STUDENTS' KNOWLEDGE, ATTITUDE, AND PRACTICE ON WASTE MANAGEMENT AND THEIR PARENTS' SOCIO-DEMOGRAPHIC FACTORS: A SURVEY OF BHAKTAPUR MUNICIPALITY

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AN ABSTRACT

of the dissertation of *Shrutina Dhanchha* for the degree of *Master of Philosophy in Education (Development Studies)* presented on 1 August 2025, entitled *Students' Knowledge, Attitude, and Practice on Waste Management and their Parents' Socio-Demographic Factors: A Survey of Bhaktapur Municipality.*

APPROVED BY

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Management of household waste in Nepal is still a major concern and is leading to public health risks and environmental degradation. While school-based education and awareness campaigns contribute to the formation of sustainable behaviour, the impact of parental influence remains unacknowledged. This study explores the relationship between the socio-demographic and cultural background of parents and their children's Knowledge, Attitude and Practice (KAP) in household (HH) waste management. It focuses on parents' function as enablers and role models in the establishment of sustainable behaviour among the children.

A quantitative study using a structured KAP survey was performed among students from grades 11 and 12 across six public schools in Bhaktapur Municipality. To ensure representation of grade and gender, stratified random sampling was chosen. The survey questionnaires, grounded in environmental education theory and KAP models, were pilot tested and validated with strong internal consistency. Ethical standards were maintained through informed consent and data confidentiality. Descriptive analysis was used to assess the KAP level. Furthermore, to examine the influence of socio-demographic, demographic and parental characteristics on students' KAP, chi-square tests and logistic regression were applied. This approach within a post-positivist paradigm ensured empirical rigour and contextual relevance.

The study found that while students exhibited positive attitudes toward household waste management, their levels of knowledge and practice varied. Female students had significantly higher knowledge of reuse, more positive attitudes, and greater engagement in waste segregation practices than males. Students from joint families showed significantly higher knowledge of segregation and overall knowledge. Logistic regression showed that households with male waste managers were significantly less likely to have recycling knowledge than those led by females. The households that receive remittances are less likely to have a positive attitude toward waste segregation. Furthermore, households living with family are more likely to practice better overall waste management.

The study suggests integrating household and school-based programs with parental involvement, gender-sensitive approaches and behaviour, and the revitalization of indigenous waste practices such as composting to promote sustainable waste management among future generations.

…… 1 August 2025

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सोध सार

विकास शिक्षामा दर्शनशास्त्रको स्नातकोत्तर डिग्रीको लागि श्रुतिना धन्छाको शोध प्रबन्धको शिर्षक "फोहोर व्यस्थापन सम्बन्धी विध्यार्थीको ज्ञान, दृष्टिकोण र अभ्यास र उनीहरूका अभिभावकको सामाजिक-सांस्कृतिक, जान्सान्ख्यिक तत्वहरूः भक्तपुर नगरपालिकाको सर्वेक्षण" १६ साउन २०८२ मा प्रस्तुत गरिएको थियो ।

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प्रा. प्रकाश चन्द्र भट्टराई, पीएचडी

शोध निर्देशक

नेपालमा घरायसी फोहर व्यवस्थापन अझै पनि एक चुनौतीपूर्ण समस्या रहँदै आएको छ, जसले जनस्वास्थ्यमा जोखिम र वातावरणीय क्षय दुवैलाई बढावा दिइरहेको छ । यस सम्बन्धमा विद्यालयमा आधारित शिक्षा र जनचेतना अभिवृद्धि कार्यक्रमहरूले दिगो व्यवहार विकासमा सहयोग पुऱ्याइरहे पनि अभिभावकहरूको भूमिकालाई महत्व दिएको पाईदैन । यस अध्ययनले अभिभावकहरूको सामाजिक-जनसांख्यिक तथा सांस्कृतिक पृष्ठभूमि र तिनीहरूको छोराछोरीको घरायसी फोहर व्यवस्थापन सम्बन्धी ज्ञान, दृष्टिकोण र अभ्यास बीचको सम्बन्धलाई समग्र रूपमा विश्लेषण गर्दै दिगो व्यवहार को विकास गर्नमा अभिभावकहरूको उत्प्रेरक भूमिकाको बारेमा खोजी गरिएको ।

भक्तपुर नगरपालिका अन्तर्गतका ६ वटा सार्वजनिक विद्यालयका कक्षा ११ र १२ का ३२७ विद्यार्थीहरूसँग ज्ञान, दृष्टिकोण र अभ्यास सर्वेक्षणमार्फत परिमाणात्मक अध्ययन गरिएको हो । कक्षा र लिङ्गको प्रतिनिधित्व सुनिश्चित गर्न तहगत रेन्डम नमूना छनोट गरिएको थियो । वातावरणीय शिक्षा सिद्धान्त र ज्ञान, दृष्टिकोण र अभ्यास मोडेलमा आधारित प्रश्नावलीलाई पूर्व परीक्षण गरी क्रोनब्याक अल्फा ०.८९१ सहित प्रमाणीकरण गरिएको थियो । अध्ययनका क्रममा सहभागीहरूसँग तथ्यांक लिन पूर्व सहमति लिइएको र तथ्यांकको गोपनीयता कायम गरिने बारेमा जानकारी गराईएको थियो । विद्यार्थीहरूको ज्ञान, दृष्टिकोण र अभ्यासको स्तर निर्धारण गर्न व्याख्यात्मक विश्लेषण गरिएको थियो भने सामाजिक-जनसांख्यिक तथा अभिभावकीय विशेषताहरूको ज्ञान, दृष्टिकोण र अभ्यास मा पर्ने प्रभाव परीक्षण गर्न लागि काई स्क्वायर र लजिस्टिक रिग्रेसन प्रयोग गरिएको थियो ।

अध्ययनले देखाए अनुसार विद्यार्थीहरू घरायसी फोहोर व्यवस्थापनप्रति सकारात्मक दृष्टिकोण राखेको पाइयो, तर उनीहरुको ज्ञान र अभ्यासको स्तर फरक-फरक देखियो । महिला विद्यार्थीहरूमा पुनःप्रयोग सम्बन्धी ज्ञान उल्लेखनीय रूपमा उच्च थियो भने उनीहरूको सकारात्मक दृष्टिकोण पनि बढी देखियो । त्यस्तै फोहोर वर्गीकरणको अभ्यासमा पनि उनीहरूको बढी संलग्नता भएको देखियो । संयुक्त

परिवारका विद्यार्थीहरूमा फोहोर वर्गीकरण सम्बन्धी ज्ञान र मात्र हैन की यस सम्बन्धी अन्य समग्र ज्ञान उल्लेखनीय रूपमा बढी थियो। पुरुष फोहोर व्यवस्थापक भएका घरपरिवारमा पुनःप्रयोगको ज्ञान कम भएको पाइयो । त्यसैगरी, विप्रेषण प्राप्त गर्ने घरपरिवारहरूमा फोहोर वर्गीकरणप्रति सकारात्मक दृष्टिकोण कम पाइयो । साथै, परिवारसँग बसोबास गर्ने घरपरिवारहरूले समग्र रूपमा राम्रो फोहोर व्यवस्थापन गर्ने गरेको पाइयो ।

यस अध्ययनले घर, समुदाय र विद्यालमा आधारित कार्यक्रमहरूमा अभिभावकको सहभागिता, लैङ्गिक दृष्टिकोण र व्यवहारलाई समावेश गरी पारम्परिक फोहोर व्यवस्थापनका अभ्यासहरू जस्तै प्राङ्गारिक मल उत्पादन गर्ने जस्ता सीप तथा ज्ञानलाई नयाँ पुस्तामा हस्तान्तरण गर्दै दिगो फोहोर व्यवस्थापन प्रवर्द्धन गर्न आवश्यक देखिन्छ ।

..... १६ साउन २०८२

श्रुतिना धन्छा

उपाधि उम्मेदवार

This dissertation, entitled *Students' Knowledge, Attitude, and Practice on Waste Management and their Parents' Socio-Demographic Factors: A Survey of Bhaktapur Municipality,* presented by *Shrutina Dhanchha* on 01 August 2025.

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I understand that my dissertation will become a part of the permanent collection of the library of Kathmandu University. My signature below authorizes the release of my dissertation to any reader upon request for scholarly purposes.

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DECLARATION

I affirm that this dissertation has not been submitted or published as part of any other degree candidacy.

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DEDICATION

TO

All Paragons of Virtue

My Universe

To those who live with integrity, teach with kindness, lead with wisdom and inspire through quiet strength – this work is for you.

Special thanks to

My daughter Darshita Shrestha

My husband, Deepak Man Shrestha

My mother, Saraswoti Dhanchha

My brothers Jagat Ram and Suman

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Before I finish, I am very grateful to my friends and well-wishers for their moral support, encouragement and patience throughout this academic journey. Their kindness and understanding have meant the world to me.

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ABBREVIATIONS

3Rs	Reduce, Reuse, Recycle
ADB	Asian Development Bank
CBS	Central Bureau of Statistics
CO^2	Carbon Dioxide
EIA	Environmental Impact Assessment
EIA	Environmental Impact Assessment
ESD	Education for Sustainable Development
GoN	Government of Nepal
HH	Household
IEE	Initial Environmental Examination
KAP	Knowledge, Attitude and Practice
KU	Kathmandu University
MA	Master of Arts
MLE	Maximum Likelihood Estimation
MoFE	Ministry of Forests and Environment
MoLD	Ministry of Local Development
MoUD	Ministry of Urban Development
MPhil	Master of Philosophy
MSW	Municipal Solid Waste
NGO	Non-governmental Organization
NLC	Nepal Law Commission
OR	Odds Ratio
PhD	Doctor of Philosophy
PPP	Public Private Partnership
SDGs	Sustainable Development Goals
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
USEPA	United States Environmental Protection Agency
WB	World Bank

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CHAPTER I
INTRODUCTION

Household waste management is a global concern, impacting public health, the sustainable environment and social and economic development. In Nepal, the process of urbanization and population growth has exacerbated waste management issues, particularly in urban municipalities like Bhaktapur Municipality. Despite some efforts, the country is facing critical issues in managing waste, including irregular collection, transportation and a lack of disposal systems and a low level of public awareness and engagement in waste segregation practices. This chapter introduces the study in the context of growing challenges of waste management globally and in Nepal, concentrating specifically on Bhaktapur Municipality. The chapter identifies gaps in existing research, especially the lack of focused data on students' knowledge, attitudes and practices (KAP) and the influence of parental socio-demographic, demographic and educational backgrounds. It draws the research problem, purpose, questions, hypothesis, significance and scope, establishing a foundation for examining how the educational level of parents and household factors affect student waste management behaviour.

Study Context

During my tenure at United Nations Development Program (UNDP) Nepal, I worked on a project aimed at strengthening the capacities of five municipalities in effective waste management while creating employment opportunities. Through this experience, I gained insight into the substantial challenges Nepal's cities face in managing solid waste, which includes collection, transportation and recovery, as well as a lack of resources. In the project working area, most households fail to implement adequate waste segregation practices at the source, resulting in almost all collected waste being deposited in landfills. In rural areas, where communities are farming, the management of organic waste is not an issue. In urban settings, a significant proportion of residents report the absence of effective waste segregation practices, limited physical space for segregating waste at the household level and limited opportunities for the utilization of organic waste. Furthermore, there is a general lack of awareness and understanding regarding appropriate waste segregation methods, which often results in the unsegregated disposal of household waste. Besides, the

municipality lacks regulatory provisions obligating waste segregation. Waste, particularly solid waste, is generated by human activity, which generates staggering environmental, public health and economic burdens. Bad practices of waste disposal methods, especially open burning and landfill dumping, are causing environmental pollution and greenhouse gas emissions. The open burning of HH waste is among the major contributors to air pollutants like carbon dioxide (CO^2), particulate matter and toxic chemicals, which are usually underestimated in current emission inventories (Wiedinmyer et al., 2014). Landfills, especially open dump sites common in developing countries, emit methane and other greenhouse gases, resulting in air, water and land pollution (Meidiana, 2012). Municipal solid waste is responsible for approximately 5% of total greenhouse gas emissions, with landfills alone contributing around 12% of global methane emissions (Osazee & Gupta, 2021). The activities are posing a serious threat to human, plant and animal populations by emitting toxic pollutants into the environment, water source and soil (Chavan et al., 2018). To mitigate these environmental impacts, sustainable waste management initiatives, such as landfill gas-to-energy projects, are being developed (Osazee & Gupta, 2021). According to the Waste Management Baseline Survey conducted by Nepal's Central Bureau of Statistics (CBS) in 2020, municipalities primarily utilize three waste management methods: landfill disposal (48.6%), burning (32.1%) and riverbank dumping (27.4%) refer to challenges such as a shortage of trained personnel, irregular waste collection services, lack of appropriate tools and machinery, low level of awareness and limited landfill sites as major hindrances in effective waste management practices. The urban areas of Nepal produce approximately 1.8 million tons of solid waste annually, and 56% of the total consists of organic waste (World Bank [WB], 2020). However, only 50% of the waste is collected, while the remaining 50% is disposed of haphazardly in urban or rural areas, leading to environmental contamination and public health risks (WB, 2020). This experience highlights critical gaps in Nepal’s urban waste management, particularly inadequate source segregation, limited awareness, and regulatory weaknesses, contributing to significant environmental and public health challenges that demand integrated, sustainable interventions.

Climate vulnerability varies across Nepal’s provinces (Bhattarai et al., 2023), with some provinces and municipalities being more affected than others. They have their own ways of responding to the climate crisis. Bhaktapur Municipality,

accommodating 18,987 households (National Statistics Office, 2021), has adopted several solid waste management measures, such as door-to-door daily household waste collection activities and segregation at the plant. However, the problems such as limited landfill capacity, insufficient waste segregation at source and urbanization lead to a surge in the quantity of waste (Ranjit et al., 2019). Complicating this scenario is the low level of knowledge, especially among students who are key actors in the transformation of practice to sustainable solid waste management.

Non-standard waste disposal practices, which include open burning and disposal near riverbanks, are threatening public health and disturbing the environment. These activities are known to lead to environmental degradation and groundwater contamination and cause health impacts to communities that reside close to the disposal areas. Sisdol landfill site, the biggest landfill in Nepal, receives over 800 tonnes of unsegregated waste daily, 60% of which is organic waste, which is operating above capacity (Shrestha et al., 2020). As a result, the untreated leachate in landfills contaminates nearby water sources, enhancing the risks to the environment and public health (Shrestha et al., 2020; Singh et al., 2015). Non-standard waste disposal practices, such as open burning and riverbank dumping, significantly threaten public health and environmental quality, exemplified by Nepal's overcapacity Sisdol landfill, where unsegregated waste and untreated leachate exacerbate contamination risks.

Effective handling of waste needs the engagement of multiple stakeholders, including governments, municipalities, educational institutions, communities and households (Muturi, 2021; Soltani et al., 2015). While municipalities, as the primary tier of local government, hold the principal responsibility for the collection and disposal of waste, the role of households is equally critical, particularly in the segregation of waste at its source (Muturi, 2021). However, the lack of adequate knowledge often serves as a stumbling block to the active participation of these stakeholders (Ikhuoso, 2018). Schools and colleges are small cities and generate a lot of waste, and they are important in promoting the behaviour of a sustainable environment (Elhalwagy, 2024). Teaching, researching and implementing environmental management systems are among the activities that involve academia for waste management in schools and colleges (Elhalwagy, 2024). Enhancing environmental education among students and introducing a sustainable waste management system on school premises can help create awareness and improve the

overall disposition of waste (Elhalwagy, 2024; Ikhuoso, 2018). Effective waste management requires coordinated involvement of governments, municipalities, households, and educational institutions, where enhancing environmental education in schools plays a vital role in overcoming knowledge gaps and fostering sustainable waste segregation practices.

As the leaders and change-makers of the future, the responsibility of students in promoting proper waste management principles is distinctive (Bhattarai et al., 2024). People's waste behaviour is affected by education and awareness levels (Fadhullah et al., 2022; Licy et al., 2013). Moreover, the condition of parents' socio-economic and educational status highly influences children's KAP on waste management (Herdiansyah et al., 2021; Zhang et al., 2023). Education level, income and residence could confound the waste management practice (Handayani et al., 2018). Social and demographic factors such as age, sex and family size are also factors to consider, in which women and older individuals are better at managing waste (Handayani et al., 2018; Shrestha et al., 2025). According to Hayat et al. (2023), a family's educational background determines the practice of waste management by the family. The family without practical experience of waste segregation by household may account for poor waste management (Hayat et al., 2023). The composition of HH waste is variable and depends on factors such as family size, education level and work status (Gharagozloo & Ghazizade, 2023). These insights underscore the need to address socio-economic and demographic factors holistically to enhance waste management practices at both the household and community levels. Family waste segregation behaviour has a significant effect on students' waste segregation behaviour (Zhang et al., 2023). Students who have a strong awareness of environmental problems, as stressed by Tartiu (2011), may be able to actively support appropriate waste management systems, thereby developing their effective leadership skills. Early environmental education is important for increasing awareness of environmental degradation and motivating people to engage in environmental conservation efforts (Owojori et al., 2022). Understanding these dynamics is essential for designing targeted interventions that effectively foster sustainable waste management behaviours among students and their families.

These observations establish that socio-economic aspects can be taken into account to develop an effective waste-management policy that emphasizes the necessity of education about waste management that targets all socio-economic areas.

There is, however, limited research on KAP towards waste management of secondary school-going students in Nepal based on their socio-demographic background and more so in the area of management of household waste.

Statement of Problem

Bhaktapur Municipality is known for its comparatively effective waste management system, which sets it apart from other places. The city implements daily waste collection, segregating biodegradable and non-biodegradable waste at the source, and operates a compost plant using Carbon and Nitrogen Balanced Nutrient (CNBN) technology to convert organic waste into affordable compost (Giri, as cited in Aryal, 2022). Non-degradable waste is sold to generate revenue, while compost is distributed at subsidized rates to encourage urban farming and rooftop gardening. In tourist areas, waste is collected multiple times a day, supported by strategically placed staff and bins to maintain cleanliness. Unlike other municipalities that rely on privatized collection, Bhaktapur mobilizes its own municipal employees to ensure consistent waste management services.

Despite these strengths, Bhaktapur still faces critical challenges. Proper segregation at the source is not consistently practiced, and infrastructure for sustainable waste disposal remains inadequate (Ranjit et al., 2019). Many residents are neither well-informed nor sufficiently motivated to separate waste, resulting in mixed disposal and low-quality compost (Karki et al., 2021). Studies indicate that 49–66% of the waste sent to landfill is organic, much of it unsegregated (Thapa & K.C., 2011). Although policies promote waste reduction and the 3Rs (Reduce, Reuse, Recycle), there is a notable gap between awareness and actual practice, particularly among youth and school students (Khanal et al., 2023; Mahayuddin et al., 2024). Consequently, approximately 800 tons of mostly unsegregated waste are sent daily to landfill sites such as Sisdol, where recyclable materials are recovered and sold; however, untreated leachate continues to contaminate the Kolpu stream, posing environmental and health risks (Nepali Times, 2021; Shrestha et al., 2020; Sisdol landfill, 2022; Singh et al., 2015). Bhaktapur Municipality faces household waste management challenges mainly due to limited landfill space, poor source segregation, insufficient composting facilities, low financial resources, and weak public participation despite effective waste collection efforts.

A key but underexplored factor in this gap is the influence of parents' socio-demographic and educational backgrounds on students' waste management

behaviour. Current waste management strategies often overlook how family structure/size, gender roles, income source and status, parental education and occupation, and living status affect students' KAP. No prior research in Bhaktapur has investigated this family influence, creating a gap that this study aims to fill in order to improve waste management practices through more inclusive, family-centred interventions.

Research Purpose

The research aims to assess the KAP of students in Bhaktapur Municipality about household waste management and to explore the influence of students' demography and parental socio-demographic, demographic and educational characteristics in shaping their KAP.

Research Questions

1. What are the levels of knowledge and attitudes of school students in Bhaktapur Municipality regarding household waste management?
2. To what extent do school students engage in household waste management practices?
3. To what extent do parents' socio-demographic, demographic and educational backgrounds influence KAPs of school students regarding household waste management?

Hypothesis

School students in Bhaktapur Municipality with higher levels of parental education demonstrate greater knowledge, more positive attitudes and better practices concerning household waste management compared to students with lower levels of parental education and who are affected by social-cultural background. To examine this relationship, the following null hypotheses were tested:

1. $H0_1$: There is no significant difference in the knowledge levels of school students regarding household waste management based on their parents' educational level.
2. $H0_2$: There is no significant difference in attitudes towards household waste management among school students across different levels of parental education in Bhaktapur Municipality.
3. $H0_3$: There is no significant difference in household waste management practices among school students based on their parents' educational level.

Significance of the Study

This study is important because it fills an important gap in the literature on students' KAP with regard to HH waste management in Bhaktapur Municipality, Nepal. Most researchers have focused on policy and infrastructure for waste management, giving little attention to students and parents. By studying the level of KAP among students and the impact of socio-demographic and educational settings, the study will thus provide some valuable information to support and inform local policy, school programs and community-based interventions to shape sustainable waste management behaviours.

The study will have practical implications for Bhaktapur Municipality, which will include real problems such as scant landfill capacity, poor segregation of waste at source and growing urbanization. This study will assist municipal authorities by providing basic information for designing targeted awareness campaigns and behavioural change programs for better waste management. The findings will also inform evidence-based policy regarding the enforcement of sustainable waste management behaviour and scaling up, considering the very high levels in urban areas of Nepal.

The study offers grounding to enhance environmental education for schools and educators. By assessing students' KAP levels, schools can adapt curricula to provide waste management lessons at practical levels, effect a recycling program for use by the whole school and encourage students to be environmental ambassadors within their households. Since students tend to affect the behaviours of their families, enhancing their awareness would entail the sustenance of a community-wide practice.

The study also indicates the circumstances wherein parents and community organizations determine waste management behaviours. The education levels of parents and their cultural traits have a great impact on the attitude and practices of a student. Thus, the findings can be very instrumental in helping non-governmental organizations (NGOs) and the local community come up with training programs or other creative initiatives that address these socioeconomic and cultural settings.

This study adds to the global conversation on sustainable waste management, especially in emerging urban settings outside of Nepal. By highlighting the significance of education and youth involvement in environmental sustainability, it is in line with Sustainable Development Goals (SDGs), such as SDG 11 (Sustainable Cities) and SDG 12 (Responsible Consumption). Additionally, by providing a model

for comparable studies in other quickly urbanizing regions, the study offers an empirical foundation for future research on waste management behaviours.

This study not only fills a research gap but also supports practical, actionable strategies for improving waste management in Bhaktapur and beyond. Fostering collaboration between schools, families, local governments, and NGOs paves the way for more sustainable, community-driven waste management solutions.

Delimitations of the Study

The scope of the study is delimited to the students who are studying in grades 11 and 12 of the six public higher Secondary Schools of Bhaktapur Municipality. Since it was based on self-reported data from a structured KAP survey, it might be influenced by a social desirability bias. The study does not account for students attending private schools, and it does not consider heterogeneity in external factors, including school-based programs, peer influences and municipal waste policies. The results were confined to the single setting of Bhaktapur Municipality and may not be transferable to other settings.

Organization of the Study

This study is divided into six chapters to provide a systematic explanation of the research conducted and the results obtained.

Chapter I, Introduction, provides the framework of the study by exposing the background, statement of the problem, research objectives and significance of the study. Chapter II, Literature Review and Theoretical Framework, reviews literature that is pertinent to the study and provides the theoretical base. Chapter III, Research Methodology, describes the study design, the study area, the sampling procedures, the data collection and the analysis procedures.

Chapter IV, Data Analysis, includes the statistical results extracted from the data collected. The relationship between students' KAP and the independent variable (socio-demographics) is presented by using descriptive analysis and inferential statistics to determine patterns and trends.

Chapter V, Findings and Discussion, brings together the findings analyzed and identifies key emerging trends and patterns with respect to students' KAP in waste management. Chapter VI, Conclusion and Recommendations, recaps the study and suggests recommendations for all parties involved.

Concluding the Chapter

This chapter has underlined the importance of the most pressing waste management issues in Nepal and has focused specifically on the urban context, such as Bhaktapur Municipality, where poor infrastructure, low practice of segregation and low public awareness consequently lead to environmental and health risks. It has also shifted the research emphasis towards secondary school students' KAP on household waste management, with an emphasis on parents' socio-demographic, demographic and educational backgrounds, an aspect that has been largely ignored in the Nepalese context. The chapter has demonstrated the importance of the study as a basis for educational interventions and city waste regulations, and it also presented pivotal research questions that structured the study. These building blocks form the basis for the subsequent review of the literature, which explored theoretical models and supporting evidence related to waste behaviours and educative influences more closely.

