledge about solid waste management? Yes ☐ No ☐

13. Have you received any training on solid waste management? Yes ☐ No ☐

14. What type of solid waste does your house produce?

Solid waste categories	usually	often	sometimes	Rarely	Never
Kitchen waste					
Paper and cartoon					
Plastics					
Tins/cans					
Fiber bags					
Glass					

15. What type of container do you use to collect waste? Cartoon ☐ Waste basket ☐ old bucket ☐ Plastic bag ☐ Tin/can ☐ other ☐

16. How do you dispose of collected waste before municipal take it? Inside house premises ☐ outside the house premises ☐ Place in the street ☐ Burn ☐

17. In what period does waste transportation take collected waste? Once a day ☐ once a week ☐ every 15 days (about 2 weeks) ☐ once a month ☐

18. Do you think the waste disposal method is a problem in your city? Yes ☐ No ☐

19. How do you evaluate the state of solid waste collection in your city? Better ☐ Good ☐ Neutral ☐ bad ☐ Very bad ☐

20. How the waste is collected by the municipal? Mixed ☐ Sorted ☐ *I do not know* ☐

21. What significant effect has the presence of Municipal solid waste caused in your locality?

    Air pollution ☐   odor ☐   Diseases ☐ presence of pest ☐

22. What are the challenges facing in household waste management?

    Lack of waste management infrastructure ☐ Lack of waste collections services ☐ Lack finances to conduct effective household waste management ☐ inadequate waste management facilities ☐ Lack of knowledge on various aspects of household waste management ☐

Group B: Women Participation in Solid Waste Management

23. Do you separate waste that is generated in your household? Yes ☐ No ☐

24. What is reason behind not segregation of waste? Do have any idea ☐ Government does not collect waste separately ☐ Do not have space to collect separately ☐ It is time consuming ☐

25. What do you do with items that you separate/recycle? Selling to itineration buyers ☐ Own reuse ☐ Give it away to others who will use it again ☐ Others ☐

26. How do you sort the following waste?

S.N	Waste categories	Throw in one bin	Throw in Separated	Sell	Reuse/recycle
1	Kitchen waste				
2	Paper and carton				
3	Plastics				
4	Empty containers/ bottles				
5	Glass				
6	Tins/cans				

27. Are you willing to practice proper solid waste management? Yes ☐

No ☐

28. Do you compost organic solid waste? Yes ☐ No ☐

29. What do you do with compost solid waste? Use in rooftop garden ☐ Sell compost ☐ Throw ☐

30. How is compost done? In a pit ☐ In an old bucket ☐ In a composted bin ☐ In open space ☐

31. Do you have rooftop gardening? Yes ☐ No ☐

32. What type of gardening do you have? Terrace gardening ☐ Sack farming ☐ bucket farming ☐ kitchen gardening ☐

33. How is your rooftop gardening? Buy all the new equipment for gardening ☐ Use recycled waste as a pot ☐

34. How do you get knowledge of rooftop gardening? From education ☐ Training ☐ Field visit ☐ friends/ family ☐ Social media ☐

35. Do you get economic benefit from waste management? Yes ☐ No ☐

36. How much do you earn from SWM (recycle and rooftop gardening)? Less than 999 ☐ 1000-2499 ☐ 2500-4999 ☐ 5000-10000 ☐

37. Are you a responsible consumer?   Yes ☐   No ☐

If yes how?

Do you take your shopping bag while going shopping? ☐

Do you only buy needy things? ☐

Do you avoid unnecessary use of plastics bag? ☐

Section C: Awareness of Solid Waste Management

	Very aware	aware	Slightly Aware	Not Aware
Are you aware of household solid waste management?				
Are you aware of household waste management rules and regulations?				
Are you aware that composting reuse and recycle are proper ways to manage solid waste management?				
Are you aware of the impact of poor household solid waste management?				
Health				
Economic				
Environment				
Are you aware practicing waste segregation, collection, reduction and reusing and recycle can significantly contributed to proper solid management?				
Are you aware of burning waste harmful gas that affects climate?				
Are you aware of where do municipal dispose of household waste?				
Are you aware of the current situation of landfill of household waste in Kathmandu?				

Group D: Role of Women in Waste Management

Items	Strongly agree	Agree	N	Disagree	Strongly Disagree
Proper solid waste disposal is important for solid waste management					
Cleaning the household, collection of waste and disposal of waste is solely my responsibility.					
I use more reusable items than disposal items.					
I segregate garbage to manage waste better					
I try to generate less waste at household to reduce landfills					
I recycle my old clothes and bottles that has reduce textiles, plastics, and metals waste.					
I compost all the organic waste from kitchen that had reduce the waste.					
I reuse an old bucket, jar, sacks, containers, bottle, and plastics cover as a pot in my rooftop gardening.					
It concerns me if I see garbage scatter in the road.					
Rooftop gardening provides vegetables that are organic and has provided economic and health benefits to my family.					
My cleanliness habit and waste management proper play have significant on my family health.					
My ways of handling waste can significantly help to reduce landfill					

Annex 2

Table for Determining Sample Size from a Given Population

N	S	N	S	N	S
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384

Note.—*N* is population size.
S is sample size.

i https://www.nepalitimes.com/from-the-nepali-press/a-plastic-republic
ii https://www.nepalarchives.com/content/kathmandu-metropolitan-city-kathmandu-profile/