CHAPTER II
LITERATURE REVIEW AND THEORETICAL/RESEARCH FRAMEWORK/ REFERENT

This chapter relates to waste management with emphasis on its global problems and how the challenges manifest specifically in Bhaktapur Municipality. It addresses key concerns like environmental contamination, inadequate infrastructure and human health hazards linked with harmful waste disposal practices. The review considers different approaches for managing waste, the roles of stakeholders and policy frameworks and the roles of stakeholders and policy frameworks. It also identifies gaps in implementation and actor configuration. The focus is on the KAP of students on HH waste in relation to the socio-demographic and educational status of their parents. Based on the theory of Environmental Education and the KAP model, the paper builds the theoretical basis of this research. It also highlights the importance of community-based research in areas undergoing rapid urbanization, such as Bhaktapur, as well as the role of schools in encouraging sustainable waste behaviours. This review of literature also contributes to the empirical focus on effective education and policy to encourage better waste management practices.

Waste and Its Problem

Waste is a very serious problem that results in heavy environmental, economic and social consequences around the world. More than 11.2 billion tonnes of solid waste are collected each year globally, which represents 5% of total greenhouse gases generated in the world (Jain & Shah, 2019). Poor waste disposal practice is one cause of serious environmental pollution, such as air, water and soil pollution, as well as a public health threat through the spread of diseases, including the burning of refuse (Abubakar et al., 2022; Yadav et al., 2018). These challenges are even more pronounced in developed countries in the global south, where urbanization and population growth have resulted in more waste being generated than the capacity to process it (Parvathamma, 2014). This growing imbalance between waste generation and management capacity underscores the urgent need for sustainable, scalable solutions tailored to rapidly urbanizing regions. The reliance on landfills and open dumping for waste disposal is a prevalent challenge in low and middle-income countries, contributing to environmental hazards such as groundwater pollution, soil

contamination and the release of greenhouse gases (Yadav et al., 2018; Yang et al., 2017). Addressing this overreliance requires transitioning to integrated waste management systems that prioritize reduction, recycling, and safe treatment methods to mitigate environmental and health risks.

The informal waste recycling sector, involving approximately 15 million workers worldwide, is an important instrument in waste reduction that poses enormous health and environmental threats (Latinović et al., 2023; Yang et al., 2017). Informal waste pickers encounter various occupational hazards, including physical, social, biological and chemical hazards. The common health hazards faced by workers include epidermal problems, communicable diseases, musculoskeletal disorders and respiratory diseases (Zolnikov et al., 2021). Children and women in developing countries are highly susceptible; studies show a very high level of worm infections, respiratory infections and heavy metal poisoning among waste pickers (Hunt, 2001). Primitive techniques used by informal recyclers, coupled with faulty occupational health systems, further exacerbate the problem of environmental pollution, causing low life expectancy (Latinović et al., 2023; Yang et al., 2017). So, if the informal sector is integrated with formal waste management systems, it can promote greater opportunities for health and livelihood concerns while simultaneously doing better waste management (Yang et al., 2017; Latinović et al., 2023). Integrating the informal recycling sector into formal waste management frameworks can enhance resource recovery while safeguarding the health, livelihoods, and well-being of vulnerable workers.

The inefficiency of waste management systems in less developed countries can be attributed to various reasons. One of them is the poor waste management infrastructure coupled with a lack of funds and a low level of public awareness (Marshall & Farahbakhsh, 2013; Zohoori & Ghani, 2017). In addition, socioeconomic variations, rapid urban growth and cultural norms and practices that affect waste management behaviour (Marshall & Farahbakhsh, 2013) add to the complexity of the problem. Municipal solid waste is particularly a daunting task, as the combustible waste amounts have been on the rise, wreaking havoc on municipal budgets and outstripping the collection and processing capacity (Guerrero et al., 2013). Addressing these multifaceted challenges requires strengthening infrastructure, securing sustainable funding, and fostering public awareness to build resilient and efficient waste management systems.

Nepal offers an example of these structural issues, particularly in cities where waste management is still limited. The country produces about 1.8 million tons of solid waste annually, 56% of which is organic waste (WB, 2020). Existing harmful disposal practices, such as open burning, riverbank dumping and uncontrolled dumping, result in disastrous environmental degradation and public health consequences. For instance, the capacity of the 800+ tons per day Sisdol landfill is exceeded, contributing to groundwater pollution and affecting health in surrounding areas (Shrestha et al., 2020; Singh et al., 2015). These conditions highlight the urgent need for sustainable waste management solutions in Nepal that prioritize source segregation, infrastructure improvement, and environmentally sound disposal practices.

The informal sectors are also important actors in HH waste management, but they are still widely neglected and not supported (Cataldo et al., 2023). Local communities have a challenge of developing solid waste handling, transporting and resource recovery systems and are increasingly dumping waste unsustainably (Maharjan & Lohani, 2020). The Waste Management Baseline Survey of Nepal (2020) talked about the key hindrances in managing waste, which include a shortage of skilled personnel, irregular waste collection, insufficient equipment, low public awareness and limited landfill space. These issues are particularly evident in urban areas such as Bhaktapur, where rising waste generation and inadequate infrastructure place immense pressure on existing systems (Ranjit et al., 2019). In addition, while there are regulatory frameworks, poor implementation and limited community involvement continue to hamper waste management. (Maharjan et al., 2019). Strengthening support for the informal sector, enhancing infrastructure, and fostering active community participation are crucial to overcoming persistent waste management challenges in urban Nepal.

Waste Management

Effective waste management is fundamental to reducing environmental conditions detrimental to human health and to building sustainable, healthy and productive communities. Modern strategies focus on a complete hierarchy, where waste reduction, reuse, recycling and energy recovery are given priority and disposal is considered the last option (Zorpas, 2020). An integrated model of sustainable waste management considers environmental management systems, legislative factors and public involvement (Yuzvovich et al., 2024; Zorpas, 2020). Moreover, technologies

relating to the treatment of waste present a very good opportunity for reducing carbon emissions and improving the efficiency of resource use (Yuzvovich et al., 2024). Indeed, waste management policies can be designed in accordance with local contexts to maintain the integrity of the natural ecosystems, as well as in the direction of shifting to a circular, low-carbon economy (Zorpas, 2020). Therefore, public education, awareness campaigns and continued research are very important to create opportunities and to move forward in responsible waste management (Yuzvovich et al., 2024). Implementing such integrated and context-specific approaches can accelerate the transition toward sustainable waste systems that protect health, conserve resources, and support a circular economy.

The hierarchy of waste was proposed by the European Commission (2008) as a system seeking to direct waste management in a sensible way, preventing and minimizing waste generation, promoting reuse, recycling and recovery of materials and waste and, at the very bottom of the ladder, landfill disposal of waste. The operationalization of this tier involves a mix of reducing waste, improving recycling and composting organic waste and environmentally sound landfilling (United Nations Environment Programme [UNEP], 2015). Applying this waste hierarchy effectively requires coordinated policy, infrastructure, and community engagement to prioritize prevention and resource recovery over disposal.

Community participation is key to better waste management. Participation in nature programs and awareness campaigns improves segregation and recycling rates considerably (Zurbrügg et al., 2014). The involvement of the community in waste segregation and recycling makes a difference in the recycling and waste segregation rates (Chisanga et al., 2024). Education, stakeholder involvement and participation of residents in the planning and decision-making process are said to be the success factors for community participation (Chisanga et al., 2024). Colleges and universities are also important agents of change that incorporate waste sorting and recycling activities in their curricula, teaching students sustainable actions (Moghadam et al., 2009). Community engagement, supported by education and inclusive planning, drives effective waste segregation and recycling, making it essential for sustainable waste management.

A comprehensive strategy involving policy regulation, technology advancement and community participation is needed for the development of sustainable waste management. If societies establish strategies in line with the waste

hierarchy and encourage public involvement, negative environmental impacts can be reduced as the world moves towards a more resource-efficient future.

Stakeholders in Waste Management

A comprehensive management of waste is a joint responsibility of governments, the private sector, NGOs and the public (Wilson et al., 2006). In policy, local governments and communities are involved in developing infrastructure and implementation monitoring (Ariyadi & Afriandi, 2024), with communities themselves involved in implementing waste reduction, recycling and program involvement (Ariyadi & Afriandi, 2024; Kurhayadi, 2021). Service delivery and public awareness campaigns are supported by NGOs and community-based organizations (Ahmadi et al., 2013). The positive economic, social and environmental impact of public-private-community partnerships is proven (Mappasere & Idris, 2016). The government can be the regulator, service provider and collaborator. As regulators, governments decree policies, strategies and local laws to direct (instruct) waste management operations. In providing services, they provide certain facilities, tools/ equipment and services of assistance in carrying out the activities of waste (Tadasi & Choiriyah, 2024). In addition, the government is a model and pioneer through the provision of community training programs and education programs (Tadasi & Choiriyah, 2024).
Municipalities hold primary responsibility for the collection, transportation and disposal of solid waste. In addition, they are mandated to promote and monitor waste segregation at the household level and to encourage behaviours that support waste minimization. The education sector, particularly schools, can serve as a pivotal platform for fostering environmental awareness and instilling pro-environmental values among younger generations (Harman & Yenikalayci, 2022). Effective waste management requires collaboration among governments, the private sector, NGOs, and communities, with local authorities leading infrastructure and monitoring, and partnerships driving service delivery and public awareness to promote sustainable practices.

Despite an influential status, many local governments have ineffective policies and enforcement. Guerrero et al. (2013) argue that resource and cost limitations often cause ineffective waste collection and disposal in developing countries, and thus, there is a need to develop waste management approaches that incorporate both the formal and informal sectors. Likewise, Wilson et al. (2015) advocate the significant

role of stringent policies, such as landfill taxes and extended producer responsibility, in increasing the efficiency of municipal waste management.

Participation of the private sector in waste management has demonstrated positive results in many developing countries, in that collection rates have been increased and the operation has been improved. In Ghana, the private sector manages over 60% of the urban solid waste (Oduro-Kwarteng & van Dijk, 2013) and in Lagos, Nigeria, the private sector has been efficiently responding to the city's huge daily waste generation but, the problem still remains: bad infrastructure and profit-oriented systems that do not allow for regular waste collection (Opoko & Oluwatayo, 2016). The waste management sector also provides good opportunities for the private sector to bring efficiency and cost-effectiveness into its operations (Maharjan et al., 2019), with the model of private participation spanning from full privatization to partnerships between private and public sectors in public-private partnerships (PPP) (Baud et al., 2001). PPPs are promoted for developing and rural countries (Alhanaqtah et al., 2019). Private sector involvement in waste management has improved collection and efficiency, though challenges like poor infrastructure and profit-driven limitations persist, making public-private partnerships a promising approach for developing countries.

In Nepal, the private sector's participation in waste management has been promoted through the PPP model to enhance the efficiency and sustainability of solid waste management. Biratnagar is a good example, in which private sector involvement commenced in 1997 and has achieved a financially sustainable infrastructure for city waste management (WB, 2010). In Kathmandu, to manage the growing volume of waste due to urbanization, the municipality has outsourced private companies for door-to-door collection service and disposal of generated waste (United Nations [UN] Digital Library Nepal, 2011). Despite these efforts, barriers remain, such as the lack of formal arrangements between the municipalities and private sector companies and the lack of policy-led frameworks to truly integrate private sector efforts (WB, 2018). Understanding and addressing these institutional and policy barriers is crucial to improving the effectiveness of private sector participation in Nepal's solid waste management systems.

Parents have a powerful influence on children's waste management attitudes and behaviours by way of role modelling, involvement and communication (Zhang et al., 2023). Research evidence indicates that the actions of children in reducing waste

behaviour are affected not only by the green behaviour of their parents but also by the quality of the parent-child interaction. Children observed environmentally friendly behaviour associated with hanging out with their parents across a variety of cultural contexts, and this relation was true across the cultural spectrum, albeit it may vary for specific cultural or environmental contexts (Katz-Gerro et al., 2020). Parents' actions affect children's value-based judgments, and social norms are part of the child's environment, and subjective norms regarding parents' guiding principles help create children's personal norms (Yorifuji, 2011). Parental influence plays a critical role as a key determinant shaping children's environmental attitudes and waste management behaviours across diverse cultural contexts.

Mothers have a greater influence on children's recycling behaviours and direct engagement regarding waste management than fathers, although they both have influence (Nguyen et al., 2025). Parents' recycling behaviour is the most important predictor of children's recycling behaviour, and at the same time, the recycling programs at the school level contribute to discussing environmental issues (Šorytė & Pakalniškienė, 2021). The relationship is also reciprocal because youth also influence their parents' pro-environmental intentions and behaviour (Žukauskienė et al., 2020). Methods of generating environmental stewardship in children consist of engaging in outdoor activities, holding family dialogue about environmentally friendly matters and becoming involved in environmental community projects and activities (Hassan & Khalil, 2024). However, people's socioeconomic and urban way of life limitations prevent the participation of parents in enhancing children's environmental values (Hassan & Khalil, 2024). These studies emphasize that while mothers often play a stronger role in shaping children's recycling behaviours, parental influence is dynamic and reciprocal, yet can be constrained by socioeconomic and lifestyle factors.

Students themselves, primary stakeholders, have the power to effect change (albeit as a cog in the wheel) by taking part in waste management at the university. Schools and universities' role is pivotal in educating students about sustainability and nurturing environmental responsibility (Tilbury & Wortman, 2004). The research conducted by Paghasian (2017) among school students on waste management practices shows that students with good levels of awareness and positive practice always have high levels of awareness of waste segregation, reduced consumption, and promoted recycling efforts. However, knowledge alone cannot be assumed to be acted

upon by people, even with appropriate knowledge dissemination and educational outreach prerequisites; there is no guarantee that people who have attained optimal knowledge will implement this knowledge. While information dissemination and educational outreach are important, they do not guarantee that people will act on their knowledge (Chess & Johnson, 2007). Multiple factors influence behaviour change, including self-efficacy, personal values, and perceived rewards (Levine & Cosby, 2002). An integrated mass awareness program and environmental education program need to complement the knowledge requirement(Licy et al., 2013). To promote behaviour change, interventions should consider not only knowledge dissemination but also address personal values, self-efficacy, and anticipated outcomes (Levine & Cosby, 2002). While educational institutions play a crucial role in raising awareness and knowledge among students, effective waste management behaviour requires a holistic approach that also addresses personal values, self-efficacy, and motivational factors beyond mere knowledge dissemination.

Demographic variables such as gender, age, and economic status also influence some students' waste management behaviour, with gender differences in adopting eco-friendly practices (Ifegbesan, 2011). High school students in Ghana are knowledgeable of waste problems, yet some engage in inappropriate disposal practices, including open dumping (Ampofo, 2020). Also, while some students can be seen to have positive attitudes toward waste management, others have insufficient knowledge and behaviour (Harman & Yenikalayci, 2022). It is suggested that environmental education be incorporated into the curriculum and that training be increased for teachers to increase children's performance in waste management (Harman& Yenikalayci, 2022). Demographic factors shape students' waste management behaviours, underscoring the need for targeted environmental education and teacher training to improve knowledge and practices across diverse student groups. This is true because the demographic characteristics and training influence behaviour practices (Bhurtel & Bhattarai, 2023).

Students' participation in waste management is largely shaped by their knowledge, attitudes, and practices (KAP). Research suggests that individuals with greater environmental knowledge are more likely to engage in pro-environmental actions, such as waste categorization and recycling (Barr, 2007). Attitudes toward waste management, however, are not developed in isolation but are influenced by cultural, social, and educational contexts. In line with this, a recent study indicates

that both knowledge and attitude significantly predict circular economy behaviour among students (Olech et al., 2025). Furthermore, a positive attitude toward the environment fosters a sense of environmental responsibility and strengthens the belief that human action can provide solutions to environmental problems (Hines et al., 1987). Habits are, however, affected by infrastructure, social norms and peer pressure. Practices, on the other hand, are also influenced by the availability of infrastructure (Darnton, 2008). These literatures show that knowledge, attitude, and available infrastructure collectively shape students' effective participation in waste management.

Factors Influencing Students' Engagement in Waste Management

Students' involvement in waste handling is on account of several factors, such as the socio-economic status of the parents, parents' attitude towards waste management and the school environment. The socio-economic background of students, particularly the parents' education, earnings and type of occupation, influences access to environmental education and sustainable living in a crucial way (Chawla & Cushing, 2007). Parental attitudes and behaviour concerning HH waste management also strongly influence students' behaviours (Evans et al., 2007; Grønhøj & Thøgersen, 2012). Parental socio-economic status significantly shapes students' environmental education access and waste management behaviours. Family structure plays a role, too. Joint families, with their emphasis on intergenerational knowledge transfer, uphold a higher consciousness and practice of sustainable actions than nuclear families, in which work is more individualized (Dhole et al., 2020; Sadhu & Das, 2020). Family-oriented students have structured routines and parental exemplars, while independent students face challenges in the form of time constraints and few recycling facilities (Barr, 2007; Tucker & Speirs, 2003). Joint family environments foster stronger, sustainable practices among students through intergenerational learning compared to nuclear families.

Attitudes and behaviour are influenced by economic conditions, particularly remittance income. Remittance-paying families may prioritize ease over sustainability, substituting labour-based activities like composting with professional services (Kaur & Kaur, 2024; Becker, 1965). Poor students may adopt the reusing of waste out of economic necessity, though poor awareness and facilities generally stand in the way of proper implementation (Barmon et al., 2015; Mak et al., 2021).

Evidence shows that economic resources and remittance income influence household waste behaviours, often balancing convenience and sustainability.

One of the pillars of student engagement is environmental education. Students taught with official curricula imparting sustainability principles are more likely to participate in waste segregation and recycling activities (Karpudewan et al., 2014). Environmental education raises awareness about the impacts of wasteful disposal and inspires pro-environmental behaviour (Mogensen & Schnack, 2010). Research confirms that formal environmental education enhances students' participation in waste segregation and recycling activities.

Still, gaps between knowledge and practice persist. Evidence shows that while the students may have average consciousness, little behavioural change takes place because the education is theoretical in nature with no practical aspects involved (Gupta et al., 2015; Kaza et al., 2018). Introducing hands-on sustainability projects into education can help bridge the gap (Zelezny, 1999). Literature highlights a persistent gap between students' environmental knowledge and actual behaviour, underscoring the need for practical, hands-on learning approaches.

Institutional settings influence student behaviour considerably. Schools and universities that adopt sustainability in clear policies, like compulsory recycling or zero-waste initiatives, have higher levels of student engagement (Armijo de Vega et al., 2008). Administration support in the aspects of resources, facilities and organized programs like environmental clubs influences student participation (Sammalisto & Lindhqvist, 2007). Empirical findings reveal that schools with clear sustainability policies and active administrative support have higher levels of student engagement in waste management.

The availability of environmental clubs, sustainability programs and environmental role models at school has been linked with higher motivation of students (Moghadam et al., 2009; Stern, 2000). These organizational mechanisms establish an environmental responsibility culture.

Social influence, particularly peer-group and cultural norms, holds strong control over environmental behaviours. That way, students are more likely to act sustainably if they see peers opting for such behaviour (Cialdini et al., 1990). Social conformity coupled with group processes thus tends to reinforce good behaviour (Nolan et al., 2008). Organizations could, therefore, promote peer-led campaigns and collective actions through student environmental bodies.

A lack of easy-to-use infrastructure, unless this includes waste bins strategically placed and well signposted, discourages participation in recycling and composting schemes (Kelly et al., 2006). Badly designed facilities or their absence act as barriers to participation (Tonglet et al., 2004). Therefore, it becomes compulsory for institutions to prioritize the location and maintenance of their waste management systems.

Intrinsic motivation and personal values also play a part in waste behaviour. Students with strong pro-environmental attitudes tend to exhibit sustainable behaviours (Bamberg & Möser, 2007). Environmental responsibility transforms into actual change in behaviour over time (De Young, 2002); whereas when inconvenience is perceived, or one does not see the effect, participation may go down (Hornik et al., 1995). Incentive structures such as rewards and recognition can be used to enhance continued student motivation.

KAP on Waste Management of Students

The KAP model is a commonly used quantitative tool to understand what people know, their belief, and their practices about a given topic of interest. This model is especially useful for assessing KAP reflected by school students in the domain of household waste management (United States Agency for International Development [USAID], 2014). Knowledge refers to the information and understanding acquired through study or experience. In this context, it pertains to students' comprehension of HH waste management processes, environmental consequences, and best practices, such as the 3R (reduction, reuse, and recycling) principles of waste (Fadhullah et al., 2022). Attitudes are the cognitive and affective mindsets that influence people to view, respond, and react in certain ways. Students' attitude towards waste management is their acceptance, feelings, intentions, and intention to act in an environmentally friendly manner. Practices are the customary actions and things that people do. For the students, these were waste sorting, recycling, and composting, which would lead to the development of new skills and to balanced behaviour in waste management.

Understanding HH waste is crucial in influencing sustainable HH waste management and reducing the negative impact of improper waste management on public health and the environment (Fadhullah et al., 2022). The Kathmandu Valley faces numerous problems in solid waste management, including hazardous waste disposal practices, long transportation distances due to outdated vehicles and heavy

machinery, lack of capacity enhancing opportunities, inadequate equipment and workshop facilities, an insufficient workforce, inappropriate laws and policies, limited awareness among the public and political intervention (Lakhe & Manandhar, 2022). Most of the study respondents had moderate knowledge of waste management, and only a few had good practice levels (Lakhe & Manandhar, 2022). Khanal et al. (2021) have added to this the fact that almost 44% of the valley's waste generated is reusable or recyclable, which underscores the potential for increasing household investment in recycling and sorting.

The value of gender in influencing individuals' perceptions and actions regarding waste management is increasingly being documented in the literature. Women exhibit a more positive attitude and behaviour toward waste management than men (Qu et al., 2023). Gender plays a significant role, with women generally demonstrating more positive attitudes and behaviours toward waste management than men.

Education is essential to improve waste management practices, benefitting both society and the environment at large (Dung et al., 2017). Initial environmental education focuses on raising students' awareness of environmental issues and educating them on effective conservation practices (Owojori et al., 2022), and education is considered an important component influencing people's perceptions in managing household waste (Fadhullah et al., 2022). Sensitization drives have been successful at promoting better waste management in Nigeria (Dauda et al., 2019), and school projects have also created a sense of engagement among students and their families (Desa et al., 2012). However, waste management practice is also affected by socio-economic and demographic factors like level of education, sex, income, and awareness (Stanley et al., 2018). Notwithstanding efforts to sensitize the public, unsustainable disposal behaviour, like open burning and littering, is still dominant in some areas, including Nigeria (Ogun State), and participatory strategies are strongly commended for the betterment of the state's waste management system (Stanley et al., 2018). This represents the need for more focused educational interventions. Reodica (2021) also highlights schools in the transmission of knowledge around waste management, and that an institutional activity may influence the broader comprehension of students and their daily behaviour. Furthermore, studies by Grodzinska-Jurczak et al. (2003) and Palmer et al. (2003) exhibit that program design may play a considerable role in helping students understand and become involved in

municipal waste management, and is often influenced by age group and depth of program involvement. However, Debrah et al. (2021) and Licy et al. (2013) emphasized the importance of more inclusive education on waste management, especially in the context of developing countries, such as a lack of hands-on education to instruct teachers and an insufficient level of environmental knowledge in students.

While a wide-ranging review of world literature shows the noteworthy role of education and awareness campaigns on HH waste management attitude and practice, it is unfortunate that there is a lack of research on KAP of students in relation to household waste management in Bhaktapur Municipality. Existing literature on waste management in Nepal might offer a wider view of the subject, but it is insufficient to contextualize the issue within Bhaktapur Municipality. Although some studies have highlighted education as a crucial factor in affecting the attitudes and behaviours among individuals regarding SWM, the parental educational aspect and its effect on the KAP of students are unexplored.

Increasing awareness of and encouraging good waste management is crucial. Recycling and waste segregation, at least at the HH level, are to be more encouraged in handling waste management problems (Khanal et al., 2021). Moreover, despite having positive attitudes toward waste management, environmental education can be added to the curriculum to improve behaviours and attitudes (Harman & Yenikalayci, 2022). In view of these remaining knowledge gaps, particularly in low-income countries, comprehensive educational strategies are necessary to promote sustainable waste treatment. Subsequent studies can be conducted in Bhaktapur Municipality to examine the KAPs of students and the contribution of parents' education in modifying waste management practices.

Policy Review

The Government of Nepal (GoN) is actively working to deal with the issues and challenges related to waste management in Nepal. While many local governments have considered SWM and disposal as a priority, the scarcity of funding and technological improvements has restricted how efficiently these facilities have become. This review examines six key national policies, strategies and acts relevant to waste management to analyse how they address (or overlook) household-level waste practices, particularly in relation to student behaviour and parental influence. These include:

Solid Waste Management National Policy, 2053 (1996)

Solid Waste Management National Policy, 2053 (1996) provides a common framework for effective local management of solid waste by the government and local bodies in Nepal. The policy is intended to promote the organized development of solid waste management and the improved quality of solid waste management to reduce adverse impacts on the environment, health, and municipal economy (Ministry of Local Development [MoLD], 1996). The policy is focused on 'waste-as-resource' and advocates for privatization in waste management. It also emphasizes the public's role in awareness building and in supporting sanitation activities. Yet, there exists a gap in explicitly incorporating the household-level waste management practices into a broader framework.

Solid Waste Management Act, 2068 (2011)

The Solid Waste Management Act, 2068 (2011) decentralizes the responsibilities of different actors in handling solid waste, from the central government to local authorities. The Act formally assigns the responsibility for solid waste management to local government bodies (municipalities) (Nepal Law Commission [NLC], 2011). It includes specific provisions for the establishment and operation of waste management systems encompassing waste collection, segregation, processing, and disposal. However, there is a noticeable gap in research specifically examining the role of parental education level in shaping students' behaviours toward waste management. Nepal has implemented some policies and regulations on waste management, including the Solid Waste Management Act (2011) and National Urban Development Strategy (2015), but their implementation is weak mainly because of insufficient resources and capacity of institutions (Asian Development Bank [ADB], 2013; Ministry of Urban Development [MoUD], 2015). While Nepal's Solid Waste Management Act decentralizes responsibilities to local governments, gaps remain in understanding how parental education influences students' waste management behaviours, and policy implementation is often weak due to limited institutional capacity.

Local Government Operation Act, 2074 (2017)

Local Government Operation Act, 2074 (2017) reinforces the duties, functions, and powers of local governments in relation to health and sanitation. It highlights the need to create awareness of sanitation and waste management, collection, reuse, recycling, and disposal of waste (GoN, 2017). While promoting

collaboration with the private sector and non-governmental organizations, more focused attention is not given to community-based approaches for waste management, and less emphasis is given to behaviour change communication strategies.

National Climate Change Policy, 2076 (2019)

The National Climate Change Policy, 2076 (2019), is promulgated with the objective of mitigating climate change impact and for the establishment of a climate-resilient society. The policy focuses on the prudential management of hazardous waste and also advocates for the utilization of biodegradable waste for energy generation (Ministry of Forests and Environment [MoFE], 2019). It focuses on the source segregation of waste generated from households, hotels, industries, and hospitals. The policy contributes towards achieving the larger objective of social-economic well-being as well as responding to challenges of climate change by promoting sustainable waste management practices (MoFE, 2019). However, the explicit consideration of waste management practices at the household level is missing.

Environment Protection Act, 2076 (2019)

The new Environment Protection Act, 2076 (2019), consolidates and replaces all previous acts regarding environmental conservation in Nepal. It aims to guarantee the right of every individual of the present and future generations to a clean and healthful ecology: balance the needs of the present generation and the future generations to develop the environment and the concerns of the economy and the environment (GoN, 2019). It provides measures for the prevention, control, and mitigation of pollution and establishes standards for the management of pollution. The act also underscores the necessity of conducting environmental studies and assessments, including Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) for the development initiatives. However, no targeted programs exist that address household-level waste management practices and parental sociocultural and educational factors influencing HH waste behaviour.

Although the reviewed policies collectively highlight the importance of improved waste management, several critical gaps persist. Most policies focus on institutional responsibilities and technical solutions, while neglecting behavioural, cultural, and educational aspects of household waste management. There is minimal emphasis on community engagement, behaviour change communication, and the influence of parental or household-level education on children's waste practices.

Furthermore, weak implementation mechanisms and resource constraints continue to hinder the translation of policies into effective, localized action.

Research Gap

Although numerous studies have been conducted on municipal solid waste management in Nepal, there are prevailing gaps, particularly the lack of contextual research focused on Bhaktapur Municipality in the country. Cities like Kathmandu have been well documented in the academic literature (Lakhe & Manandhar, 2022; Khanal et al., 2021). Bhaktapur, with its specific socio-demographic context, fast-growing urbanization process, and waste management, remains unknown to a large extent. National studies, like the Waste Management Baseline Survey of Nepal (2020), recognize the long-term problems experienced in Bhaktapur, such as inconsistent waste collection and limited landfill capacity. However, they do not explore local community initiatives or household practices. Additionally, researchers like Yorifuji (2011) and Zhang et al. (2023) highlighted the role of parents' behaviour in shaping children's environmental behaviour around the world. However, specific studies on parents' socio-economic status and education in relation to students' KAP toward waste management are limited in the context of Nepal. There is also no evidence of factors that could influence students' KAP on waste management amongst students in Bhaktapur, yet literature found in other settings has demonstrated that creating awareness among students does not always guarantee the sustainability of practices (Ampofo, 2020; Dauda et al., 2019). Furthermore, the waste management policy adopted in Nepal, like the Solid Waste Management Act, 2011, focuses on the technical and infrastructural approaches, lacking the application of behavioural solutions at the household level, including students and parents (NLC, 2011). Even though successful models from elsewhere, for example, Singaporean family-inclusive schooling initiatives (Zurbrügg et al., 2014), are not a part of the Nepalese education model. Finally, although environmental education is considered important to day-to-day learning (Dung et al., 2017), there is no adapted or curriculum-integrated intervention for schools in the Bhaktapur municipality. These lacunae highlight the necessity of conducting well-schemed research to address student KAP locally, incorporating parental influences, checking the efficacy of policies, and suggesting educational approaches to develop benign waste management behaviours in Bhaktapur.

Theoretical Framework

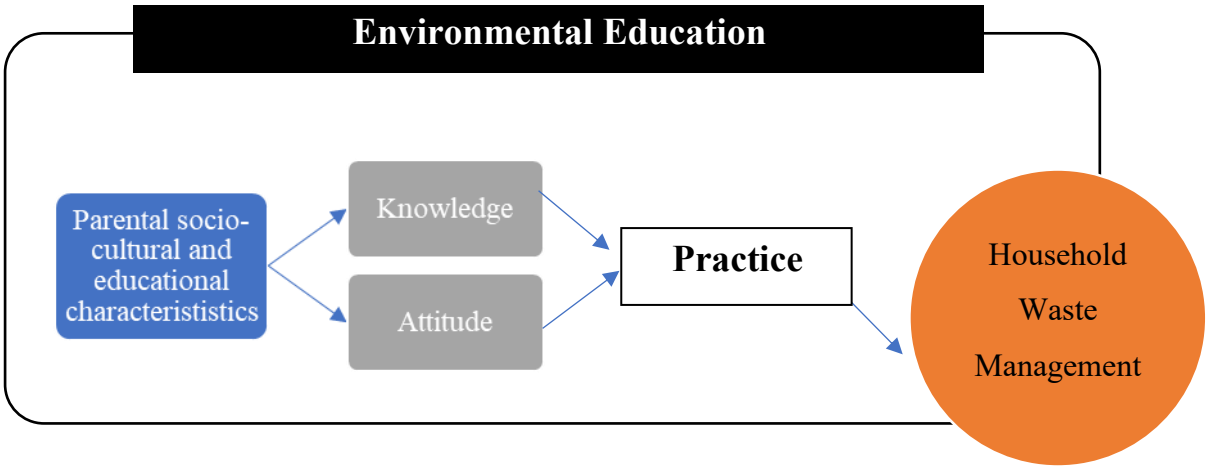
This study seeks to blend environmental education principles with the KAP Model to comprehensively assess students' KAP in household waste management while considering the influence of parental education and social aspects (USAID, 2014).

Environmental Education functions as a pivotal tool in nurturing environmental literacy, awareness, and pro-environmental behavioural change. Through this lens, the assessment of students' levels of awareness and advocacy for sustainable waste management practices was conducted. Environmental education empowers individuals to discover environmental challenges, get involved in problem resolution, and act to improve the environment (United States Environmental Protection Agency [USEPA], 2022). By infusing principles of environmental education into the study, a theoretical basis for assessing students' KAP regarding waste management was established, thereby concentrating on the fundamental area of environmental education-knowledge, attitude, and behaviour, which are essential for promoting sustainable practices (Harman & Yenikalayci, 2022). This underscores the critical role of environmental education in shaping students' knowledge, attitudes, and behaviours toward sustainable waste management.

In this blended framework, the study seeks to assess the students' waste management knowledge with a specific focus on the environmental effects of waste, prevailing practices in the local context, and the part played by household waste in environmental sustainability. The research has also examined students' perceptions of their role in taking care of waste, the implementation of environmentally sustainable activities, and how waste from home affects the environment. Also, the study examines students' present approaches to waste management in households, in detail, including the methods mostly adopted for disposal, recycling behaviour, and efforts to decrease the amount of waste being generated. This study looks into the effect of parental education on students' KAP towards HH waste management to determine whether elevated parental education is associated with higher levels of students' KAP of waste management.

Figure 1

Theoretical Framework



Concluding the Chapter

This extensive literature review has confirmed the worldwide significance of solid waste management as an important environmental, social, and economic issue in Nepal's urban settings, such as Bhaktapur Municipality. The analysis indicates general weaknesses in facilities, policy, and public cooperation related to waste management and presents an urbanization-driven, unsuitable waste disposal system. Although previous studies have emphasized the contribution of different stakeholders like municipalities, private sector organizations, and community organizations, a notable knowledge gap exists in terms of how the KAP of students is influenced by parental socio-demographic and educational influences in Bhaktapur. The theoretical model, which combines the elements of environmental education with those of the KAP model, allows a solid base for an analysis of these relationships by highlighting generations as an instrument for waste management practices (USAID, 2014). While Nepal has made advancements in policy, such as the Solid Waste Management Act (2011) and Local Government Operation Act (2017), operational challenges remain, highlighting the need for context-specific, behaviour-driven interventions. This review not only synthesizes international and national evidence on waste management education and its underlying determinants for further empirical testing in Bhaktapur but also delineates the areas where further studies are needed to establish how educational strategies and parental involvement can contribute to promoting sustainable waste management among the students.

CHAPTER III
RESEARCH METHODOLOGY

The research approach used to examine school students' KAP on household waste in Bhaktapur Municipality, Nepal, is presented in this chapter. Within a post-positivist paradigm, the research privileges the empirical evidence with an awareness of the subjective factors impacting the construction of knowledge. Start with a discussion on the paradigm of research and design and then delve into a description of the study area, sampling strategy, and data acquisition techniques, with a focus on the structured KAP survey. It follows with methodology focusing on the scale-building procedure (validity and reliability control) and the data analysis plan (descriptive and inferential statistics: Chi-square tests, logistic regression). Lastly, ethical issues are discussed for the protection of participants and data privacy. By documenting the research protocol systematically, this chapter lays the basis for the examination of waste management behaviour and its association with students' sociocultural factors, which encapsulates the broader objectives of the study.

Research Paradigm and Design

A post-positivist paradigm is used in this research study undertaken to evaluate students' understanding of HH waste management. The paradigm has been utilized because post-positivists state that what we know about the reality of the physical world is generated by human consciousness through the use of language and oppose endeavours to anchor knowledge beyond human experience (Moxley, 2023). In the case of the study, the knowledge was acquired from the consciousness of the students regarding their KAP through a survey rather than an experiment. Thus, this study acknowledges the value of empirical data and scientific methodology, but at the same time values the view that knowledge can be measured through some errors in social issues like waste management (Panhwar et al., 2017). This research adopts a post-positivist paradigm to balance empirical measurement with an understanding of the subjective nature of students' knowledge, attitudes, and practices in household waste management.

Ontology

This study is rooted in post-positivist ontology, which acknowledges that there is an objective reality that can be measured from the consciousness of students on the

complex issue of waste management. Ontologically, post-positivism aligns with the objective measurement of issues (Pretorius, 2024). The researcher believes that the KAP of students on waste management can be measured objectively, by a number of contextual aspects such as cultural beliefs and practices, economic levels, and level of education.

Epistemology

Informed by post-positivist epistemology, the study holds in high regard systematic inquiry and empirical observation, does not compromise methods for inquiry objectivity, and regards knowledge as being provisional and probabilistic. Epistemology explores the nature and scope of knowledge, emphasizing the dynamic relationship between the knower and what is known and acknowledging that while empirical and systematic methods are valued, knowledge remains provisional, interpretive, and open to refinement (Pretorius, 2024). Findings on students' KAP relating to household waste management are reported based on a KAP survey, which is not only reported subjectively but also individually perceived and biased. Using reliable survey instruments and statistical methods, the research seeks to generate reliable, comparable information that supports better-informed waste management decision-making in Bhaktapur Municipality.

Axiology

Axiologically, the research does not compromise its neutrality and objectivity in the subject matter of the students' waste management practices. Although this study attends to environmental and social problems, we do not want to suggest that participants are morally wrong in their behaviours and attitudes. In the post-positivist paradigm, axiology recognizes that while complete objectivity is unattainable, researchers strive to minimize bias and uphold rigor to produce credible and valid knowledge (Creswell & Creswell, 2017). This study values empirical evidence from students' KAP on household waste management while acknowledging the influence of social and cultural contexts on their behaviours. Ethical considerations guide the research process to ensure respectful and accurate representation of participants' perspectives. By adopting this value stance, the study aims to generate actionable insights that support evidence-based interventions promoting sustainable waste management practices.

Design

The study employed a KAP survey to assess the awareness level of school students in HH waste management. A KAP survey, employing predefined questions in standardized questionnaires, serves as a quantitative method to access information, uncovering misconceptions or misunderstandings that could impede planned activities and hinder behaviour change, though it primarily captures opinions and declarative statements, highlighting the potential disparity between expressed attitudes and actual behaviours (DeVellis, 2022). Data were gathered using pre-tested and validated questionnaires to collect information on students' KAP towards household waste management. Data was descriptively and inferentially analysed to summarize the results and the relationships among the variables.

Within selected schools, students are randomly chosen to ensure diversity. The instrument for data collection is self-constructed based on the 3Rs principle of waste management. Data is collected through KAP surveys administered using a hybrid method, which is Google Forms and hardcopy. Ethical considerations consist of getting permission from the Bhaktapur Municipality Education Branch for the conduct of the survey, obtaining permission from head teachers and students, ensuring the maintenance of privacy and confidentiality, and respecting ethical guidelines for the protection of the participants' well-being and rights during the study.

Study Area

The study was conducted in six public schools running grades 11 and 12 in Bhaktapur Municipality. The research focused on target school students for insight into household waste management techniques because their knowledge and attitudes provide insights into the possible impact of educational interventions on future behaviour. The study aspires to offer insights into family-level interventions with a special focus on parental education. Furthermore, since students represent a crucial target in forming sustainable practices and changing their values, they are an ideal class of subjects to explore how educational interventions could foster sustainable behaviour. Educational intervention in nursing students significantly promoted KAP toward sustainability development (Elshall et al., 2022). Likewise, a longitudinal study on university students found that education for sustainable development improved pro-environmental knowledge, norms, and behaviour, and these effects remained after a year of the intervention (Collado et al., 2021). Program elements that are effective in sustainability include structuring in small groups, discussion-oriented

orientation, and appeal to existing values (Wynveen et al., 2019). A large cross-sectional study in Sweden found that Education for Sustainable Development (ESD) is associated with students' sustainability awareness and consciousness, emphasizing the importance of ESD in promoting sustainable development (Pauw et al., 2015). This study emphasizes the role of educational interventions and parental influences in fostering sustainable behaviour.

Bhaktapur Municipality is known for its good waste management, which sets it apart from other places. The city carries out waste segregation at the source, sorting bio-degradable and non-degradable waste and collecting it on a daily basis. It operates a compost plant to manage organic waste. Non-degradable waste is sold to generate income, while degradable waste, after being converted into compost through the CNBN technology, is sold for a cheap price (Giri, as cited in Aryal, 2022). In major tourist areas, waste is collected throughout the day, and staff and dustbins are placed in such a way that the area remains as clean as possible. In addition, local authorities are encouraging rooftop gardening by providing residents with compost sourced from household waste at a subsidized rate to promote the use of organic waste in urban farming (Aryal, 2022). Unlike other municipalities where waste collection has been privatized, in Bhaktapur, municipal employees are being mobilized to collect waste, which helps to maintain clean streets (Aryal, 2022). Bhaktapur Municipality exemplifies effective waste management.

Bhaktapur is still struggling with the problem of HH waste. The municipality has no landfill site of its own, and waste is dumped on the riverbanks. Municipal waste generation is on the rise, especially plastic waste, and there is a poor practice of waste segregation at the source. In addition, the infrastructure in the city is not able to accommodate its growing demands (Ranjit et al., 2019). Ranjit et al. (2019) stated that municipal HH waste generated was 0.093 kg/capita/day, predominantly made up of organic (77%) and plastic and paper (18% & 3%, respectively). Although the collection system was reported to have been performing well, treatment and final disposal were identified as unsustainable due to dysfunctional treatment plants and other infrastructural components lacking.

It is, therefore, relevant to explore the waste management knowledge of school students in Bhaktapur, as the practices and attitudes of students may be influenced by the associated efforts of the municipality. Grades 11 and 12 students are ideally suited to complete such a survey because of their developmental maturity, exposure to

related topics, and transition to post-secondary education or the workforce. These are also grades where leadership opportunities exist and long-term effects on attitudes about waste management can be followed through transition from force or trying it in college (or adulthood) education. KAP study in Bhaktapur can, thus, build on effective strategies that may be feasible to implement, replicate, or modify in other settlements, and add to broader efforts to strengthen the capacity of community people to manage waste as well as to promote a sustainable environment.

Population and Sample

This research focuses on individual secondary school students of classes 11 and 12 enrolled in all 6 public higher secondary schools in Bhaktapur Municipality. For obtaining a representative sample, a stratified random sampling technique was employed. Within selected schools, students were randomly chosen to ensure diversity by considering grade and gender.

The population consists of 1,907 students, and the sampling method chosen is stratified random sampling, with grade levels (+2) serving as the strata. The sample size was calculated by using Cochran's formula for a finite population,, provided below, which is 320.

$$n = \frac{(Z^2 \times p \times (1-p)}{E^2}$$

n = sample size

Z = desired level of confidence (1.96 for a 95% confidence level)

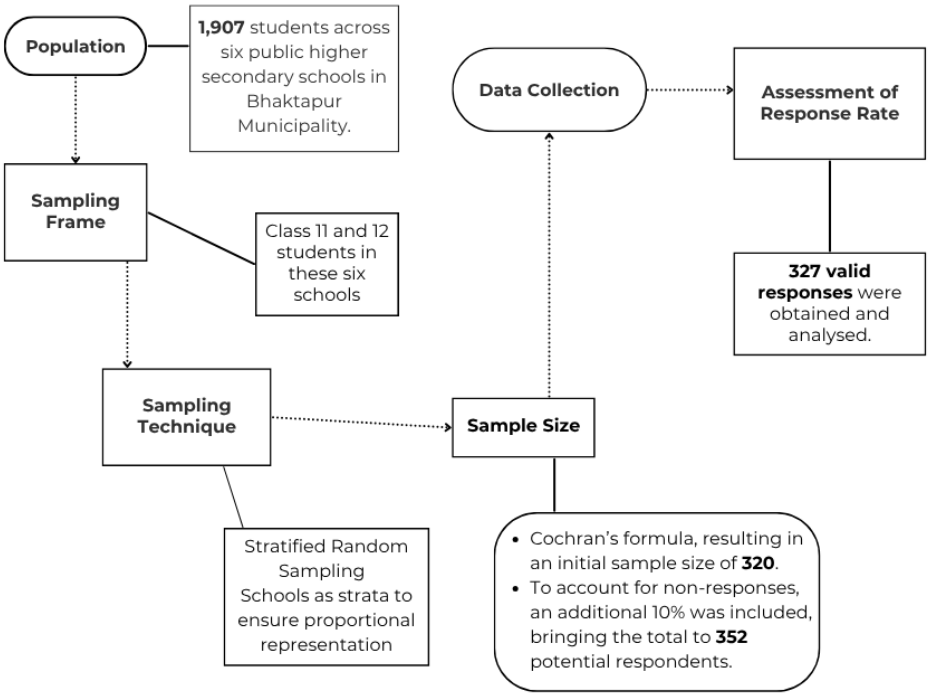
p = estimated proportion of the population with the characteristic of interest

E = desired margin of error

An additional 10% of the initially determined sample size was added to allow for possible non-responses, partial completions, and other issues that could create difficulties in collecting information. Of the 352 respondents contacted, valid and complete responses were collected from 327. This approach was used in order to ensure an adequate statistical power of results, but at the same time, it diminished the possibility of data attrition due to non-responders or incomplete submissions. The study now incorporates a larger sample size, which enhances the reliability and validity of the findings in analysing household waste management practices within Bhaktapur Municipality.

Figure 2

Sampling Framework



Once the sample size was obtained, the study ensured that the results would be statistically significant and representative of the target population by applying a stratified random sampling technique. The procedure of sampling is given as follows:

1. **School Stratification**: All public schools in the municipality were selected, and the sample size of each school was determined proportionately to its population share. For example, School F (63% of the total population) contributed the highest proportion to the sample, and School B (only 1% of the total population) contributed the lowest.

   Table 1

   Distribution of Students Across Six Schools

School Name	Grade 11	Grade 12	Total Students	Percentage
School A	150	200	350	18%
School B	6	19	25	1%
School C	25	57	82	4%
School D	16	49	65	3%
School E	60	120	180	9%
School F	392	813	1, 205	63%
Total	**649**	**1, 258**	**1, 907**	**100%**

2. **Classroom-Level Selection**: Due to the unavailability of pre-existing student rosters from the schools, random sampling was conducted on-site during

classroom visits. Within each school, the number of students sampled was aligned with its proportional share. In each selected Grade 11 and 12 classroom, students were chosen using systematic random sampling (every third or fifth student) to minimize selection bias. In smaller schools (Schools B to D), where the required number of participants was very limited, students were selected using a lottery method, either by drawing names from the attendance list or selecting randomly from volunteers.

This multi-stage, field-adapted sampling strategy allowed the study to approximate stratified random sampling as closely as possible under field constraints. It ensured that the sample reflected the distribution of students across schools without overrepresentation and maintained methodological rigor despite the absence of formal student lists.

Scale Construction

The comprehensive survey-based study is used to measure the KAP of students of Bhaktapur Municipality regarding waste in households. The scales were developed systematically to establish reliability, validity, and cultural appropriateness.

Students' KAP on household waste management was appraised using a structured questionnaire to measure the KAP of the students regarding household waste management in Bhaktapur Municipality. Rigorous methods were undertaken in developing the scales to maintain validity, reliability, and cultural appropriateness in the study context. It was designed based on theoretical frameworks of environmental education (Ajzen, 1991; Kollmuss & Agyeman, 2002), best practices from previous KAP studies on waste management (Singhirunnusorn et al., 2017; Wan et al., 2017), and consideration of specific behaviours for Nepali students.

The scale was composed of three dimensions:

a) ***Knowledge***: This measured students' awareness of ways of disposing of waste, the consequences of waste to the environment, and the 3Rs principle (Reduce, Reuse, and Recycle) with waste segregation.
b) ***Attitudes***: These are about the students' beliefs, perceptions, motivations, and willingness to behave sensibly and sustainably in the disposal of waste.
c) ***Practices***: Assessed students' self-reported environmental behaviours, such as recycling, composting, and segregating waste in the home and school.

Within these three categories, the items were classified as Reduce, Reuse, Recycle, and Segregation to allow a comprehensive analysis of practices of waste management. For psychosocial constructs, it is necessary to have a systematic way to develop behavioural measurement scales because specific KAP frameworks identify knowledge gaps as well as points of lag in behavioural change (Schultz, 2002; Vicente & Reis, 2008). The classification of waste management practices into Reduce, Reuse, Recycle, and Segregation categories enables a thorough analysis, while systematic behavioural measurement scales help identify knowledge gaps and barriers to change in KAP frameworks.

To construct the items of the survey, a meticulous review of the literature was carried out, which revealed confirmed KAP instruments from earlier studies regarding waste management. This review guided the first draft of the survey questions to align with environmental education theory and local waste management practices in Nepal. The questionnaire consisted of three parts, which are Knowledge (16 multiple choices questions with one or more correct answers per question), Attitudes (19 statements which were measured by a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree") and Practices (18 behaviour-based questions were rated on 5-point frequency scale ranged from Never through Always). The classification of the survey items into the KAP framework draws from earlier research into waste behaviour and environmental psychology (Barr et al., 2001; Kaiser & Wilson, 2004). The knowledge domain included eight knowledge statements (reduce (e.g., reduce waste and understand the impact of waste on environment-B.1, B.2, B.3, B.9, B.12), reuse (e.g., reuse items in the home such as jars and books-B.13, B.14, B.15, B.16), recycle (e.g., recycle material and make compost from waste-B.10, B.11, B.18) and segregation (separating waste into categories such as organic and recyclable-B.4, B.6, B.7, B.8). The Attitude part included questions related to respondents' personal opinions about waste management (e.g., importance of reducing waste, reusing goods, recycling for financial gain, safer disposal through segregation) (reduce-C.1, C.3, C.4, C.9, C.11, C.12, C.13, C.14, C.19; reuse-C.15, C.16, C.17, C.18; recycle-C.2, C.5, C.7, C.10; segregation-C.6, C.8). Their behaviours were assessed in Practice, which included the following practical activities: reducing waste using sustainable methods, reusing items (bags), recycling materials and sorting at home in different waste bins (reduce-D.9, D.10, D.11, D.12, D.14, D.15; reuse-D.7, D.17, D.18; recycle-D.3, D.4, D.5, D.6, D.8, D.13; sorting at home-D.1, D.2, D.16). This inclusive strategy is designed to provide

us with insights from survey participants about their KAP towards waste management in reduce, reuse, recycle and segregation areas.

This structured classification helped to assess the KAP of HH waste management, focusing on the principles of environmental education and sustainable HH waste management practices. Research has highlighted the necessity for these theory-derived measures to be able to measure waste-related behaviours reliably and to help identify areas amenable to intervention (Geiger et al., 2019; Steg & Vlek, 2009). Such a detailed and nuanced understanding is essential for designing targeted interventions that address the most critical points where behavioural change can be encouraged effectively, ultimately contributing to more sustainable household waste management practices.

The development of the survey instrument was carried out through several key stages for reliability, clarity, and applicability to the implementation of students' KAP for household waste management. Pilot testing of the questionnaire was done among our representative sample of students from Madhyapur Thimi Municipality to check the clarity and readability of questions and the precision of the responses. The pilot study permits the discovery of problems such as confusing questions, respondent biases, or logistical issues, and also provides the opportunity to modify the instrument for maximum efficiency (Creswell, 2014). Rea and Parker (2014) noted that pilot testing is a critical component to guarantee that the data are reliable, meaningful, and representative of the study population's actual attitudes, knowledge, or practices. In addition, pilot testing provides feedback on time and gives an idea of the time needed to complete the survey, which allows researchers to estimate the length of the entire instrument (Teijlingen & Hundley, 2001). It is also useful to the extent that it helps evaluate the validity of the instrument, sometimes through reliability tests (e.g., Cronbach's alpha) as a means to ensure that the respondents will always be measured on a scale as intended (DeVellis, 2022). This provision also facilitated the estimation of the time required to complete the survey and allowed the detection of potential response biases. Modifications were made based on the feedback from this pilot study: simplification of technical terms, the addition of an English version of the questionnaire for a good understanding of technical terminology, and rephrasing obscure items for better understanding. For further examination of the survey, Cronbach's alpha was calculated for each section, ensuring internal consistency.

The final questionnaire included 16 Knowledge items (multiple choice), 19 Attitude items (Likert scale), and 18 Practice items (Likert scale), with the questionnaire written in two language versions (Nepali and English) along with instructions for precise responses.

Data Analysis and Interpretation

KAP survey data were analysed using descriptive and inferential statistics to respond to the study's research questions. The findings are presented in tables to illustrate trends, patterns, and relationships. Descriptive statistics described a general picture related to students' KAP, and inferential statistics determined factors that were important in waste management practices. This is a detailed study giving insight into the different factors determining the practice of HH waste management amongst the students in Bhaktapur Municipality.

The first research question focused on assessing the knowledge and attitudes of school students. Descriptive statistics, percentages, and frequency distribution were used to summarize the socio-demographic characteristics of the students and their knowledge and attitudes regarding waste management at their homes.

The second research question was to investigate how students manage their waste. Descriptive statistics, percentages, and frequency distribution were used to analyse the students' practices of reducing, recycling, reusing, and segregating behaviour. The findings identified significant trends and irregularities in their practices between different groups.

Students' awareness of the management of household waste is measured based on four dimensions -reduction, reuse, recycling, and segregation. This enables the exploration of their level of consciousness and performance in sustainable waste management. For analysis, knowledge scores were categorized into three levels (high, medium, and low), attitudes into three levels (negative, neutral, and positive), and practices into three categories (low frequency, moderate frequency, and high frequency).

Research question three looked at the effect of parents' socio-demographic and educational backgrounds on the students' KAP of household waste management. Chi-square test as part of inferential statistics was performed between categorical variables, i.e., gender, grade, caste/ethnicity, family type, and KAP level. The Chi-square test is usually used to study relationships between categorical variables (Hazra & Gogtay, 2016; Msuha & Mdendemi, 2019; Rana & Singhal, 2015). By employing

this method, the study aimed to identify which socio-demographic factors were significantly related to students' waste management behaviours, thereby providing insights into how parental background and demographic context might shape environmental awareness and sustainable practices among youth.

Chi-square tests were used to analyze categorical data and examine the relationships between respondents' socio-demographic characteristics and their KAP regarding the management of household waste. The study sought to determine the associations between demographic variables (like gender, grade, caste/ ethnicity, and family system) and students' waste management behaviour. The results illustrate the effect of socio-demographic characteristics on the students in the waste management scenario of Bhaktapur Municipality.

While performing statistical analysis, especially the chi-square test, the most important thing is making sure that each category has a good sample size so that the test remains valid. It is often a rule of thumb that all expected frequencies should be at least 5. The chi-square test's minimum cell counts are a crucial point to consider for result validation. However, if this assumption is not met, the test might give inaccurate results, and alternative analyses, such as Fisher's exact test, may be opted for (Field, 2018). Field (2018) emphasizes that the chi-square test might not be valid if more than 20% of the cells in a contingency table have an expected frequency of less than 5. In these situations, researchers could potentially collapse categories in order to increase the cell count or employ an alternative statistical test, such as Fisher's exact test (Bewick et al., 2004). This helped guarantee the strength and credibility of the statistical analysis. The four original categories (Brahmin/ Chhetri/ Thakuri/ Sanyasi, Dalit, Janajati, Newar) were reclassified into two categories: Janajati with a combination of Janajati and Newar, and Other than Janajati with a combination of Brahmin/Chhetri/Thakuri/Sanyasi and Dalit. This reclassification is appreciated for a variety of reasons: consolidation of groups that are socio-culturally similar (Janajati and Newar), decreased chance of small, expected frequencies in the chi-square test (particularly for the Dalit group), compatibility with statistical demands, and sociological differences. The occupation variable was also re-coded for the chi-square test to ensure sufficient sample sizes and power. The primary categories (farmer, househusband/wife, daily wage) were recategorized together in the 'Informal' category, whereas entrepreneur, foreign employment, and service were placed under the 'Formal' category. Collapsing categories this way, it minimizes the

possibility of small frequency, expected frequencies in the chi-square test, with more trustworthy results and still captures some meaningful distinction among the categories also, because only 14 respondents reported conditions of disability in their families, a chi-square test for this variable would not produce statistically viable findings and, hence, excluded from the analysis.

Categorization of KAP Scores

To facilitate categorical analysis, the continuous scores derived from the questionnaire were classified into three ordinal levels within each domain, knowledge, attitude, and practice, based on established conventions in educational and behavioural research.

Knowledge scores, calculated as the percentage of correct responses, were categorized as Low (≤33%), Medium (34%–66%), or High (≥67%). This classification aligns with standard percentage bands commonly applied in educational assessments and knowledge-attitude-practice (KAP) surveys (Bloom, 1956; Rattray & Jones, 2007).

Attitude was measured using Likert-scale items ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The mean attitude scores were interpreted as Negative (1.00–2.33), Neutral (2.34–3.66), or Positive (3.67–5.00), following conventional interpretative frameworks for Likert-scale means (Allen & Seaman, 2007; Joshi et al., 2015).

Practice was similarly assessed using Likert-scale items reflecting behavioural frequency (1 = Never to 5 = Always). Mean scores were classified as Low Frequency (1.00–2.33), Moderate Frequency (2.34–3.66), or High Frequency (3.67–5.00), adopting the same interpretative thresholds as those used for attitude.

Logistic regression was used to predict the likelihood of high KAP levels as compared to low KAP levels. The independent variables are parental education and occupation, socio-demographic background, and family background. Logistic regression is used for multivariate analysis, as this statistical technique allows the inclusion of multiple predictors, which are then ranked according to their significance on the respective KAP. This approach is flexible, as it does not involve any assumption on linearity, normality, or homoscedasticity and thus is appropriate for the present study.

Logistic regression determines the relationship between the probability of an event occurring (e.g., having high KAP levels) and predictor variables (e.g., parental

education and family characteristics). The odds ratio, a key component of logistic regression, compares the likelihood of an event occurring in one group versus another. For instance, an odds ratio greater than 1 signifies a positive association, whereas an odds ratio less than 1 indicates a negative relationship. The logistic regression model used in this study was expressed as:

$$log\left(\frac{P}{1-P}\right) = a + \beta X$$

where βX represents the regression coefficients for the predictors, logistic regression is used to examine how dependent and independent variables are interconnected, predicting outcomes based on binary dependent variables (Dowdy et al., 2004; Zikmund et al., 2016). This method is more flexible than multiple regression because it does not assume linearity, normality, or homogeneity (Huck, 2012). It is suitable for analysing dichotomous outcomes based on both categorical and continuous independent variables.

In logistic regression, the odds ratio is the ratio of the probability that an event occurs to the probability that it does not occur. Using maximum likelihood estimation (MLE), the model determines coefficients to maximize the likelihood of observing the dependent variable values (Huck, 2012). Odds represent the ratio of successes to failures, while the odds ratio compares the odds of an event occurring under different conditions. As a result, the odds ratio cannot be negative (Huck, 2012). This interpretative framework makes logistic regression particularly useful in social sciences and health research, where understanding the strength and direction of associations between predictors and outcomes is crucial.

Reliability and Validity

It was important for this study to have reliable and effective data to have valid and reliable measurements in the measurement tool. A survey questionnaire was piloted to assess the reliability of the scale by estimating its internal consistency using Cronbach's alpha, a widely recognized and enhanced measure of reliability compared to the split-half test (Bryman, 2016). If Cronbach's alpha is greater than 0.7, the instrument is considered reliable and has internal consistency (Saunders et al., 2016). This rigorous reliability assessment helped confirm that the questionnaire was an effective tool for capturing accurate and dependable data on students' knowledge, attitudes, and practices regarding household waste management.

The Cronbach's alpha test of 37 items resulted in 0.891, greater than the 0.7 value, providing evidence for high internal consistency. Furthermore, their liability of separate dimensions was examined. Cronbach's alpha coefficients of the attitude and practice were 0.852 to 0.832, respectively, which further supported the reliability of the measuring instruments (Table 2).

Table 2

Reliability of Attitude and Practice Scales

Dimensions	Items	Cronbach's alpha coefficient
Attitude	19	0.852
Practice	18	0.832

These findings provide evidence that all scales had satisfactory levels of reliability, indicating that the measurement instruments were consistently assessing the constructs as intended. Similarly, validity was examined to determine if the questionnaire clearly reflected the purposes of the study and addressed the research questions. Validity refers to the degree to which the instrument measures what it is supposed to measure (Creswell, 2003). These included the following three forms of validity: content validity, construct validity, and criterion-related validity.

Content validity is the capacity of a questionnaire to measure what it is supposed to measure, meaning that it measures the construct in an acceptable manner (Yusoff, 2019). Content validity is a crucial phase in developing and adapting measurement instruments (Alexandre & Coluci, 2011; Rodríguez, 2015). The content validity of the questionnaire was evaluated in terms of alignment with the literature and relevance to key determinants of the students' KAP in household waste management. Input was also obtained from environmental education and survey design experts to finalize the instrument's content. In this way, it could be ensured that the questionnaire included all the factors and components of the KAP in the management of household waste.

Its importance in scale development and psychological research is not to be overstated, as it guarantees that the scale measures accurately represent the desired construct (Clark & Watson, 1995; Wehner et al., 2018). It is a complex process that is rather difficult to perform properly, starting from a clear definition of the target construct to an overinclusive item pool (Clark & Watson, 1995). Construct validity (Bryman, 2016) checks if the tool measures what it is supposed to measure. In this study, construct validity was assessed through a theory-driven approach, where each

questionnaire item was developed and reviewed against the constructs defined in environmental education theory, knowledge acquisition, attitude formation, and practical behaviours. Expert consultation was used to verify that items were conceptually aligned with these constructs. This process ensured that the questionnaire maintained a strong correspondence with the theoretical framework (Cohen et al., 2018). The items were therefore constructed in line with established constructs in environmental education and reflected strong construct validity.

Criterion validity measures the accuracy of a test by comparing it to an established standardization or to one of the tests itself (Shuttleworth, 1980). Criterion validity tests the degree of correspondence between the findings of the study and the findings of other studies of the same nature (Kerlinger, 2008). In this research, criterion validity was adopted by comparing the study's findings with patterns reported in prior empirical studies on students' waste management behaviour. The consistency observed, such as the significance of intrinsic factors, extrinsic factors, and subjective norms, provided evidence that the results align with established findings in the field. This strong alignment confirms the criterion validity of the study.

Ethical Consideration

Kathmandu University's ethical guidelines were followed to conduct this research. It was crucial to ensure that the research process was followed in a proper, fair, and appropriate manner. This required the design to be valid, reliable, legitimate, and representative (Gallardo, 2012). Gallardo (2012) outlines four key principles for conducting research ethically.

First, respect for personal autonomy, confidentiality, and informed consent: respondents may be given adequate information, facilitating them to make evidence-based decisions and freely choose to participate in the survey. To adhere to this principle, I provided all respondents with detailed information about the research purpose and objectives during the survey. Prior to the survey, permission was taken from the respondents, and no one was compelled to participate. The survey did not ask for any personal information, and no financial compensation was provided. The data obtained were purely for academic records and were not disclosed to any third party. Moreover, while analysing factors influencing KAP, the names of the institutions were not disclosed.

Second, non-maleficence and beneficence: Researchers may avoid causing harm, and the research may benefit participants. To maintain non-maleficence, I

ensured that participants felt at ease during the survey, respecting their responses. Regarding beneficence, the research is designed to benefit all stakeholders, as noted by Cohen et al. (2007). The findings of this research are not intended for personal gain; rather, the results will be made freely accessible to all interested parties.

Third, justice: All participants, regardless of race, age, ethnicity, gender, or any other characteristic, may be treated equally and benefit from the study. I made sure to respect all participants by focusing only on the research-related questions and hypotheses. I took extra care to avoid including any questions that could offend or discriminate based on age, gender, race, or ethnicity.

Lastly, involving participants in co-constructed research: This principle, particularly relevant in an interpretive paradigm, treats participants as co-authors, lending legitimacy and representation to the research. In line with Gallardo's (2012) guidelines, I ensured that the research followed the first three ethical principles and followed the ethical guidelines set by Kathmandu University.

Concluding the Chapter

By adopting a post-positivist paradigm to assess school students' KAP regarding the management of household waste in Bhaktapur Municipality. A structured KAP questionnaire was used to survey 327 students by stratified random sampling from a sample of six public higher secondary schools, and the data collected were made to be representative and reliable. The survey instrument, pre-tested and with a Cronbach alpha ($\alpha = 0.891$) to assess the main dimensions of waste management, KAP, consisted of multipart (sectioned) types of multiple-choice and 5-point Likert scale questions. Analysis of the data used descriptive statistics to identify patterns, as well as inferential analysis (Chi-square test and logistic regression) to explore the relationship between parental socio-demographic variables and the waste management behaviour of the students. Ethical standards, such as informed consent and confidentiality of participants, were rigorously met during the study. The findings of the study are used to identify the impact of current intervention methods and to explore opportunities for improving sustainable waste management behaviour among students.

CHAPTER IV
DATA ANALYSIS

This section provides a detailed analysis of the investigation of students' KAP related to the management of household waste in Bhaktapur Municipality. It systematically reviews the structured survey data with respect to the research questions, presenting aspects of students' awareness, perceptions and behaviours toward sustainable waste management. The chapter is divided into principal areas of theme, as the discussion commences with the measurement of students' KAP in various domains like reduction, reusing, recycling and segregation. It then investigates the impact of a range of socio-demographic factors such as gender, grade, caste and ethnicity, family structure, parent education and parents' occupation on KAP. Associations are tested and significant predictors are identified using inferential statistical methods. The chapter proceeds in a logical order from descriptive statistics on sample characteristics to more sophisticated inferential analysis and hence informs us in detail about the factors shaping students' waste management behaviours.

Background Variables and Socio-demographic Information of the Respondents

The background of the respondents, in terms of demographic and socioeconomic status, contributes significantly to influencing their knowledge and practices in the management of household waste.

Socio-Demographic Variables of Students

The socio-demographic variables convey useful context for contextualizing the results, such as gender, grade, caste or ethnicity, family type, residency, parental educational support, dependence on household remittance and living arrangements. The sample was broadly representative of the student population in grades 11 and 12; the gender split was approximately equal, and the sample included a mixture of residents and non-resident students. The ethnic makeup underscored the multi-ethnic nature of the Bhaktapur Municipality. The education level of parents, their occupations and financial factors, especially remittance, also influence the students' perception of waste management. These background characteristics are listed with frequency distribution in Table 3.

Table 3

Socio-Demographic Variables of Students

Category	Frequency (N)	Percent
Total students surveyed	327	
Gender		
Female	170	52%
Male	157	48%
Grade		
11	156	48%
12	171	52%
Caste/Ethnicity		
Brahmin/Chhetri/Thakuri/Sanyasi	76	23%
Dalit	20	6%
Janajati	148	45%
Newar	83	25%
Originality of residence		
Local	136	42%
Migrated from another area	191	58%
Disability in family	14	4%
Remittance (Yes)	72	22%
Family Structure		
Nuclear	109	33%
		67%
Joint	218	
Student living with parents (Yes)	277	85%
Parent's support for the study		
Full	261	80%
Partial	66	19.9%
Residency status		
Resident	144	44%
Migrated from another area	183	56%

The data includes 327 survey respondents, which is balanced in terms of gender. The respondents are mostly Janajati (45%), with the majority of the students being 58% from other areas and 42% local. Out of a total, 22% of respondents reported that their family had received a remittance last year. The majority of them are from a joint family and live with their families.

Parental Education and Occupation

Parental education and occupation have some relationship with waste management practices, and therefore, data concerning parental education and occupation were analysed and presented in Table 4. Table 4 consists of the frequency and percentage distribution of parental education and occupation variables for the 327 students surveyed in this study.

Table 4

Frequency of Categories of Parental Education and Occupation Variables

Parental variables	Frequency (n = 327)	Percentage
Education (Mother)		
Below secondary	254	77.7
Secondary and above	73	22.3
Education (Father)		
Below secondary	218	66.7
Secondary and above	109	33.3
Mothers' Occupation		
Daily wages	30	9.1
Entrepreneur	20	6.1
Farming	93	28.4
Foreign employment	6	1.8
Housewife	151	46.0
Service	27	8.2
Fathers' Occupation		
Daily wage	47	14.3
Entrepreneur	41	12.5
Farming	115	35.1
Foreign employment	11	3.4
House husband	8	2.4
Service	105	32.0

The data highlights the educational and occupational backgrounds of the parents of the students surveyed. Regarding education, most mothers did not complete secondary education (77.7%), and there was a consistent trend for the education level of fathers. In terms of occupation, almost half (46%) are housewives, and others work as farmers (28.4%) and daily wage labourers (9.1%). A lesser number of mothers engaged in business (6.1%), foreign employment (1.8%) and service (8.2%). Farming (35.1%) is the most common occupation among fathers, followed by service (32%), daily wage labor (14.3%) and entrepreneurship (12.5%).

Overall KAP of Students in Management of Household Waste

The level of KAP among students varies significantly across the four key dimensions of household waste management: reduce, reuse, recycle and segregation. Each dimension has been systematically assessed and categorized into three levels—knowledge (low, medium, high), attitude (negative, neutral, positive) and practice (low, moderate, high frequency). This classification provides a detailed understanding of how students perceive and engage with waste management behaviours. A comprehensive overview of these findings is presented in Table 5, illustrating the distribution of students' responses within each category and level.

Table 5

Respondents' KAP Regarding HH Waste Management by Category and Level

Category	Reduce N(%)	Reuse N(%)	Recycle N(%)	Segregation N(%)	Overall N(%)
Knowledge					
Low	73 (22.3%)	112 (34.3%)	33 (10.1%)	52 (15.9%)	26 (8.0%)
Medium	153 (46.8%)	128 (39.1%)	159 (48.6%)	137 (41.9%)	215 (65.7%)
High	101 (30.9%)	87 (26.6%)	135 (41.3%)	138 (42.2%)	86 (26.3%)
Attitude					
Negative	10 (3.1%)	14 (4.3%)	18 (5.5%)	15 (4.6%)	8 (2.4%)
Neutral	64 (19.6%)	83 (25.4%)	116 (35.5%)	143 (43.7%)	85 (26.0%)
Positive	253 (77.4%)	230 (70.3%)	193 (59.0%)	169 (51.7%)	234 (71.6%)
Practice					
Low frequency	16 (4.9%)	11 (3.4%)	47 (14.4%)	23 (7.0%)	15 (4.6%)
Moderate frequency	265 (81.0%)	156 (47.7%)	186 (56.9%)	133 (40.7%)	216 (66.1%)
Highfrequency	46 (14.1%)	160 (48.9%)	94 (28.7%)	171 (52.3%)	96 (29.4%)

Table 5 answers the research questions one and two, highlighting that most respondents had a medium level of knowledge about waste management, particularly in recycling and segregation. In Reduce, 77% had positive attitudes, but 81% practiced moderately, indicating attitudes alone don't ensure action. In Reuse, limited knowledge still led to high practice (49%) and strong attitudes (70%). Recycling showed medium knowledge and attitudes but low high-frequency practice (29%), while Segregation was most balanced, with over 40% high knowledge, 52% positive attitudes, and frequent practice. Overall, despite 72% positive attitudes and 66% moderate-to-high practice, only 26% have high knowledge, underscoring the need to improve understanding for sustainable action.

Associations between Socio-Demographic Factors and KAP toward Management of Household Waste

This section examines how various socio-demographic characteristics influence students' KAP regarding household waste management, and it responds to research question three. Specifically, it explores the relationship between these factors and students' understanding of the concept of reduce, reuse, recycle, segregation and overall knowledge as a key component of sustainable waste management.

Relation of Socio-demography with the Students' Knowledge of Reduce

The acquisition of knowledge about waste reduction is shaped by various socio-demographic factors, including individual, familial and community characteristics. This study examines the relationship between these factors and students' understanding of waste reduction practices.

Personal Demographics and Level of Knowledge of Reduce

Students' knowledge levels on waste reduction differ across personal demographics such as gender, grade and caste/ethnicity. Knowledge is categorized as low, medium and high, with associations tested statistically. Table 6 summarizes these variations and their significance.

Table 6

Personal Demographics and Level of Knowledge of Reduce

Variable	Low	Medium	High	X^2	P
Gender					
Female	37 (21.8%)	79 (46.5%)	54 (31.8%)	0.146	.930
Male	36 (22.9%)	74 (47.1%)	47 (29.9%)		
Grade					
11	30 (19.2%)	80 (51.3%)	46 (29.5%)	2.755	.252
12	43 (25.1%)	73 (42.7%)	55 (32.2%)		
Caste/Ethnicity					
Other	19 (19.8%)	41 (42.7%)	36 (37.5%)	2.798	.247
Janajati	54 (23.4%)	112 (48.5%)	65 (28.1%)		

There is no significant correlation between personal demographics and the level of knowledge of waste reduction. Gender, grade and caste/ethnicity do not appear to influence respondents' knowledge levels, as indicated by the high p-values. Both female and male respondents show comparable distributions of low, medium and high knowledge levels. Similarly, the knowledge levels do not differ markedly

between students in grades 11 and 12 or among different caste/ethnicity groups. These findings suggest that factors like gender, grade and caste/ethnicity do not play a substantial role in shaping the respondents' understanding of waste reduction practices.

Household Characteristics and Level of Knowledge of Reduce

Knowledge levels on waste reduction vary across household characteristics such as residence origin, remittance status, family structure, living arrangements, parental support, residency type and responsibility for waste management. These variations and their statistical associations are summarized in Table 7.

Table 7

Household Characteristics and Level of Knowledge of Reduce

Variable	Low	Medium	High	X^2	P
Originality of residence					
Local	25 (18.4%)	69 (50.7%)	42 (30.9%)	2.396	0.30
Migrated	48 (25.1%)	84 (44%)	59 (30.9%)		
Remittance (Yes)					
No	52 (20.4%)	124 (48.6%)	79 (31%)	2.776	0.250
Yes	21 (29.2%)	29 (40.3%)	22 (30.6%)		
Family Structure					
Joint	46 (21.1%)	97 (44.5%)	75 (34.4%)	3.792	0.150
Nuclear	27 (24.8%)	56 (51.4%)	26 (23.9%)		
Student living with parents					
No	14 (28%)	19 (38%)	17 (34%)	2.011	0.366
Yes	59 (21.3%)	134 (48.4%)	84 (30.3%)		
Parent's support for the study					
Full	56 (21.5%)	123 (47.1%)	82 (31.4%)	0.586	0.746
Partial	17 (25.8%)	30 (45.5%)	19 (28.8%		
Residency status					
Resident	26 (18.1%)	76 (52.8%)	42 (29.2%)	4.319	0.115
Rented	47 (25.7%)	77 (42.1%)	59 (32.2%)		
Responsible to manage HH waste					
Female	55 (20.9%)	128 (48.7%)	80 (30.4%)	2.310	0.315
Male	18 (28.1%)	25 (39.1%)	21 (32.8%)		

It is demonstrated by the fact that none of the factors are statistically significantly associated with the level of knowledge of the concept of reduction, as shown by p-values that exceed 0.05. For those variables where there are trends for a

greater proportional response in some categories (family structure, which gender is responsible for waste treatment), the differences in proportion seem too small to signal a large, robust effect for comparison. This suggests that the variables studied could not be central in explaining an individual's awareness of HH waste reduction.

Parental Variable and Level of Knowledge of Reduce

Students' knowledge levels on waste reduction are also examined in relation to parental variables, including parents' education and occupation. Table 8 presents the distribution of knowledge levels across these variables along with their statistical significance.

Table 8

Parental Variable and Level of Knowledge of Reduce

Parental variables	**Low**	**Medium**	**High**	**X^2**	**P**
Education (Mother)					
Below secondary	60 (23.6%)	120 (47.2%)	74 (29.1%)	2.041	.360
Secondary and above	13 (17.8%)	33 (45.2%)	27 (37%)		
Education (Father)					
Below secondary	54 (24.8%)	102 (46.8%)	62 (28.4%)	3.021	.221
Secondary and above	19 (17.4%)	51 (46.8%)	39 (35.8%)		
Mothers' Occupation					
Informal	60 (21.9%)	127 (46.4%)	87 (31.8%)	0.298	.735
Formal	13 (24.5%)	26 (49.1%)	14 (26.4%)		
Fathers' Occupation					
Informal	37 (21.8%)	82 (48.2%)	51 (30.0%)	0.298	.862
Formal	36 (22.9%)	71 (45.2%)	50 (31.8%)		

None of the parental variables, including the education and occupation of both mothers and fathers, exhibits a statistically significant effect on the categorization of responses. This suggests that these parental factors are not key determinants in shaping students' knowledge of the reeducation of HH waste.

Relation of Socio-demography with the Students' Knowledge of Reuse

Understanding the relationship between socio-demographic factors and students' knowledge of waste reuse is essential for identifying the drivers of environmental awareness and behaviour. This study examines how personal demographics, household characteristics and parental variables shape students' understanding of reuse practices.

Personal Demographics and Level of Knowledge of Reuse

Knowledge levels on waste reuse vary by personal demographics, including gender, grade, and caste/ethnicity, and they are categorized into low, medium, and high levels. Table 9 provides a breakdown of how these factors might influence students' understanding and awareness of reuse practices.

Table 9

Personal Demographics and Level of Knowledge of Reuse

Variable	Low	Medium	High	X^2	P
Gender					
Female	48 (28.2%)	76 (44.7%)	46 (27.1%)	6.567	**.038***
Male	64 (40.8%)	52 (33.1%)	41 (26.1%)		
Grade					
11	59 (37.8%)	58 (37.2%)	39 (25%)	1.693	.429
12	53 (31%)	70 (40.9%)	48 (28.1%)		
Caste/Ethnicity					
Other	38 (39.6%)	37 (38.5%)	21 (21.9%)	2.284	.319
Janajati	74 (32.0%)	91 (39.4%)	66 (28.6%)		

The table summarizes the association of personal characteristics with the level of knowledge students have regarding the reuse of waste. Medium knowledge is the dominant knowledge level in both genders, but there is a significant association between gender and their knowledge level on reuse, indicating female students tend to have higher knowledge. At all grades, the Grade 11 and Grade 12 students equally have an average level of knowledge. There are no significant differences between caste/ethnic distribution. These results demonstrate a gender-based bias in knowledge regarding reuse, and targeted interventions may be necessary to address disparities.

Household Characteristics and Level of Knowledge of Reuse

The level of knowledge of reuse varies by HH characteristics like residence originality, remittance status, family structure, living arrangements, parental support, residency and responsibility for waste management. Table 10 presents the analysis of the relationship between household characteristics and students' knowledge of the reuse of HH waste.

Table 10

Household Characteristics and Level of Knowledge of Reuse

Variable	Low	Medium	High	X^2	P
Originality of residence					
Local	44 (32.4%)	56 (41.2%)	36 (26.5%)	0.492	0.78
Migrated	68 (35.6%)	72 (37.7%)	51 (26.7%)		
Remittance (Yes)					
No	83 (32.5%)	104 (40.8%)	68 (26.7%)	1.777	0.411
Yes	29 (40.3%)	24 (33.3%)	19 (26.4%)		
Family Structure					
Nuclear	68 (31.2%)	85 (39.0%)	65 (29.8%)	4.324	0.115
Joint	44 (40.4%)	43 (39.4%)	22 (20.2%)		
Student living with parents					
No	19 (38%)	20 (40%)	11 (22%)	0.724	0.696
Yes	93 (33.6%)	108 (39%)	76 (27.4%)		
Parent's support for the study					
Full	82 (31.4%)	109 (41.8%)	70 (26.8%)	5.318	0.070
Partial	30 (45.5%)	19 (28.8%)	17 (25.8%)		
Residency status					
Resident	45 (31.3%)	57 (39.6%)	42 (29.2%)	1.324	0.516
Rented	67 (36.6%)	71 (38.8%)	45 (24.6%)		
Responsible to manage HH waste					
Female	85 (32.3%)	103 (39.2%)	75 (28.5%)	3.309	0.191
Male	27 (42.2%)	25 (39.1%)	12 (18.8%)		

Table 10 demonstrates that there is no significant relationship between household characteristics and students' knowledge of waste reuse. Most students, regardless of their residence status, demonstrate medium knowledge of reuse, with 41.2% of local residents and 37.7% of migrants falling into this category.

Parental Variables and Level of Knowledge of Reuse

Parents' education and occupation impact on their children's knowledge of the reuse of HH waste. Table 11 explores the role of parental variables, including parental education and occupation, in shaping students' knowledge about waste reuse and its significance.

Table 11

Parental Variables and Level of Knowledge of Reuse

Parental variables	Low	Medium	High	X^2	P
Education (Mother)					
Below secondary	85 (33.5%)	102 (40.2%)	67 (26.4%)	0.526	.769
Secondary and above	27 (37%)	26 (35.6%)	20 (27.4%)		
Education (Father)					
Below secondary	77 (35.3%)	86 (39.4%)	55 (25.2%)	0.700	.705
Secondary and above	35 (32.1%)	42 (38.5%)	32 (29.4%)		
Mothers' Occupation					
Informal	96 (35.0%)	108 (39.4%)	70 (25.5%)	0.139	.592
Formal	16 (30.2%)	20 (37.7%)	17 (32.1%)		
Fathers' Occupation					
Informal	55 (32.4%)	68 (40.0%)	47 (27.6%)	0.583	.747
Formal	57 (36.3%)	60 (38.2%)	40 (25.5%)		

Parental variables, education, and occupation do not show a significant relationship with the level of knowledge of waste reuse, indicating that these independent variables do not significantly determine the level of knowledge of reuse. Most students in each parental category fall into the medium level of knowledge of the reuse and management of household waste.

Relation of Socio-demography with the Students' Knowledge of Recycling

The relationship between demographic factors and the knowledge of recycling amongst students is a necessary step toward understanding what affects their environmental concern and their behaviour. In this study, we examine the degree to which the personal representation, household, and parental research elements are associated with students' knowledge of recycling. The chi-square test is not feasible for students living with parents because the expected frequency is less than 5 and, thus, has been removed from the analysis.

Personal Demographics and Level of Knowledge of Recycling

Personal demographic factors can impact students' knowledge of recycling. Hence, the analysis is done to examine the relationship between students' recycling knowledge and their social and demographic characteristics, including gender, grade, and caste/ethnicity, in Table 12.

Table 12

Personal Demographics and Level of Knowledge of Recycling

Variable	Low	Medium	High	X^2	P
Gender					
Female	17 (10%)	88 (51.8%)	65 (38.2%)	1.519	.468
Male	16 (10.2%)	71 (45.2%)	70 (44.6%)		
Grade					
11	18 (11.5%)	75 (48.1%)	63 (40.4%)	0.696	.706
12	15 (8.8%)	84 (49.1%)	72 (42.1%)		
Caste/Ethnicity					
Other	8 (8.3%)	51 (53.1%)	37 (38.5%)	1.230	.541
Janajati	25 (10.8%)	108 (46.8%)	98 (42.4%)		

The chi-square test results for these variables show high p-values, suggesting no statistical significance in the relationship between these demographic factors and knowledge of recycling. These findings imply that demographic variables like gender, grade, and caste/ethnicity do not have a significant effect on recycling knowledge among the respondents.

Household Characteristics and Level of Knowledge of Recycling

Household characteristics may influence students' knowledge of recycling. Table 13 presents the relationship between recycling knowledge levels and various household factors such as residence originality, remittance status, family structure, parental support, residency status, and responsibility for household waste management.

The table examines the relationship between various household characteristics and the level of knowledge of recycling. Females, being primarily responsible for managing household waste, tend to have higher levels of knowledge about recycling compared to males, showing a statistically significant relationship. This indicates that households where females play a major role in managing waste have a significant influence on students' knowledge of recycling. However, other variables such as residency status, remittance, and parental support for the study do not show significant associations, as evidenced by the high p-values.

Table 13

Household Characteristics and Level of Knowledge of Recycling

Variable	Low	Medium	High	X^2	P
Originality of residence					
Local	14 (10.3%)	58 (42.6%)	64 (47.1%)	3.601	0.165
Migrated	19 (9.9%)	101 (52.9%)	71 (37.2%)		
Remittance					
No	27 (10.6%)	125 (49%)	103 (40.4%)	0.544	0.762
Yes	6 (8.3%)	34 (47.2%)	32 (44.4%)		
Family Structure					
Joint	20 (9.2%)	104 (47.7%)	94 (43.1%)	1.192	0.551
Nuclear	13 (11.9%)	55 (50.5%)	41 (37.6%)		
Parent's support for the study					
Full	27 (10.3%)	126 (48.3%)	108 (41.4%)	0.117	0.943
Partial	6 (9.1%)	33 (50.0%)	27 (40.9%)		
Residency status					
Resident	13 (9.0%)	64 (44.4%)	67 (46.5%)	2.927	0.231
Rented	20 (10.9%)	95 (51.9%)	68 (37.2%)		
Responsible to manage HH waste					
Female	20 (7.6%)	131 (49.8%)	112 (42.6%)	9.177	**.010***
Male	13 (20.3%)	28 (43.8%)	23 (35.9%)		

Parental Variables and Level of Knowledge of Recycling

Parental factors such as education and occupation may affect students' knowledge of recycling. The knowledge of recycling is categorized into three: low, medium, and high. Table 14 explores the distribution of recycling knowledge levels according to mothers' and fathers' educational attainment and occupational status, highlighting the potential influence of parental background on students' environmental awareness.

The parental variables in relation to the level of knowledge of recycling reveal varying degrees of influence. The educational level, maternal and paternal, does not statistically affect the knowledge about recycling. Occupation, too, returns mixed results. There is no significant difference between the mothers' occupations (formal vs. informal), but regarding the fathers' occupations, the formal ones seem to have slightly more knowledge than those who work in the informal sector, although the p-value shows that this weak trend is also not significant.

Table 14

Parental Variables and Level of Knowledge of Recycling

Parental variables	Low	Medium	High	X^2	P
Education (Mother)					
Below secondary	28 (11%)	127 (50%)	99 (39%)	2.890	.236
Secondary and above	5 (6.8%)	32 (43.8%)	36 (49.3%)		
Education (Father)					
Below secondary	24 (11%)	106 (48.6%)	88 (40.4%)	0.679	.712
Secondary and above	9 (8.3%)	53 (48.6%)	47 (43.1%)		
Mothers' Occupation					
Informal	28 (10.2%)	132 (48.2%)	114 (41.6%)	0.139	.933
Formal	5 (9.4%)	27 (50.9%)	21 (39.6%)		
Fathers' Occupation					
Informal	20 (11.8%)	88 (51.8%)	62 (36.5%)	3.688	.158
Formal	13 (8.3%)	71 (45.2%)	73 (46.5%)		

Socio-demography Correlation of Socio-demography with the knowledge of the students on Segregation

The analysis of how different socio-demographic and household variables are associated with students' awareness of segregation is presented in the following tables. It is through these tables that the study would determine the relationships, if any, that exist between socio-demographic variables and the level of knowledge and practices of waste segregation on the part of the students. The chi-square test for the mother's occupation is not valid and hence removed from the analysis as the expected frequency is less than 5.

Personal Demographics and Level of Knowledge of Segregation

Personal demographic factors influence students' knowledge of waste segregation. The relationship between students' knowledge levels on segregation and their social and demographic characteristics, such as gender, grade, and caste/ethnicity, is presented in Table 15.

The analysis reveals no significant differences between gender, grade, or caste/ethnicity in relation to knowledge levels on segregation. Based on the Chi-square values, these demographic variables do not influence students' knowledge of waste segregation statistically since the p-values are higher than the adopted level of significance. This indicates that in this sample, gender, grade, and caste/ethnicity do not seem to affect how students make sense of the segregation practices.

Table 15

Personal Demographics and Level of Knowledge of Segregation

Variable	Low	Medium	High	X^2	P
Gender					
Female	28 (16.5%)	73 (42.9%)	69 (40.6%)	0.383	.826
Male	24 (15.3%)	64 (40.8%)	69 (43.9%)		
Grade					
11	27 (17.3%)	67 (42.9%)	62 (39.7%)	0.877	.645
12	25 (14.6%)	70 (40.9%)	76 (44.4%)		
Caste/Ethnicity					
Other	16 (16.7%)	36 (37.5%)	44 (45.8%)	1.101	0.577
Janajati	36 (15.6%)	101 (43.7%)	94 (40.7%)		

Household Characteristics and Level of Knowledge of Segregation

Household characteristics influence students' knowledge of waste segregation. Table 16 presents the relationship between segregation knowledge and factors such as residence originality, remittance status, family structure, living arrangements, parental support, residency status, and responsibility for household waste management.

Table 16

Household Characteristics and Level of Knowledge of Segregation

Variable	Low	Medium	High	X^2	P
Originality of residence					
Local	21 (15.4%)	53 (39%)	62 (45.6%)	1.139	0.566
Migrated	31 (16.2%)	84 (44%)	76 (39.8%)		
Remittance					
No	43 (16.9%)	103 (40.4%)	109 (42.7%)	1.378	0.502
Yes	9 (12.5%)	34 (47.2%)	29 (40.3%)		
Family Structure					
Joint	26 (11.9%)	95 (43.6%)	97 (44.5%)	7.757	**.021***
Nuclear	26 (23.9%)	42 (38.5%)	41 (37.6%)		
Student living with parents					
No	9 (18%)	20 (40%)	21 (42%)	0.215	0.898
Yes	43 (15.5%)	117 (42.2%)	117 (42.2%)		
Parent's support for the study					
Full	41 (15.7%)	110 (42.1%)	110 (42.1%)	0.051	0.975
Partial	11 (16.7%)	27 (40.9%)	28 (42.4%)		
Residency status					
Resident	25 (17.4%)	50 (34.7%)	69 (47.9%)	5.496	0.064
Rented	27 (14.8%)	87 (47.5%)	69 (37.7%)		
Responsible to manage HH waste					
Female	42 (16%)	109 (41.4%)	112 (42.6%)	0.116	0.944
Male	10 (15.6%)	28 (43.8%)	26 (40.6%)		

With the distribution of household profiles in accordance with the level of knowledge regarding waste segregation, we can observe interesting trends, especially in the family structure variable. A significant association is found between family structure and knowledge about waste segregation (p=0.021). Students from joint families are more likely to fall into the high knowledge segregation compared to those from nuclear families. This indicates that family structure plays a significant role in shaping knowledge-related waste segregation. In contrast, other variables such as originality of residence, remittance status, and residency status show no significant association with the level of knowledge, indicating that these factors might not influence knowledge of segregation as strongly.

Parental Variables and Level of Knowledge of Segregation

Parental factors, including the education levels of mothers and fathers as well as fathers' occupation, influence students' knowledge of waste segregation. The associations between these parental variables and students' knowledge levels, categorized as low, medium, and high, are presented in Table 17.

Table 17

Parental Variables and Level of Knowledge of Segregation

Parental variables	Low	Medium	High	X^2	P
Education (Mother)					
Below secondary	44 (17.3%)	110 (43.3%)	100 (39.4%)	4.147	.126
Secondary and above	8 (11%)	27 (37%)	38 (52.1%)		
Education (Father)					
Below secondary	36 (16.5%)	93 (42.7%)	89 (40.8%)	0.539	.764
Secondary and above	16 (14.7%)	44 (40.4%)	49 (45%)		
Fathers' Occupation					
Informal	31 (18.2%)	77 (45.3%)	62 (36.5%)	4.944	.084
Formal	21 (13.4%)	60 (38.2%)	76 (48.4%)		

The analysis examines the relationship between parental variables and the level of knowledge of segregation, revealing no statistically significant associations across the tested categories. However, the majority of students with higher levels of parental education and fathers working in the formal sector demonstrated a prominent level of knowledge of waste segregation.

Relation of Socio-demography with the Students' Overall Knowledge

In this section, the relationship between socio-demographic factors, household characteristics, and parental variables with students' overall knowledge of waste management is explored. The objective of the analysis is to uncover the main determinants in shaping students' perception of good waste management by shedding light on how personal characteristics, family, and parents' background affect their knowledge. These findings help inform a better understanding of the factors that may affect students' knowledge levels regarding waste management. Since the expected frequency is less than 5, the chi-square test for variables (student living with parents and 'mother's occupation') is not valid and has therefore been excluded.

Personal Demographics and Level of Overall Knowledge

Personal demographic factors influence students' overall knowledge levels. The relationship between overall knowledge and social characteristics such as gender, grade, and caste/ethnicity is summarized in Table 18.

Table 18

Personal Demographics and Level of Overall Knowledge

Variable	Low	Medium	High	X^2	P
Gender					
Female	11 (6.5%)	112 (65.9%)	47 (27.6%)	1.221	.543
Male	15 (9.6%)	103 (65.6%)	39 (24.8%)		
Grade					
11	15 (9.6%)	106 (67.9%)	35 (22.4%)	2.952	.229
12	11 (6.4%)	109 (63.7%)	51 (29.8%)		
Caste/Ethnicity					
Other	9 (9.4%)	60 (62.5%)	27 (28.1%)	0.737	.692
Janajati	17 (7.4%)	155 (67.1%)	59 (25.5%)		

The analysis of personal demographics and their correlation with the level of overall knowledge reveals that gender, grade, and caste/ethnicity show no significant statistical influence on students' knowledge levels. The Chi-square values indicate that these variables do not contribute to variations in the overall knowledge of the students.

Household Characteristics and Level of Overall Knowledge

Household characteristics influence students' overall knowledge levels of household waste management. Table 19 presents the relationship between overall

knowledge and variables such as originality of residence, remittance status, family structure, parental support, residency status, and responsibility for managing household waste.

Table 19

Household Characteristics and Level of Overall Knowledge

Variable	Low	Medium	High	X^2	P
Originality of residence					
Local	10 (7.4%)	83 (61%)	43 (31.6%)	3.397	0.183
Migrated	16 (8.4%)	132 (69.1%)	43 (22.5%)		
Remittance					
No	21 (8.2%)	160 (62.7%)	74 (29%)	4.965	.084
Yes	5 (6.9%)	55 (76.4%)	12 (16.7%)		
Family Structure					
Joint	11 (5%)	141 (64.7%)	66 (30.3%)	10.986	**.004***
Nuclear	15 (13.8%)	74 (67.9%)	20 (18.3%)		
Parent's support for the study					
Full	18 (6.9%)	173 (66.3%)	70 (26.8%)	1.998	.368
Partial	8 (12.1%)	42 (63.6%)	16 (24.2%)		
Residency status					
Resident	8 (5.6%)	90 (62.5%)	46 (31.9%)	5.388	0.068
Rented	18 (9.8%)	125 (68.3%)	40 (21.9%)		
Responsible to manage HH waste					
Female	17 (6.5%)	174 (66.2%)	72 (27.4%)	4.365	.113
Male	9 (14.1%)	41 (64.1%)	14 (21.9%)		

The analysis of household characteristics and the level of overall knowledge indicates varying patterns that highlight the impact of specific factors on respondents' awareness of waste management practices. In particular, the family structure is significantly related to overall knowledge ($p = 0.004$); knowledge is lower in nuclear families compared to joint families, especially at medium and high levels. This indicates that family relationship factors, including sharing responsibilities and passing of knowledge across generations, might be important contributors to awareness. On the other hand, variables such as the originality of residence, remittance, and parental support for studies do not exhibit statistically significant effects, indicating that these factors may not directly impact the overall knowledge.

Parental Variables and Level of Overall Knowledge

Parental factors, including education levels and fathers' occupations, influence students' overall knowledge. Table 20 presents the association between these parental variables and students' knowledge levels, categorized as low, medium, and high.

Table 20

Parental Variables and Level of Overall Knowledge

Parental variables	Low	Medium	High	X^2	P
Education (Mother)					
Below secondary	20 (7.9%)	174 (68.5%)	60 (23.6%)	4.423	.110
Secondary and above	6 (8.2%)	41 (56.2%)	26 (35.6%)		
Education (Father)					
Below secondary	18 (8.3%)	148 (67.9%)	52 (23.9%)	2.021	.364
Secondary and above	8 (7.3%)	67 (61.5%)	34 (31.2%)		
Fathers' Occupation					
Informal	8 (17%)	28 (59.6%)	11 (23.4%)	4.831	.089
Formal	5 (12.2%)	27 (65.9%)	9 (22%)		

The analysis of parental variables and overall knowledge levels shows no significant associations. In the same way, parents' occupation also does not have a significant bearing on the knowledge of the students, and p-values show no clear relation between informal/formal occupation and knowledge levels.

Relation of Socio-demography with the Students' Attitude towards Reduce

This section explores the relationship between socio-demographic factors, household characteristics, parental variables, and students' attitudes toward waste reduction. Since the expected frequency is less than 5, the chi-square test for demographic variables (students' grade and caste/ethnicity), household characteristics variables, and parental variables (mother's education and occupation, and father's occupation) are not valid and have therefore been excluded from the analysis.

Personal Demographics and Level of Attitude on Reduce

Students' attitudes toward waste reduction are shaped by personal demographic factors. Table 21 presents the relationship between students' attitudes toward reducing and their demographic characteristics, specifically gender, highlighting the distribution across negative, neutral, and positive attitudes.

Table 21

Personal Demographics and Level of Attitude on Reduce

Variable	Negative	Neutral	Positive	X^2	P
Gender					
Female	5 (2.9%)	29 (17.1%)	136 (80.0%)	1.475	0.478
Male	5 (3.2%)	35 (22.3%)	117 (74.5%)		

The analysis of the personal demographics and their level of attitude towards reducing waste reveals a clear positive trend in attitudes among both female and male respondents. Nevertheless, the Chi-square test demonstrates that there is no significant difference in attitudes between the male and female groups. This highlights that other factors may play a more pivotal role in shaping attitudes in the context of waste reduction, as gender alone does not account for significant variations in opinion.

Parental Variables and Level of Attitude on Reduce

Parental background shapes students' attitudes toward waste reduction. Table 22 presents the relationship between students' attitudes on reducing waste and their fathers' education level, categorized as below secondary and secondary or above.

Table 22

Parental Variables and Level of Attitude on Reduce

Parental variables	Negative	Neutral	Positive	X^2	P
Education (Father)					
Below secondary	5 (2.3%)	41 (18.8%)	172 (78.9%)	1.346	0.510
Secondary and above	5 (4.6%)	23 (21.1%)	81 (74.3%)		

The analysis of the relationship between fathers' education level and attitudes towards waste reduction reveals no significant association. The chi-square test result indicates that the father's education level does not influence the attitude of children toward waste reduction.

Relation of Socio-demography with the Students' Attitude to Reuse

This section analyzes how different socio-demographic factors are associated with students' attitudes toward waste reuse practices. It is divided into personal demographics (like gender), household characteristics (like joint family household and residency status), and parental variables (fathers' education and occupation). These were selected to examine how they could influence students' perceptions of reuse. Since the expected frequency is less than 5, the chi-square test for demographic variables (students' grade and caste/ethnicity), household characteristics variables (except 'originality of resident' and 'residency status'), and parental variables

(mother's education and occupation) are not valid and have therefore been excluded from analysis.

Personal Demographics and Level of Attitude on Reuse

Students' attitudes toward reuse are shaped by personal demographic factors. Table 23 explores the connection between the gender of the students and attitudes toward reuse.

Table 23

Personal Demographics and Level of Attitude on Reuse

Variable	Negative	Neutral	Positive	X^2	P
Gender					
Female	8 (4.7%)	33 (19.4%)	129 (75.9%)	6.670	**.036***
Male	6 (3.8%)	50 (31.8%)	101 (64.3%)		

The analysis reveals that there is a statistically significant relationship between gender and attitude toward reuse, with female students demonstrating more positive attitudes compared to male students. This indicates that gender plays a role in shaping students' attitudes toward reuse.

Household Characteristics and Level of Attitude on Reuse

Students' attitudes toward reuse are shaped by their household characteristics. Table 24 presents the relationship between their attitudes, categorized as negative, neutral, and positive, and variables such as originality of residence and residency status.

Table 24

Household Characteristics and Level of Attitude on Reuse

Variable	Negative	Neutral	Positive	X^2	P
Originality of residence					
Local	7 (5.1%)	38 (27.9%)	91 (66.9%)	1.396	0.497
Migrated	7 (3.7%)	45 (23.6%)	139 (72.8%)		
Residency status					
Resident	8 (5.6%)	37 (25.7%)	99 (68.8%)	1.078	0.583
Rented	6 (3.3%)	46 (25.1%)	131 (71.6%)		

The analysis of household characteristics in relation to attitudes towards reuse reveals that neither the originality of residence nor residency status significantly influences the attitudes of residents toward reuse. This suggests that factors such as whether a household is local or migrant, or whether the household is rented or owned, do not have a substantial impact on the level of positive attitudes towards reuse in the context of waste management.

Parental Variables and Level of Attitude on Reuse

Parental characteristics shape students' attitudes toward waste reuse. Table 25 presents the relationship between students' attitudes and their fathers' education and occupation. The findings suggest no statistically significant association, indicating that these parental variables have limited influence on students' attitudes toward reuse.

Table 25

Parental Variables and Level of Attitude on Reuse

Parental variables	Negative	Neutral	Positive	X^2	P
Education (Father)					
Below secondary	9 (4.1%)	53 (24.3%)	156 (71.6%)	0.470	0.791
Secondary and above	5 (4.6%)	30 (27.5%)	74 (67.9%)		
Fathers' Occupation					
Informal	7 (4.1%)	47 (27.6%)	116 (68.2%)	0.960	0.619
Formal	7 (4.5%)	36 (22.9%)	114 (72.6%)		

The analysis of parental variables in relation to the level of attitude toward reuse reveals no significant differences based on either fathers' education or occupation. Chi-square tests for both variables with high p-values show that parents' education and occupation do not affect attitude towards reuse level. The majority of students with both parental characteristics have a positive attitude towards reuse.

Relation of Socio-demography with the Students' Attitude towards Recycling

This section investigates the association between socio-demographic factors and students' attitudes toward recycling, emphasizing personal demographics, household characteristics, and parental variables. The analysis is aware of constructs of gender, grade, and family background (e.g., family structure, parental education, and parental occupation) and examines their contribution to explaining differences in the recycling attitudes of the students. Since the expected frequency is less than 5, the chi-square test for demographic variables (students' caste/ ethnicity), household characteristics variables (students living with family and parents' support for study), and parental variables (mother's education, mother's occupation) are invalid. Thus, these variables were not considered in the analysis.

Personal Demographics and Level of Attitude on Recycling

Students' gender and their grade affect their attitude toward recycling. Table 26 shows the relationship between the gender and grade of the students and their recycling attitudes.

Table 26

Personal Demographics and Level of Attitude on Recycling

Variable	Negative	Neutral	Positive	X^2	P
Gender					
Female	7 (4.1%)	61 (35.9%)	102 (60.0%)	1.311	0.519
Male	11 (7.0%)	55 (35.0%)	91 (58.0%)		
Grade					
11	11 (7.1%)	58 (37.2%)	87 (55.8%)	2.076	0.354
12	7 (4.1%)	58 (33.9%)	106 (62.0%)		

The analysis of personal demographics and the level of attitude toward recycling shows that gender and grade level have no significant influence on students' attitudes toward recycling, as evidenced by the Chi-square test results. The obtained p-values suggest that these demographic variables do not strongly influence the attitudes of students toward recycling, indicating a possible influence of other factors on students' views of recycling.

Household Characteristics and Level of Attitude on Recycling

An individual's residence originality, remittance status, family structure, and residency type also shape the recycling attitude. Likewise, the gender of the person responsible for managing HH waste also shapes the attitude toward recycling. Table 27 presents the relationship between students' recycling attitudes and these variables.

The household characteristics show no significant influence of household characteristics on recycling attitudes. Positive attitudes are still high among all groups, though locals and migrants are similarly positive. Those who receive remittances are a little less likely than the non-recipients to express a positive attitude about this prospect, but the difference is not statistically significant.

Table 27

Household Characteristics and Level of Attitude on Recycling

Variable	Negative	Neutral	Positive	X^2	P
Originality of residence					
Local	9 (6.6%)	49 (36.0%)	78 (57.4%)	0.654	0.721
Migrated	9 (4.7%)	67 (35.1%)	115 (60.2%)		
Remittance					
No	12 (4.7%)	85 (33.3%)	158 (62.0%)	4.534	0.104
Yes	6 (8.3%)	31 (43.1%)	35 (48.6%)		
Family Structure					
Joint	11 (5.0%)	77 (35.3%)	130 (59.6%)	0.296	0.863
Nuclear	7 (6.4%)	39 (35.8%)	63 (57.8%)		
Residency status					
Resident	7 (4.9%)	55 (38.2%)	82 (56.9%)	0.918	0.632
Rented	11 (6.0%)	61 (33.3%)	111 (60.7%)		
Responsible to manage HH waste					
Female	12 (4.6%)	95 (36.1%)	156 (59.3%)	2.344	0.310
Male	6 (9.4%)	21 (32.8%)	37 (57.8%)		

Parental Variables and Level of Attitude on Recycling

The education level and occupation of parents also shape the recycling attitude of their children. Table 28 concentrates on parental characteristics (fathers' education and occupation) and their relationship with students' attitudes toward recycling.

Table 28

Parental Variables and Level of Attitude toward Recycle

Parental variables	Negative	Neutral	Positive	X^2	P
Education (Father)					
Below secondary	13 (6.0%)	77 (35.3%)	128 (58.7%)	0.265	0.876
Secondary and above	5 (4.6%)	39 (35.8%)	65 (59.6%)		
Fathers' Occupation					
Informal	8 (4.7%)	67 (39.4%)	95 (55.9%)	2.549	0.280
Formal	10 (6.4%)	49 (31.2%)	98 (62.4%)		

Parental factors show no significant influence on recycling attitudes. Positive attitudes are similar between those whose fathers have below secondary and secondary or higher education. Likewise, fathers' occupations do not significantly affect attitudes, with those in formal jobs having slightly higher positive attitudes than those in informal jobs.

Relation of Socio-demography with the Students' Attitude to Segregation

This section focuses on the association between socio-demographics and students' attitudes toward waste segregation. The investigation centers on personal demographics, family structures, and parental factors that explain how the above-mentioned factors contribute to shaping students' opinions of apartheid practices. As the expected counts are less than 5, chi-square tests for the following independent variables cannot be conducted: demographic variables (students' caste/ethnicity), household characteristics variables ('family structure', 'students living with family', 'parent's support for study' and 'gender responsible to manage HH waste') and parental variables (mother's education and occupation and father's education).

Personal Demographics and Level of Attitude on Segregation

Gender and the education level of students contribute to shaping the segregation attitude. Table 29 presents the relationship between students' gender and grade level and their attitudes toward waste segregation.

Table 29

Personal Demographics and Level of Attitude on Segregation

Variable	Negative	Neutral	Positive	X^2	P
Gender					
Female	7 (4.1%)	75 (44.1%)	88 (51.8%)	0.183	0.913
Male	8 (5.1%)	68 (43.3%)	81 (51.6%)		
Grade					
11	6 (3.8%)	74 (47.4%)	76 (48.7%)	1.801	0.406
12	9 (5.3%)	69 (40.4%)	93 (54.4%)		

Personal demographics do not significantly impact attitudes toward waste segregation. Gender shows minimal differences, with females and males having nearly identical positive attitudes. Similarly, grade level does not play a key role, as 11^{th} graders and 12^{th} graders exhibit comparable positive attitudes.

Household Characteristics and Level of Attitude toward Segregation

An individual's attitude toward waste segregation is influenced by the characteristics of the household they live in. Table 30 illustrates the relationship between household characteristics, such as place of origin, remittance status, and residency status, and their waste segregation attitude.

Table 30

Household Characteristics and Level of Attitude Toward Segregation

Variable	Negative	Neutral	Positive	X^2	P
Originality of residence					
Local	6 (4.4%)	65 (47.8%)	65 (47.8%)	1.576	0.455
Migrated	9 (4.7%)	78 (40.8%)	104 (54.5%)		
Remittance					
No	7 (2.7%)	110 (43.1%)	138 (54.1%)	9.990	**.007***
Yes	8 (11.1%)	33 (45.8%)	31 (43.1%)		
Residency status					
Resident	6 (4.2%)	62 (43.1%)	76 (52.8%)	0.186	0.911
Rented	9 (4.9%)	81 (44.3%)	93 (50.8%)		

Household characteristics show varying influences on attitudes toward segregation, with students from remittance status being significantly associated. Students from non-remittance families exhibit more positive attitudes toward waste segregation than those from remittance-receiving families. This suggests that having remittance as a source of income in the family significantly impacts students' attitudes toward waste segregation, with a higher presence of remittance income being associated with more negative attitudes.

Parental Variable and Level of Attitude on Segregation

Parents' profession determines the attitudes of their children. Table 31 explores the association between fathers' occupation and students' attitudes toward waste segregation.

Table 31

Parental Variables and Level of Attitude on Segregation

Parental variables	Negative	Neutral	Positive	X^2	P
Fathers' Occupation					
Informal	9 (5.3%)	78 (45.9%)	83 (48.8%)	1.320	0.517
Formal	6 (3.8%)	65 (41.4%)	86 (54.8%)		

Parental variables, such as fathers' occupation, do not significantly affect attitudes toward segregation. Both informal and formal occupation groups show similar distributions of attitudes, with most individuals expressing neutral or positive views, indicating that the father's occupation type may not strongly influence attitudes toward segregation.

Relation of Socio-demography with the Students' Overall Attitude

Since the expected frequency is less than 5, the chi-square test for all variables is not valid and has therefore been excluded from the analysis.

Relation of Socio-demography with the Students' Practice on Reduce

This section examines the association between socio-demographic factors and students' waste reduction practices. It focuses on personal demographics, household characteristics, and parental variables to understand how these elements might influence students' frequency of engaging in reduction behaviours. The analysis includes factors such as gender, grade, family structure, and parental occupation, examining their potential role in shaping waste reduction practices. Since the expected frequency is less than 5, the chi-square test for demographic variables, household characteristics variables, and parental variables is not valid and has therefore been excluded from the analysis.

Personal Demographics and Level of Practice on Reduce

An individual's gender and level of education influence their behaviour regarding waste reduction. Table 32 explores the relationship between these personal demographic factors and the frequency of waste reduction practices.

Table 32

Personal Demographics and Level of Practice on Reduce

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Gender					
Female	8 (4.7%)	139 (81.8%)	23 (13.5%)	0.121	0.941
Male	8 (5.1%)	126 (80.3%)	23 (14.6%)		
Grade					
11	5 (3.2%)	128 (82.1%)	23 (14.7%)	1.872	0.392
12	11 (6.4%)	137 (80.1%)	23 (13.5%)		

Personal demographics, such as gender and grade, do not significantly influence the frequency of practice in reducing behaviours. The p-values for gender and grade suggest no substantial difference in practice frequency between males and females or between grades 11 and 12. Both groups predominantly engage in moderate frequency practices, indicating that these demographic factors do not strongly affect how often individuals practice reduction behaviours.

Household Characteristics and Level of Practice on Reduce

Household characteristics, such as place of origin, remittance status, and residency status, play a role in shaping students' waste reduction behaviour. Table 33 examines the relationship between these household factors and the frequency with which students engage in waste reduction practices, such as originality of residence, family structure, and residency status.

Table 33

Household Characteristics and Level of Practice on Reduce

Variable	Low	Medium	High	X^2	P
Originality of residence					
Local	6 (4.4%)	108 (79.4%)	22 (16.2%)	0.923	0.630
Migrated	10 (5.2%)	157 (82.2%)	24 (12.6%)		
Family Structure					
Joint	10 (4.6%)	179 (82.1%)	29 (13.3%)	0.489	0.783
Nuclear	6 (5.5%)	86 (78.9%)	17 (15.6%)		
Residency status					
Resident	7 (4.9%)	119 (82.6%)	18 (12.5%)	0.531	0.767
Rented	9 (4.9%)	146 (79.8%)	28 (15.3%)		

Household characteristics, including originality of residence, family structure, and residency status, do not significantly affect the frequency of practice in reducing behaviours. The p-values suggest no major differences in reduction practices across these variables. In all groups, the majority engage in moderate frequency practices, with small variations in high and low frequency. This indicates that these household factors do not strongly influence the frequency of reduction practices.

Parental Variables and Level of Practice on Reduce

The occupation in which parents, particularly fathers, are engaged for earning appears to influence their children's behaviour. Table 34 examines the relationship between fathers' occupations and students' waste reduction practices, revealing observable trends.

Table 34

Parental Variables and Level of Practice in Reducing

Parental variables	Low frequency	Moderate frequency	High frequency	X^2	P
Fathers' Occupation					
Informal	11 (6.5%)	141 (82.9%)	18 (10.6%)	5.006	0.082
Formal	5 (3.2%)	124 (79.0%)	28 (17.8%)		

The parental variable of the father's occupation shows a trend toward influencing the level of practice in reducing behaviours, though it is not statistically significant. Individuals with fathers in formal occupations have a slightly higher percentage of high-frequency reduction practices compared to those with fathers in informal occupations, suggesting that while occupation type may have some impact, it is not a decisive factor in the frequency of reduction practices.

Relation of Socio-demography with the Students' Practice on Reuse

This part of the analysis investigates the association between students' socio-demographic factors and their reuse practices. The study particularly focuses on how individual demographic and household characteristics may impact the frequency of reuse behaviours. Since the expected frequency is less than 5, the chi-square test for demographic variables (students' caste/ethnicity), household characteristics variables ('originality of residence', 'remittance', 'parent's support for study' and 'gender responsible to manage HH waste') and parental variables (mother's education and occupation and father's education) are not valid and have therefore been excluded from the analysis. Each table provides an indication of how these various factors may relate to students' likelihood to reuse, thereby contributing to the socio-demographic determinants of waste management practices.

Personal Demographics and Level of Practice on Reuse

An individual's gender and level of education influence their behaviour regarding the reuse of HH waste. Table 35 examines the relationship between fathers' occupations and the frequency of students' waste reduction practices, categorized as low, moderate, and high. A trend is observed across these frequency levels.

Table 35

Personal Demographics and Level of Practice on Reuse

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Gender					
Female	5 (2.9%)	75 (44.1%)	90 (52.9%)	2.309	0.315
Male	6 (3.8%)	81 (51.6%)	70 (44.6%)		
Grade					
11	5 (3.2%)	77 (49.4%)	74 (47.4%)	0.329	0.848
12	6 (3.5%)	79 (46.2%)	86 (50.3%)		

Personal demographics, including gender and grade, do not significantly impact the frequency of reuse practices, suggesting that there is no substantial

difference between males and females or between grades 11 and 12 in how frequently individuals engage in reuse behaviours. In both groups, most individuals practice reuse at a moderate or high frequency, indicating that these demographic factors do not strongly influence the level of reuse practices.

Household Characteristics and Level of Practice on Reuse

Household characteristics, such as family structure (joint or nuclear), living arrangements (with or without parents), and housing status (own residence or rented), influence an individual's reuse practices. Table 36 explores the relationship between these factors and students' levels of reuse behaviour, categorized into low, moderate, and high frequency of practice.

Table 36

Household Characteristics and Level of Practice on Reuse

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Family Structure					
Joint	6 (2.8%)	100 (45.9%)	112 (51.4%)	1.989	0.370
Nuclear	5 (4.6%)	56 (51.4%)	48 (44.0%)		
Student living with parents					
No	5 (10.0%)	18 (36.0%)	27 (54.0%)	9.733	**.008***
Yes	6 (2.2%)	138 (49.8%)	133 (48.0%)		
Residency status					
Resident	6 (4.2%)	65 (45.1%)	73 (50.7%)	1.012	0.603
Rented	5 (2.7%)	91 (49.7%)	87 (47.5%)		

Household characteristics show varied impacts on the level of reuse practices. Family structure (joint vs. nuclear) and residency status (resident vs. rented) do not significantly affect reuse behaviour, as indicated by the p-value. However, whether the student lives with parents has a significant impact. Students living with parents have a higher frequency of moderate and high reuse practices compared to those not living with parents, who show a lower frequency of moderate and a higher frequency of high reuse practices. This suggests that living with parents influences the level of reuse practices, with students who live with their parents more actively participating in reuse behaviours.

Parental Variable and Level of Practice on Reuse

Parental education level also influences children's reuse behaviour. Table 37 examines the association between fathers' educational levels and the frequency of students' reuse practices, categorized as low, moderate, and high.

Table 37

Parental Variable and Level of Practice on Reuse

Parental variables	Low frequency	Moderate frequency	High frequency	X^2	P
Education (Father)					
Below secondary	6 (2.8%)	105 (48.2%)	107 (49.1%)	0.759	0.684
Secondary and above	5 (4.6%)	51 (46.8%)	53 (48.6%)		

Fathers' education level does not significantly influence the frequency of reuse practices, as indicated by the p-value. Both groups, those with fathers having education below secondary and those with secondary or higher education, show similar distributions of low, moderate, and high-frequency reuse practices. This suggests that the father's educational background may not play a significant role in determining the level of reuse behaviour.

Relation of Socio-demography with Students' Practice on Recycling

This section analyzes the association between socio-demographic factors and students' recycling behaviours. It explores how variables such as personal demographics (gender, grade, and caste/ethnicity), household characteristics (residence status, family structure, and support for study), and parental factors (education and occupation) influence the frequency of recycling behaviours. These tables illustrate their magnitude, shedding light on how socio-demographic and household characteristics influence the recycling efforts of students and, hence, provide a more comprehensive perspective on the factors affecting recycling behaviour among the students.

Personal Demographics and Level of Practice on Recycling

Individual recycling behaviour varies based on personal demographic factors such as gender, grade level, and caste/ethnicity. Table 38 analyzes the association between these variables and students' levels of recycling practice, categorized into low, moderate, and high frequency.

Personal demographics, including gender, grade, and caste/ethnicity, are not significantly associated with the frequency of recycling practices. The p-values for gender, grade, and caste/ethnicity indicate no significant differences in the frequency of recycling practices across these variables. In all groups, moderate-frequency recycling is the most common, with similar distributions of low and high-frequency practices, suggesting that these demographic factors have a negligible impact on recycling behaviour.

Table 38

Personal Demographics and Level of Practice on Recycling

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Gender					
Female	27 (15.9%)	97 (57.1%)	46 (27.1%)	0.914	0.633
Male	20 (12.7%)	89 (56.7%)	48 (30.6%)		
Grade					
11	19 (12.2%)	91 (58.3%)	46 (29.5%)	1.166	0.558
12	28 (16.4%)	95 (55.6%)	48 (28.1%)		
Caste/Ethnicity					
Other	13 (13.5%)	50 (52.1%)	33 (34.4%)	2.113	0.348
Janajati	34 (14.7%)	136 (58.9%)	61 (26.4%)		

Household Characteristics and Level of Practice on Recycling

Household characteristics appear to influence students' recycling practices to varying degrees. Table 39 explores the relationship between various household characteristics and students' level of recycling practice.

Table 39

Household Characteristics and Level of Practice on Recycling

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Originality of residence					
Local	24 (17.6%)	71 (52.2%)	41 (30.1%)	2.790	0.248
Migrated	23 (12.0%)	115 (60.2%)	53 (27.7%)		
Remittance					
No	40 (15.7%)	139 (54.5%)	76 (29.8%)	2.985	0.225
Yes	7 (9.7%)	47 (65.3%)	18 (25.0%)		
Family Structure					
Nuclear	33 (15.1%)	119 (54.6%)	66 (30.3%)	1.403	0.496
Joint	14 (12.8%)	67 (61.5%)	28 (25.7%)		
Student living with parents					
No	10 (20.0%)	23 (46.0%)	17 (34.0%)	3.096	0.213
Yes	37 (13.4%)	163 (58.8%)	77 (27.8%)		
Parent's support for the study					
Full	39 (14.9%)	150 (57.5%)	72 (27.6%)	0.976	0.614
Partial	8 (12.1%)	36 (54.5%)	22 (33.3%)		
Residency status					
Resident	19 (13.2%)	86 (59.7%)	39 (27.1%)	0.861	0.650
Rented	28 (15.3%)	100 (54.6%)	55 (30.1%)		
Responsible to manage HH waste					
Female	39 (14.8%)	151 (57.4%)	73 (27.8%)	0.719	0.698
Male	8 (12.5%)	35 (54.7%)	21 (32.8%)		

Household characteristics do not show significant effects on the level of recycling practices. The p-values for the originality of residence, remittance status, family structure, student living with parents, parents' support for the study, residency status, and responsibility to manage household waste indicate no strong association with recycling frequency. In all categories, the majority engage in moderate-frequency recycling, with similar distributions for low and high-frequency practices, suggesting that these household factors do not strongly influence recycling behaviour.

Parental Variables and Level of Practice on Recycling

Parents' educational level and occupation influence the recycling behaviour of their children. Table 40 presents the association between parental variables, education, and occupation of father and mother, as well as students' recycling practices. The table categorizes recycling behaviour into low, moderate, and high frequency levels and includes variables such as father's education, mother's education, father's occupation, and mother's occupation.

Table 40

Parental Variables and Level of Practice on Recycling

Parental variables	**Low frequency**	**Moderate frequency**	**High frequency**	**X^2**	**P**
Education (Mother)					
Below secondary	32 (12.6%)	152 (59.8%)	70 (27.6%)	4.806	.090
Secondary and above	15 (20.5%)	34 (46.6%)	24 (32.9%)		
Education (Father)					
Below secondary	32 (14.7%)	127 (58.3%)	59 (27.1%)	0.904	.636
Secondary and above	15 (13.8%)	59 (54.1%)	35 (32.1%)		
Mothers' Occupation					
Informal	40 (14.6%)	161 (58.8%)	73 (26.6%)	3.711	.156
Formal	7 (13.2%)	25 (47.2%)	21 (39.6%)		
Fathers' Occupation					
Informal	27 (15.9%)	97 (57.1%)	46 (27.1%)	0.914	.633
Formal	20 (12.7%)	89 (56.7%)	48 (30.6%)		

Parents' variables reveal patterns but no significant relationship to recycling habits. The near-significant difference in mothers' education demonstrates that respondents with less than secondary education and those with secondary or higher education are more likely to practice moderate recycling than those with secondary education. But with the p-value not being super low, the significance is not strong

enough to make a statement. The father's education, the mother's job, and the father's job do not affect the disposal/recycling of waste. These results indicate that, in spite of partial parental education, occupation-related tendencies in recycling behaviour, none of these characteristics could significantly contribute towards parental effect.

Relation of Socio-demography with the Students' Practice on Segregation

This section examines the association between socio-demographic factors and students' waste segregation practices. The analysis includes personal demographics (gender, grade, and caste/ethnicity), household characteristics (residence status, family structure, and support for study), and parental factors (education and occupation) in relation to the frequency of segregation practices. This analysis helps to understand how various socio-demographic factors relate to students' engagement with waste segregation practices. Since the expected frequency is less than 5, the chi-square test for household characteristics variables (remittance) and parental variables (mother's education) is not valid and has therefore been excluded from the analysis.

Personal Demographics and Level of Practice on Segregation

Individual waste segregation practice varies based on personal demographic factors such as gender, grade level, and caste/ethnicity. Table 41 examines the association between personal demographic characteristics and students' frequency level of practice on waste segregation.

Table 41

Personal Demographics and Level of Practice on Segregation

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Gender					
Female	9 (5.3%)	59 (34.7%)	102 (60.0%)	8.644	**.013***
Male	14 (8.9%)	74 (47.1%)	69 (43.9%)		
Grade					
11	10 (6.4%)	64 (41.0%)	82 (52.6%)	0.178	.915
12	13 (7.6%)	69 (40.4%)	89 (52.0%)		
Caste/Ethnicity					
Other	5 (5.2%)	38 (39.6%)	53 (55.2%)	0.904	.636
Janajati	18 (7.8%)	95 (41.1%)	118 (51.1%)		

The test shows that gender makes a significant difference (p = .013) in how often students separate their waste. Female students tend to practice waste segregation more regularly than male students. Grade and caste/ethnicity, on the other hand, are

not significantly different when it comes to segregation. The distributions of both grades and ethnic groups across low, moderate, and high-frequency practices are comparable, indicating that these demographics are not major drivers of segregation behaviour.

Household Characteristics and Level of Practice on Segregation

Household characteristics appear to influence students' segregation practices to varying degrees. Table 42 analyzes the relationship between household characteristics and students' level of practice on waste segregation.

Table 42

Household Characteristics and Level of Practice on Segregation

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Originality of residence					
Local	9 (6.6%)	58 (42.6%)	69 (50.7%)	0.389	.823
Migrated	14 (7.3%)	75 (39.3%)	102 (53.4%)		
Remittance					
No	19 (7.5%)	98 (38.4%)	138 (54.1%)	2.454	.293
Yes	4 (5.6%)	35 (48.6%)	33 (45.8%)		
Family Structure					
Nuclear	16 (7.3%)	87 (39.9%)	115 (52.8%)	0.207	.902
Joint	7 (6.4%)	46 (42.2%)	56 (51.4%)		
Student living with parents					
No	6 (12.0%)	17 (34.0%)	27 (54.0%)	2.749	.253
Yes	17 (6.1%)	116 (41.9%)	144 (52.0%)		
Parent's support for the study					
Full	16 (6.1%)	107 (41.0%)	138 (52.9%)	1.617	.446
Partial	7 (10.6%)	26 (39.4%)	33 (50.0%)		
Residency status					
Resident	9 (6.3%)	63 (43.8%)	72 (50.0%)	1.083	.582
Rented	14 (7.7%)	70 (38.3%)	99 (54.1%)		
Responsible to manage HH waste					
Female	16 (6.1%)	106 (40.3%)	141 (53.6%)	2.216	.330
Male	7 (10.9%)	27 (42.2%)	30 (46.9%)		

Household characteristics generally show no significant effect on the level of

practice in segregation. The p-values for originality of residence, remittance status, family structure, student living with parents, parents' support for study, residency status, and responsibility to manage household waste indicate no significant differences in segregation practices across these variables. In all cases, most individuals engage in moderate to high-frequency segregation practices, suggesting that these household factors do not strongly influence segregation behaviour.

Parental Variables and Level of Practice on Segregation

Parents' educational level and occupation influence the recycling behaviour of their children. Table 43 presents the association between parental variables, education, and occupation of parents and students' segregating practices. The table categorizes segregating behaviour into low, moderate, and high frequency levels and includes variables such as mother's education, father's occupation, and mother's occupation.

Table 43

Parental Variables and Level of Practice on Segregation

Parental variables	Low frequency	Moderate frequency	High frequency	X^2	P
Education (Mother)					
Below secondary	18 (7.1%)	100 (39.4%)	136 (53.5%)	0.819	.664
Secondary and above	5 (6.8%)	33 (45.2%)	35 (47.9%)		
Education (Father)					
Below secondary	17 (7.8%)	91 (41.7%)	110 (50.5%)	1.149	.563
Secondary and above	6 (5.5%)	42 (38.5%)	61 (56.0%)		
Fathers' Occupation					
Informal	11 (6.5%)	74 (43.5%)	85 (50.0%)	1.226	.542
Formal	12 (7.6%)	59 (37.6%)	86 (54.8%)		

Parental variables, including the mother's education, father's education, and father's occupation, do not significantly influence the level of practice in segregation. Both groups, regardless of education level or occupation type, predominantly practice segregation at a moderate to high frequency, indicating that these parental characteristics have a negligible impact on segregation practices.

Relation of Socio-demography with the Students' Overall Practice

This section analyses the relationship between socio-demographic factors and students' overall practice levels, considering personal demographics (gender and caste/ethnicity), household characteristics (residence status, living with parents, and responsibility for management of household waste), and parental variables (mother's

education and father's occupation). The analysis aims to explore how these socio-demographic elements correlate with students' overall engagement in sustainable practices. Since the expected frequency is less than 5, the chi-square test for demographic variables (students' grade), household characteristics variables ('remittance', 'family structure', 'parent's support for study' and 'residency status') and parental variables (mother's occupation and father's education) are not valid and have therefore been excluded from the analysis.

Personal Demographics and Level of Overall Practice

Students' overall waste management practices differ across personal demographic factors such as gender and caste/ethnicity. Table 44 examines the association between demographic variables and the overall level of practices.

Table 44

Personal Demographics and Level of Overall Practice

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Gender					
Female	7 (4.1%)	110 (64.7%)	53 (31.2%)	0.667	.717
Male	8 (5.1%)	106 (67.5%)	43 (27.4%)		
Caste/Ethnicity					
Other	5 (5.2%)	57 (59.4%)	34 (35.4%)	2.732	.255
Janajati	10 (4.3%)	159 (68.8%)	62 (26.8%)		

Personal demographics, including gender and caste/ethnicity, do not significantly affect the overall level of practice. The p-values for gender and caste/ethnicity indicate no significant differences in the frequency of overall practices. In both groups, the majority engage in moderate-frequency practices, with similar distributions in low and high-frequency categories, suggesting that these demographic factors do not strongly influence overall practice behaviours.

Household Characteristics and Level of Overall Practice

Household characteristics appear to influence students' overall waste management practices to varying degrees. Table 45 analyzes the association between these HH factors and the frequency levels of students' waste management practices.

Table 45

Household Characteristics and Level of Overall Practice

Variable	Low frequency	Moderate frequency	High frequency	X^2	P
Originality of residence					
Local	5 (3.7%)	87 (64.0%)	44 (32.4%)	1.286	.526
Migrated	10 (5.2%)	129 (67.5%)	52 (27.2%)		
Student living with parents					
No	5 (10.0%)	26 (52.0%)	19 (38.0%)	7.037	**.030***
Yes	10 (3.6%)	190 (68.6%)	77 (27.8%)		
Responsible to manage HH waste					
Female	10 (3.8%)	174 (66.2%)	79 (30.0%)	2.019	.364
Male	5 (7.8%)	42 (65.6%)	17 (26.6%)		

Household characteristics show that "student living with parents" significantly ($p = .030$) influences the level of overall practice. Students who live with parents are more likely to be exposed to moderate practices compared to those who do not live with their parents, and those who do not live with their parents have a higher proportion of high-frequency practices. The originality of residency and responsibility of the management of household waste also do not affect overall practice patterns, as the categories roughly have the same distributions.

Parental Variable and Level of Overall Practice

Parental background factors may also shape students' engagement in household waste management practices. Table 46 explores the relationship between parental variables, specifically mothers' education and fathers' occupation, and the overall frequency of students' waste management practices.

Table 46

Parental Variable and Level of Overall Practice

Parental variables	Low frequency	Moderate frequency	High frequency	X^2	P
Education (Mother)					
Below secondary	9 (3.5%)	173 (68.1%)	72 (28.3%)	3.827	.148
Secondary and above	6 (8.2%)	43 (58.9%)	24 (32.9%)		
Fathers' Occupation					
Informal	9 (5.3%)	118 (69.4%)	43 (25.3%)	2.981	.225
Formal	6 (3.8%)	98 (62.4%)	53 (33.8%)		

Parental variables, including the mother's education and the father's occupation, do not show significant effects on the level of overall practice. The p-values for the mother's education and the father's occupation indicate no significant differences in practice behaviour based on these factors. While there are differences in the distributions of low, moderate, and high-frequency practices, they are not statistically significant, suggesting that these parental characteristics do not strongly influence overall practice behaviours.

Factors Influencing KAP in the Management of Household Waste

A logistic regression model was employed to assess and quantify the influence of selected factors on KAP related to the management of household waste. This analysis restricted itself to the variables that were found to be significant in the chi-square tests, enabling the strongest predictors to be examined. This method permits a nuanced appreciation of how demographic and contextual variables are associated with KAP. Using logistic regression analysis, the study attempted to develop a model of the likelihood of higher knowledge, positive attitudes, and effective practices regarding the management of household waste, which are valuable for formulating interventions and policies based on evidence.

Results

The logistic regression findings, as identified predictors of KAP on HW management, are described in the next section. Tables 47-49 show the significant predictors of KAP toward the management of household waste. Knowledge is influenced by gender, family structure, and responsibility; attitudes by gender roles and remittance status; and practices by living with family. These discoveries provide useful implications for changes in waste management behaviour.

Table 47

Predictors Influencing Knowledge in the Management of Household Waste

Knowledge Category	Predictor Variable	B	SE	Wald χ^2	p	Odds Ratio
Reuse	Sex					
	Male (ref.-Female)	-.048	.251	.037	.847	.953
Recycle	Gender responsibility managing HH waste					
	Male (ref.-Female)	-1.130	.388	8.483	**.004**	.323
Segregation	Family structure					
	Nuclear (ref.- Joint)	-.368	.236	2.437	.118	.692
Overall	Family structure					
	Nuclear (ref.- Joint)	-.306	.239	1.639	.201	.737

The logistic regression analysis reveals that gender and family structure have varying effects on knowledge in the management of household waste. For reuse, gender does not significantly influence knowledge, as the odds ratio (0.953) and p-value (0.847) indicate no substantial difference between males and females. However, for recycling, males who are responsible for managing household waste show significantly lower knowledge levels compared to females, as evidenced by the negative coefficient (-1.130), a significant p-value (0.004), and an odds ratio of 0.323. This suggests that males have a lower likelihood of possessing high recycling knowledge. Regarding segregation and overall knowledge, family structure (nuclear vs. joint families) does not significantly impact knowledge, with p-values of 0.118 and 0.201, respectively, and odds ratios of 0.692 and 0.737, indicating no significant difference between individuals from joint and nuclear families. Overall, the analysis highlights that gender responsibility in waste management impacts recycling knowledge, while family structure does not play a significant role in knowledge about reuse, segregation, or overall waste management practices.

Table 48

Predictors Influencing Attitude Toward Management of Household Waste

Attitude Category	Predictor Variable	B	SE	Wald χ^2	p	Odds Ratio
Reuse	Gender					
	Male (ref.-Female)	.027	.473	.003	.954	1.028
Segregation	Remittance					
	Yes (ref.- No)	-.939	.372	6.365	**.012**	.391

The logistic regression analysis reveals that gender does not significantly influence attitudes toward reuse, as indicated by the p-value of 0.954, with the odds ratio of 1.028 suggesting only a slight difference between males and females. However, remittance significantly impacts attitudes toward segregation, with individuals who receive remittance showing fewer positive attitudes. This is evidenced by the negative coefficient (-0.939) and the p-value of 0.012, suggesting that those receiving remittance are less likely to have a favorable attitude toward waste segregation, with an odds ratio of 0.391 indicating a significantly lower likelihood compared to non-recipients of remittance. Overall, while gender does not have a significant effect on attitudes toward reuse, remittance has a notable influence on attitudes toward segregation.

Table 49

Predictors Influencing Practice of Management of Household Waste

Practice Category	Predictor Variable	B	SE	Wald χ^2	p	Odds Ratio
Reuse	Living with family					
	Yes (ref.- No)	.685	.467	2.158	.142	1.984
Segregation	Gender					
	Male (ref.-Female)	-.396	.352	1.266	.260	.673
Overall	Living with family					
	Yes (ref.- No)	1.344	.454	8.769	**.003**	3.834

The logistic regression analysis reveals that students living with family positively influence the management practice of household waste. While living with family shows a trend toward increased reuse practices, this result is not statistically significant ($p = 0.142$), indicating that the variable **"living with family"** cannot be considered a strong predictor of reuse practices among students. However, it

significantly impacts overall waste management practices, with an odds ratio of 3.834, indicating that individuals living with family are more likely to engage in better practices (p-value of 0.003). Though the gender of the students shows a significant association with segregation practices, it is not a strong predictor, indicating that gender alone cannot be considered a predictor of students' segregation behavior. Overall, living with family is a key predictor of more comprehensive waste management practices.

Concluding the Chapter

The study provided the municipality with crucial information on the KAP of school students in household solid waste management of Bhaktapur Municipality and identified the important determinants of KAP. Most students showed moderate to high knowledge and practice levels, with a majority holding positive attitudes toward household waste management. While parental educational level does not significantly affect their children's KAP in HH waste management, factors such as the student's gender, gender roles in HH waste management, family structure, presence of remittance in the family, and living with parents are significantly associated with students' KAP. Female students and those from households where females manage waste showed higher knowledge and better practices, though gender was not a strong predictor. Students from joint families had higher knowledge, but family structure had limited predictive power. Non-remittance households were linked to more positive attitudes, with remittance families less likely to hold positive views. Students living with parents were nearly four times more likely to practice good waste management. These findings highlight the importance of implementing targeted educational programs to bridge knowledge gaps and leverage existing positive attitudes while also considering socio-economic factors like remittance dependency.

CHAPTER V
FINDINGS AND DISCUSSIONS

The study's main findings are presented in this chapter, considering the research questions stated in Chapter I. Four major themes emerge from the results: gender dynamics, with female students more involved due to traditional household roles; family and socioeconomic factors, demonstrating stronger engagement in joint families and lower participation in remittance-receiving households; structural and cultural influences, where limited infrastructure and traditional norms shape behaviours; and students' KAP on domestic waste management, moderate knowledge and positive attitudes contrasted with limited practical action. The KAP model summarises these results, shows how they are related and provides guidance for sustainable waste management policy recommendations.

Findings

The levels of knowledge among school students vary, with 8% demonstrating low knowledge, 65.7% showing medium knowledge, and 26.3% having high knowledge about household waste management. In terms of attitudes, the majority hold positive views, with 71.6% expressing a positive attitude toward waste management, 26% remaining neutral, and only 2.4% exhibiting a negative attitude. This indicates that while a significant portion of students have favourable attitudes, there is still a segment that may require further awareness and motivation.

Student engagement in HH waste management practices also varies. Approximately 4.6% of students practice waste management activities at a low frequency, 66.1% engage at a moderate frequency, and 29.4% participate at a high frequency. These findings suggest that most students are involved in waste management behaviours, though there is potential to increase the frequency and consistency of such practices, particularly among those currently less engaged.

While previous literature highlighted poor segregation practices in the city, this study presents a more encouraging picture; segregation emerged as the most balanced aspect, with over 40% of students demonstrating high knowledge, 52% expressing positive attitudes, and 52% practicing it frequently. This indicates that awareness, when coupled with a well-structured and efficiently implemented municipal waste management system like that of Bhaktapur, can significantly enhance

students' engagement in sustainable practices. The municipality's active role in waste segregation, compost production, and frequent collection not only provides the necessary infrastructure but also reinforces the behavioural changes promoted through awareness programs. Such synergy between education and service delivery creates an enabling environment where knowledge and attitudes are more likely to translate into consistent, high-quality waste management behaviours, serving as a model for other municipalities aiming to improve their waste management outcomes.

Significant associations were observed between several parental socio-demographic factors and students' KAP regarding waste management. Factors such as the student's gender, gender roles in HH waste management, family structure, presence of remittance in the family, and living with parents are significantly associated with students' KAP. Female students generally exhibit higher knowledge, more positive attitudes, and better practices compared to males; however, gender alone is not a strong independent predictor. Students from households where females primarily manage waste demonstrate greater recycling knowledge. Those from joint families tend to have higher knowledge levels than students from nuclear families, although family structure does not independently predict knowledge. Attitudes are more positive among students from non-remittance households compared to those from remittance-receiving families. Additionally, students living with their parents show significantly better reuse practices and overall waste management behaviour, with living arrangements being a strong predictor of practice. In contrast, parental educational level appears to have no significant influence on students' KAP in this context.

Parents' education level does not play a significantly role in shaping KAP of their children; instead, the household environment, accessibility, and an effective municipal waste management system play a crucial role in promoting sustainable waste practices among youth, who generally demonstrate moderate to high knowledge, positive attitudes, and active engagement, particularly in waste segregation.

Discussion

The results are discussed in the context of the study's objectives, comparing them with existing literature and theoretical perspectives on waste management practices. The discussion identifies the factors that significantly influence KAP regarding school students' waste management and highlights the key takeaways for interventions and future policy.

Gender and Management of Household Waste

This study identifies subtle connections between gender and multiple facets of waste management, including awareness, mindset and actions. The outcomes enrich the existing understanding of how gender influences environmental behaviour and underscore the significant influence women may have in fostering sustainable waste management efforts.

The results indicate that female students possess a notably greater understanding of waste management, particularly in the areas of reuse and recycling, compared to their male counterparts. This finding agrees with the report of Ezeudu et al. (2020), indicating that gender is an important dimension of environmental consciousness and sustainability. Likewise, Zelezny et al. (2000) emphasize women's dominion over environmental knowledge and practices. The increased awareness among women is likely to be associated with their greater role in the management of household waste, and agrees with Tadesse et al.'s (2008) contention that the collection method promoted more of an active role in waste management amongst children, hence enhancing their socialization of recycling.

Gendered roles in the household are one of the primary factors that explain this disparity, with women more often responsible for daily waste sorting and disposal (Kaza et al., 2018). Empirical evidence reinforces this pattern; as an example, a World Bank study reported that, in developing nations, women are the majority of workers in informal recycling sectors and directly manage from 60 to 80% of recyclable waste (Kaza et al., 2018). Women are also central to local recycling initiatives like the Brazilian *catadoras* (waste picker cooperatives) (Dias & Ogando, 2015), where they develop essential skills and leadership in waste management. Socialization emphasizing care and responsibility, coupled with traditional gender roles assigning domestic waste management tasks to women, are frequently cited explanations (Zelezny et al., 2000; Scott et al., 2015). Together, these factors underscore the gendered nature of waste management and its implications for policy and intervention design.

Social norms in India and Nigeria are reinforcing this gendered dynamic by socially allocating waste-related chores to women, continuing the accrual of knowledge by women in dealing with waste (Ezeudu et al., 2020; Beall, 1997). Socioeconomic diversities such as income, poverty and caste relations also determine the allocation of household chores, thereby perpetuating gender inequalities (Beall,

1997). Increased attendance of women in environmental education programs further increases their knowledge of sustainable waste management practices (UNEP, 2022). Meta-analytic results also imply that women have greater pro-environmental ecological concern and ethical commitment to recycling, and on this basis, they seem to be more relevant to environmental sustainability (Zelezny et al., 2000). It is important to recognize and address gender dynamics in environmental policy and education to leverage women's pivotal role in fostering sustainable household and community waste management.

Nonetheless, logistic regression shows that gender alone does not strongly predict the reuse of knowledge. This highlights a crucial nuance: while females reported higher reuse knowledge levels overall, other unmeasured factors or the specific model covariates may better explain the variance in reuse knowledge than gender alone. This finding contradicts studies showing persistent gender gaps across all environmental knowledge domains (Zelezny et al., 2000) but aligns with research suggesting that when controlling for factors like direct experience or responsibility, gender effects can diminish (Scott & Vigar-Ellis, 2014; Xiao & McCright, 2015). Thus, other factors, such as education, the pressure of schoolwork and access to resources, are conceived to play a more crucial role (Abushammala & Ghulam, 2022). smaller or non-significant gender gaps in actual recycling behaviour in specific contexts like public spaces and specific workplace settings (Scott et al., 2015). This suggests the need to explore broader contextual and socio-economic factors beyond gender to better understand knowledge reuse in waste management.

Men tend to be more neutral than negative toward reuse compared to women. However, logistic regression analysis shows that gender does not significantly influence attitudes toward reuse; when considering other factors, both males and females demonstrate a similar likelihood of having a positive attitude toward reuse. Previous findings indicate that women are more inclined to present pro-environmental behaviors and attitudes, mostly because of general social nurturing and devotion to the community, since sustainable practices and savings are also taught therein (Vicente-Molina et al., 2018). Unlike women, men's neutral attitudes may be associated with their diverging priorities and social conceptions, given that men are less involved in household-level environmental decisions (Xiao & McCright, 2015). These insights highlight the importance of tailoring environmental education to address differing social roles and motivations across genders.

Although no significant gender-based predictors appear to be the case, women's more favourable attitudes mean they may be more open toward sustainability appeals. Given their influence in disseminating pro-environmental behaviours within homes, directed educational programs may be used to capitalize on this to improve HH waste management as a whole (Xiao & McCright, 2015). Leveraging women's generally positive environmental attitudes through targeted programs could amplify sustainable waste management practices at the household level.

Regarding practice, women constitute a higher percentage of those who adopt segregation of waste, as was found in previous studies (Ayalon et al., 2009). Men are less likely to be involved in segregation, as shown by the regression analysis, even if this is not by a very large amount from the regression analysis result. Greater participation of women in the disposal of domestic waste results in a greater sense of accountability and awareness in the segregation of waste (Martínez-Sánchez et al., 2015). Single female-headed families also tend to have higher knowledge of recycling, with females having strong decisions on waste issues (Ojolowo & Adeoye, 2024). Women's greater involvement in waste segregation reflects not only traditional roles but also highlights their potential as key agents in promoting effective household waste management strategies.

Gender disparities in KAP are clear. However, they do not entirely explain variations in waste management responses. Socio-demographic features (education, income and access to recycling infrastructure) also greatly affect participation (Abushammala & Ghulam, 2022; Geetha & Rajalakshmi, 2020). Barriers, including low levels of environmental consciousness and poor waste management infrastructure, also reduce the extent of participation (Abushammala & Ghulam, 2022). Addressing these barriers through gender-sensitive policies, economic incentives, and inclusive educational programs could enhance waste management outcomes (Geetha & Rajalakshmi, 2020; Ojolowo & Adeoye, 2024). To improve participation across genders, it is essential to address broader socio-economic barriers and infrastructure gaps alongside implementing gender-sensitive and inclusive waste management policies.

There are gender differentials, as indicated by the students, regarding waste disposal; on the one hand, female students had more knowledge and were more active in the use of active reuse and segregation as compared to male students. However,

logistic regression models indicate that gender is no longer a significant predictor after controlling for socio-economic and educational variables (Hunter et al., 2004). According to social role theory (Eagly & Wood, 2016), behaviour is gendered because of the division of labour and involvement of women in caregiving and associated management of household waste (Diekman & Clark, 2015). While gender differences in waste-related behaviours exist, understanding how socio-economic and educational factors mediate these effects is crucial for designing equitable and effective environmental interventions.

The study indicates that women generally have a higher level of knowledge and a more positive attitude and are more involved in waste segregation activities than men, which could be attributed to the reproductive roles that women traditionally have in waste management at home. Nevertheless, gender is not the sole determinant of patterns of waste management practices, with socio-economic, educational, and cultural aspects also being important. In many cultural settings, prevailing social norms assign household waste management primarily to women, which can result in men's limited participation. Addressing this requires targeted strategies to challenge traditional role divisions, promote shared household responsibilities, and normalize male involvement in domestic waste management through community sensitization, school-based education, and public awareness campaigns. In addition, gender-sensitive policy frameworks are suggested to foster efficient and gender-sensitive waste management and to address structural barriers, e.g., care integration and educational outreach programs to reach all societal sectors equally. Although women largely provide unremunerated labour in domestic waste disposal, gender mainstreaming is necessary at a policy level by setting up structures that are sustainable for future generations.

Family Structure and Management of Household Waste

The study revealed a notable link between family type and students' understanding of waste segregation, with those from joint families demonstrating greater knowledge compared to students from nuclear families. This implies that the transfer of knowledge from one generation to another under the joint family system has contributed significantly to the promotion of sustainable household practices. Previous studies by Barr et al. (2011) support this observation in that extended family structures support environmental learning and joint activities.

In families where more than one generation co-resides, the pool of family members across ages that are all involved in maintaining the home, including systematic waste management, provides a naturalistic context where the younger generation acquires waste segregation and recycling practices by observing and learning from their senior family members. This ongoing informal education process of spatialized waste sorting in the community seems to “institutionalize” sustainable habits more extensively at a faster rate compared to the nuclear family level.

On the other hand, students belonging to nuclear families demonstrated a relatively poor understanding of waste segregation principles, which may be due to the fact that, in nuclear families, household work is more segmented. Whereas in joint families, recycling is a joint effort with a built model of knowledge transfer, this multi-generational scaffold of the nuclear family systems does not exist; the possible reason is a fragmented shift of sustainable practices.

The study found a significant link between family structure and students' knowledge levels, showing that students from joint families had a notably greater understanding of waste segregation and overall waste management compared to those from nuclear families. This result is aligned with the earlier studies, which concluded that the family structure has a substantial impact on cultivating the knowledge and practice of waste sorting and disposal (Sadhu & Das, 2020; Dhole et al., 2020). Most households have moderate knowledge and practice scores regarding domestic waste management, highlighting the need for further education (Madhushree & Baptist, 2024). Religion, caste, and socio-economic status also determine waste disposal practices; certain communities are more likely to follow the regular disposal procedures (Sadhu & Das, 2020). In addition, work reported by Kinyua et al. (2016) reported that exposure to knowledge and attitudes related to waste management predicts household behaviour, especially in informal settlements, suggesting that awareness is key to enhancing waste management practices. Discussion and routines in joint family settings also support the knowledge of younger members about waste reduction.

However, the logistic regression analysis indicated that family structure did not have a statistically significant effect on knowledge of management of household waste. Although the previous study by Handayani et al. (2018) indicated that household traits had an impact on waste management practices, the majority of variables, like educational level, information, income, age, and sex, might take a more

dominant position. Urban households manage waste better than rural households, and behaviour is better among women and older people (Handayani et al., 2018). This is consistent with supplemental studies on health that find individuals from nuclear families have worse total health outcomes than individuals in joint families (Bansal et al., 2014), thereby suggesting that there could be potential systemic variations in household health-environment associations across family types. The implications of these results are substantial from the standpoint of policy measures on waste management development and program intervention. Although the revealed knowledge gap between different families is noteworthy, factors such as family structure do not contribute to strategies aimed at family-based education. Evidence-based strategies can include School-based curricula featuring standardized waste management education, which can offset the gaps in knowledge of the nuclear family context (Gupta et al., 2015). Targeted awareness campaigns utilizing behavioural science principles can assist in increasing actual practice in all family configurations (Zhang et al., 2021); Interventions could control for social and demographic covariates that amplify familial effects.

The findings support the established family socialization theories that household communication patterns are the determinants of children's environmental orientation (Grønhøj & Thøgersen, 2017). Although nuclear families may have some advantages in development, like better academic focus, due to structural disadvantages in the transmission of environmental knowledge, they need institutional support.

The finding gives evidence that the family type has a strong relationship with students' knowledge of waste segregation, which was greater in students from joint families, as their knowledge was shared from one generation to another. Previous work supports this, pointing to the fact that shared family structures are conducive to learning about the world. The association was also underlined by the chi-square test; however, logistic regression found family structure not to be significant, suggesting that other variables (education, income, and age) are more likely to play a role. So, joint families do well with waste management, but collective and nuclear families may not have been told. In addition, more contextual interventions targeting knowledge about waste management in various family structures are called for.

Economic Factors and Waste Management Behaviour

This study's findings emphasize the significant influence of economic elements, especially remittance-based family income, on how households perceive and approach waste separation. Households with remittance income were less likely to support segregation than their counterparts without remittance income. This is in concordance with the work of Kaur & Kaur (2024), which states that economic prosperity may increase consumption and the creation of waste without an equivalent increase in waste management. One possible reason is that the additional financial resources make it possible for households to choose convenience at the expense of sustainable waste behaviour, as they do not have to directly experience the financial aspect of waste accumulation and disposal. Moreover, the economic stability through remittances may cause behavioural complacency, decreasing motivation to segregate waste appropriately.

There are several socio-economic drivers for waste generation rates, such as an increase in population, urbanization, and household income. Urbanization, especially in the third world, is a cause of waste production (Gutberlet, 2003). China's urbanization rate rose from 33% to 54% during the period of 1985–2014, with an annual average2.96% increase in solid waste generation (Zhu & Rahman, 2020). In Jakarta, Indonesia, a high correlation was found between population and municipal solid waste (MSW) (Supangkat & Herdiansyah, 2020). Also, the consumption level and the quantity of waste produced are related to the level of income. Zhu and Rahman (2020) determined that more consumption expenditure generates more waste, and Mazzanti et al. (2008) delinked waste, where waste generation is no longer on the same path as income, to take place selectively among the rich countries. However, environmental factors, including awareness of the public and policy environment, also determine the recovery rate and recycling rate of the waste.

Studies on remittances and household decision-making show that remittance money generally changes the order of priorities in favour of consumption, housing and education at the expense of the environment (Adams & Cuecuecha, 2013). Therefore, households that rely on remittance could be less involved in the practice of waste segregation and minimisation and may use municipal waste facilities. The negative association between segregation and remittance-receiving households might also be explained by the income effect (Becker, 1965); that is, the outsourcing of time-intensive tasks increases with household income. Lifestyle modifications due to

remittances are an indirect influencing factor for waste management behaviour. High-income localities are willing to pay for better waste management (Ali et al., 2012; Barmon et al., 2015), whereas poor urban communities adopt more environmentally friendly behaviours like recycling and reduction of waste (Murad et al., 2012). There are other determinants such as income, age, perceived behavioural control, and administrative incentive (Ali et al., 2012; Mak et al., 2021). There are also differences in industrial sectors; for instance, the acceptance level of the hotel industry toward food waste recycling is higher than in the food and beverage industry (Mak et al., 2021). Remittance income shifts priorities and lifestyle, often reducing active engagement in waste segregation and sustainable practices.

The perception of responsibility for managing waste at home in Bhaktapur Municipality among households that receive remittance is likely to be lower compared to households further upstage who receive none, assuming that either the municipality or a private waste collection company does the segregation for them. Further, research can examine whether specific knowledge campaigns or financial incentives may be able to motivate remittance-receiving households to engage in waste segregation. Luo et al. (2024), through a systematic review, observed that higher income levels were revealed to result in higher awareness and implementation of recycling behaviour, confirming that improved economic status can encourage willingness to waste segregation. Also, Vistharakula et al. (2021) found that social and economic characteristics of households (e.g., income) were strongly correlated with waste management behaviours, and the richest households tended to engage in active segregation. However, Deshpande et al. (2024) added that the influence of education and social norms is also important for refuse-separation behaviour.

Income, the number of household members, and environmental concerns are the determining factors of solid waste generation and its characteristics (Trang et al., 2017). Wealthy families might participate more in recycling if they are economically motivated or care about the environment. Moreover, remittance-recipient households are more eager to pay for a better waste management system (Dhungana, 2018). Going forward, the negative relationship between remittance receipt and attitudes toward waste segregation may be explained by the higher consumption and waste creation, less attention to local environment issues due to better livelihood, and less involvement in waste management activities. These results indicate that the financial security provided by remittances does not automatically lead to environmentally

friendly behaviour. For families benefiting from remittances, management of household waste may not be as directly involved, and hence, it is dependent on external waste collection and less likely to be engaged in sustainable waste practices.

While chi-square tests indicated a strong association between remittance receipt status and attitude to waste segregation, logistic regression revealed that there was no significant association between remittance income and waste minimization or recycling behaviours. This indicates that financial status is a determinant for some of the waste handling attitudes, while it may or may not determine all the behaviours, which can be explained by a lack of awareness or a lower need to manage the waste among remittance receivers. The results are highly relevant for waste management policies and educational activities. Policymakers may want to direct educational and awareness programs on waste management to remittance households, focusing on waste separation, recycling, and sound disposal methods. Schools can play a crucial role in encouraging student participation by incorporating waste management topics into the curriculum and actively promoting waste reduction initiatives that engage students directly.

Methods such as incentivization for waste sorting and improved access to recycling centres can help increase the involvement of individual households in waste management services. The economic divide in waste management policies and education programs must be addressed to ensure inclusive, effective, and therefore sustainable waste management that is inclusive of social classes. The association between socioeconomic status and waste management practices has been examined in diverse settings. Research by Barr et al. (2011) also indicated that higher income and proper household hygiene and waste management are not necessarily in parallel with each other since enhanced economic status induces higher economic consumption and use of external waste management services (Chen et al., 2010); however, Taufique and Vaithianathan (2018) posit that financial well-being may positively influence environmental attitudes that are enhanced when individuals can access better resources and education. Yet, this research shows that the association between remittance and waste management behaviours may not be straightforward and positive.

Households receiving remittances might spend more on consumables, health, and education (Thapa & Acharya, 2017), but this does not necessarily reflect better waste management practices. Studies in Hong Kong (Chung & Poon, 1996) and in

Kenya (Kinyua et al., 2016) indicate that factors like income, education level, and community awareness influence waste management behaviours. However, financial stability alone does not necessarily lead to better waste segregation attitudes in remittance-receiving households.

Future studies may also explore other socio-economic factors (e.g., how education status and occupational status can enhance understanding of waste management attitudes. Longitudinal data may also have the utility of providing a better understanding of how attitudes and behaviours change over time, both because of evolving financial conditions and policy interventions. The findings underscore the need to take into account socio-demographic characteristics, including remittance status, in the planning of interventions on waste management. Policymakers could formulate approaches according to household groups to target specific needs in order to enhance non-participation and reduce barriers to waste segregation. Demographic, education, and some economic factors have been stated to be the major determining factors of waste segregation behaviours in some past studies (Kaur et al., 2023; Pongpunpurt et al., 2022). Focused interventions of the remittance-receiving households would be useful for encouraging sustainable solid waste management, as supported by findings that emphasize the role of awareness programs and the provision of waste disposal facilities in influencing responsible solid waste management behaviour (Suryawan & Lee, 2024). Incorporating socio-economic diversity and tailored interventions based on household characteristics can significantly improve the effectiveness of waste management policies and promote long-term behavioural change.

The results are indicative of the relevance of economic factors, remittances in particular, in explaining waste segregation attitudes. Those in receipt of remittances also have fewer positive attitudes, which could be due to a sense of greater financial security reducing the perceived importance of actively managing waste. While some scholars argue that an increase in salary leads to recycling awareness, the researchers insist that with or without a stable income, the theories of sustainable behaviours remain the same. It also depends on social aspects related to education, urbanization, policy, and so on. Although linking remittance income to attitudes, no significant association was found with actual waste reduction behaviours, which reinforces the necessity of awareness campaigns and policy guidelines. Recommendations for future research could include focused educational campaigns and incentives to encourage

better waste separation among remittance-dependent households, considering infrastructure and strategies for behaviour change.

Living Arrangements on Students' Waste Management Practices

The findings of this study highlight the significant influence that students' household environments have on their waste management behaviours. Particularly, students who live with their families engage in more waste reuse and waste management behaviours in general than students living alone. The statistically significant differences indicate that the presence of family members' roles is crucial in shaping sustainable behaviours. These findings aligned with earlier research by Barr (2007), emphasizing the impact of social and familial influence on environmental practices. The dimension of family settings promotes a habit of carrying out chores and is under adult influence, which would show whether students use waste management practices (Heimlich & Ardoin, 2008). Family dynamics in reinforcing sustainable waste management habits, suggesting that household environments serve as foundational settings for cultivating lasting pro-environmental behaviours.

A remarkable result from this research is that students living with their parents exhibit a two times higher possibility for the reuse of waste, which, however, was not statistically significant. This suggests that although family living arrangements encourage waste reuse, additional factors such as individual attitudes, access to recycling facilities, financial constraints, and environmental awareness may also contribute to determining the frequency of such behaviours. These findings are consistent with Steg and Vlek (2009), who argue that sustainable behaviours are shaped by a combination of personal norms, situational factors, and external motivations.

Moreover, the strongest factor influencing waste management behaviour identified in this study is the level of overall involvement in waste management activities. Students living with their families are 3.834 times more likely to participate in waste management than those living independently. This strong association underscores the influence of structured household routines, reinforcement from family members, and shared waste disposal responsibilities in fostering sustainable behaviours (Tucker & Speirs, 2003). These findings had implications for waste management policies targeting young adults. Colleges and policymakers can explore mechanisms to mimic the family encouragement for sustainable behaviours in student apartments, such as sustainability programs with a community element, peer-led

environmental campaigns, and formal waste management protocols. Moreover, economic aspects could affect waste management practices. Students living independently struggle with waste management due to time constraints and limited facilities (Xiao & Hong, 2010), whereas Barr et al. (2011) argue that financial limitations drive sustainable behaviours, such as waste reduction and reuse, among independent students as a cost-saving measure. Future research may explore additional variables like cultural background, environmental attitudes, and institutional policies to provide a more thorough understanding of the factors shaping waste management behaviours.

The role of social and environmental influences on waste management behaviours is well documented. Family practices, peer influence, and community engagement are critical determinants of environmental behaviours (Kollmuss & Agyeman, 2002). For instance, Dolipas et al. (2018) found that students living in university dormitories with structured waste management systems practiced waste segregation more consistently than those in apartments or boarding houses. Likewise, the study of household waste disposal behaviour by Kalonde et al. (2022) indicates that woman-headed households may be more likely to apply appropriate waste disposal techniques, specifically composting and the use of private waste collection. In the family setting, specifically a joint family system, students may be more likely to engage in sustainable waste management practices as common household culture and duties may be shared (Konstantinidou et al., 2024). The effects of family settings on waste management behaviours are not confined to the in-household domain. Parents use different strategies to teach children about waste management, which may lead to positive and negative environmental behaviours by them (Khairunnisa & Hufad, 2019). Yet, the disconnection between knowledge and practice exists as the desired practical acts of learning to sort waste are being missed by various families who are aware of its significance but don't know how to do so (Hayat et al., 2023). Socioeconomic characteristics (education, income, and location) may play an important role in waste management practice; urban and higher-educated households have a higher willingness for proper waste handling and disposal, which is quite high (Handayani et al., 2018). These findings highlight the importance of family-centred

educational initiatives in encouraging eco-friendly habits that reduce waste among diverse groups.

Parental education, particularly maternal education, has been linked to fostering informed household environments. Mothers who are more likely to be aware of sustainable practices encourage their children to adopt responsible waste management behaviours (Evans et al., 2018). However, this study suggests that school programs and community initiatives may play a more substantial role than maternal education alone in shaping students' waste management awareness. Also, maternal, rather than paternal, influence on children's recycling behaviours is higher; mothers' recycling behaviours and environmental talk show a strong association with children's reused and recycled waste (Nguyen et al., 2025). Although the direct involvement of fathers has a positive influence on the behaviours of children, the influence is less mitigated (Altikolatsi et al., 2021). A child is more likely to see some eco-friendly habit, like recycling or composting, as the norm if that habit is practiced by that child's parents.

This has important implications for interventions aiming to enhance the appropriate management of domestic waste. Interventions can be adjusted for communities with different levels of parental education, and community-level programs that merge modern and traditional waste management practices may complement more general waste management efforts. Families are the most important social institution fostering waste management behaviours, and the parents' example is crucial for their children to adopt pro-environmental behaviours (Grønhøj & Thøgersen, 2012). But the single most important factor in ecological awareness is family dialogue. Family discussions on waste reduction and environmental conservation are more likely to lead to positive attitudes toward waste management in families (Evans et al., 2007). In addition, children are not simply passive instruments of EE; they also affect household behaviour. Socialization theories hold that education can aid younger generations to promote sustainable behaviours within their families and may help to describe the observed influence of children on household practices (Grønhøj & Thøgersen, 2012). School-based programs create environmental habits of recycling and waste reduction in children at home (Larsson et al., 2010) and initiating acts of sustainability at an early age leads to a lifelong habit that contributes towards meeting environmental targets throughout the course of life (Collado et al., 2013). It is important to integrate family-centred approaches with school-based environmental

education to foster sustainable waste management habits that resonate both at home and in the wider community.

This study underscores the strong influence of living arrangements, particularly residing with family, on students' waste management behaviour, with structured household routines, shared responsibilities, and parental modelling fostering significantly higher engagement in sustainable behaviours. While family settings provide a supportive environment for pro-environmental habits, the findings also reveal that additional factors such as individual attitudes, access to facilities, and socio-economic characteristics shape waste-related behaviours. These results suggest that waste management interventions for young adults should replicate the social reinforcement found in family homes through community-based programs, peer-led initiatives, and institutional protocols, while integrating family-centred approaches with school-based environmental education to build lifelong sustainability practices.

Waste Management in Relation to the Theory of Environmental Education

The study supports environmental education theory that states the importance of knowledge acquisition, attitude formulation, and behaviour changes when it comes to environmental management. Based on this model, involvement in waste behaviours is influenced by environmental concern, motivation, and a sense of responsibility. A positive attitude towards waste management and a moderate level of knowledge and practical usage indicate that knowledge alone is not enough to drive meaningful change.

In Bhaktapur, ventures of community waste management initiatives have remarkably defined practices. The continued presence of Indigenous waste disposal techniques, e.g., in-house composting and local-level waste sorting, illustrates the contribution that local knowledge can make to formal environmental education. Yet, lags in information and varying levels of enforcement of waste policies are limiting the acceptance. While this research was originally based on the rationale of Environmental Education Theory, whose core theme is the significance of knowledge development, attitude formation, and behaviour change in achieving ecologically sound conduct, the empirical findings suggest that alternative theoretical frameworks can also be used to explain the results.

Notably, Social Practice Theory offers an enabling framework with which to interpret why waste management practice is part of the everyday lives of households. It is shaped by social norms, material circumstances, and skills. Following social

practice theory (Shove et al., 2012), waste practices occur where three aspects of life meet: infrastructure (materials), knowledge (competencies), and cultural norms (meanings). This explains the disjuncture between students' environmental knowledge and their everyday waste-related practices, as practices are not solely the result of individual awareness but of the socio-demographic context in which they occur. The moderate levels of KAP in Bhaktapur indicate that there are divergences between theoretical knowledge and practical application, both on the side of competencies (knowledge of recycling) and materials (adequate facility for waste segregation). Despite this, local knowledge and community action, poor infrastructure, and under-recognition of recycling are hindering the steps to sustainable waste management practices. This suggests that the passing of local knowledge and practice may be more facilitated by up-scaled infrastructure and sensitization to bridge the gap between attitude and practices.

Similarly, Gender and Environment Theory could help us interpret KAP differences between genders. The Gender and Environment Theory (Agarwal, 1992) is a useful framework for explaining different KAP patterns along gender lines and could have important implications for household trash control. Their contributions to this theory originate from discerning the way behaviour in environmental fields is nothing but a small part of that centred on gender and social rules and conventions. Bhaktapur women possess more knowledge and more practical ability in waste management. This accords with a more general trend in South Asian contexts where environmental responsibility tends to be feminized. In these societies, the place of women in the home and traditional work assigns them a greater part of domestic responsibilities, including managing rubbish and dirt. This pumps their everyday exposure to the prospect of environmental issues into a stronger ecological consciousness and can make for more active, engaged participation in waste management, too. This gender division of labour is not only a matter of differences in knowledge but reflects deeply rooted societal norms and expectations that tie women into roles as both caretakers for their homes (and, by extension, the environment). These results suggest that environmental action at the household level is not gender-neutral but shaped by wider social structures that continue to put domestic environmental care responsibilities squarely on women.

Household Production Theory (Becker, 1965) is also relevant to waste management decisions, along with many other household choices that are part of life

in general. Such an approach emphasizes the economic and time restraints that underpin actions of waste disposal and reaffirms that policy practices must be sensitive to their context. The explanation for the effects of remittances on waste management is like the Household Production Theory in migrant-dependent households. With increased financial security in the form of remittances, households in Bhaktapur are probably more inclined to replace work-induced activities such as waste segregation with market-based strategies in the form of paid collection from their homes. Economic factors: Other migrant-receiving societies (Bari et al., 2024) indicate that economic reasons, such as having access to remittances, can contribute to people managing waste by cutting down the workload at the household level related to segregation activities. The transition from labour-based to market-oriented detailing the relevance of finance capital for the participation of households in sustainable waste management.

Traditional and local knowledge have an important place, showing that human communities have retained practices such as composting and makeshift waste recycling on some scale or other despite their own impoverishment. Indigenous knowledge and local methods are vital for sustainable waste management, especially in economically underprivileged rural areas. Studies have shown that culturally embedded methods such as composting, recycling, and territorial management lend themselves to the conservation and restoration of nature (Brondízio et al., 2021). However, such practices are rarely discussed within scientific literature or formal waste regimes (Madonsela et al., 2024). In many communities around the world, in the absence of formal waste services, indigenous methods of waste management, including waste burning, open-air dumping, and backyard pits, come into play (Madonsela et al., 2024). Community-based waste management is largely influenced by local knowledge and the values of a community, as demonstrated by the case study of Penyengat Island (Ismail et al., 2024). Although there are useful alternative disposal mechanisms represented by these indigenous approaches, more research is necessary to clarify their sustainability and introduce them into integrated waste management systems (Madonsela et al., 2024). As to what advantages might come from doing so, no one knows at present, but it is thought that transmitted traditions can minimize environmental harm while efficiently managing waste (UNEP, 2022). These practices, rooted in generations of experience, offer valuable insights for modern waste management systems struggling with pollution and landfill overuse.

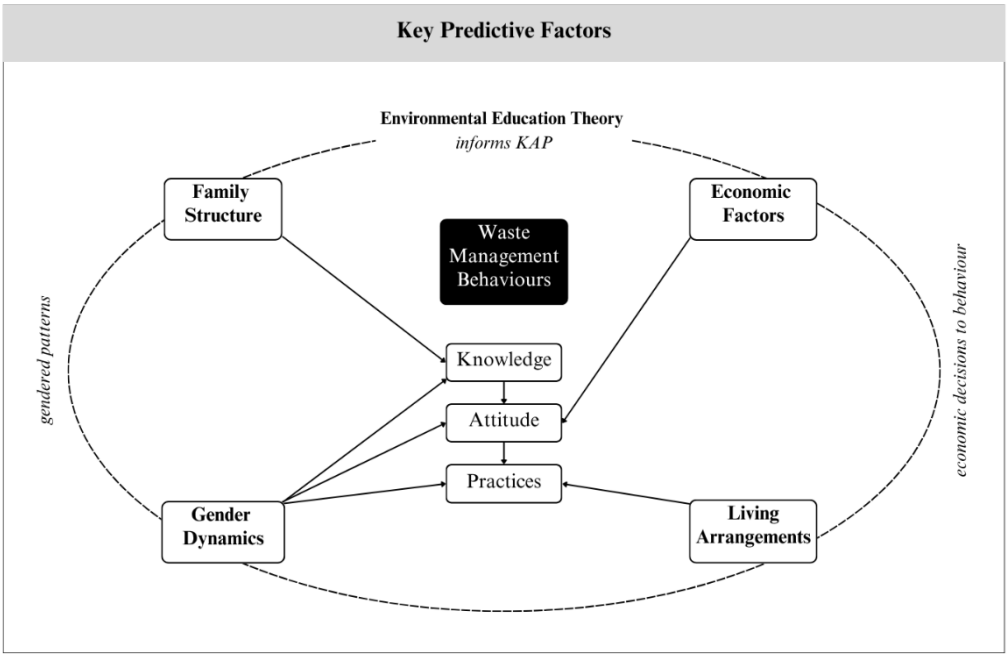
Many Indigenous communities practiced waste segregation, composting, and reuse long before these concepts became mainstream in urban sustainability programs (Kaza et al., 2018). These methods reduce landfill dependency and promote a circular economy, demonstrating that Indigenous knowledge can complement modern waste management strategies.

Local/traditional knowledge and practice help in a great way to manage solid waste, especially in rural areas where there is no dedicated waste management service. This is in contrast to the literature that indicates that combining informal, local knowledge and experience-based education with formal education is efficient in improving KAP (Dos Muchangos & Vaughter, 2019). Culturally based traditional waste management activities have room for being incorporated into the formal regime. Indigenous practices such as composting, reuse, and collective work are environmentally beneficial but are declining under modernization and a lack of formal recognition (Dhungana et al., 2022; Kosoe et al., 2019). Integrating informal mechanisms into formal systems. There are several barriers, such as public perception and political interference, yet there are many proposed benefits (Mansoor, 1997). This process is particularly simple and low-cost, but it can manage more than 50 percent of the municipal solid waste of developing countries if it is integrated (Hoornweg et al., 1999). Yet, the challenges of integrating recent arrivals into an established infrastructure for the treatment of waste are far from straightforward, partly because of language issues and the absence of information and written materials in the translated languages. Providing standardized products and clear communication, project-specific training, and target training can enable migrants to adapt to local waste management norms and expectations (Tucho et al., 2024). Recognizing and integrating traditional and informal waste management practices like composting, alongside formal systems, can enhance sustainability, especially in underserved areas, by leveraging local knowledge and cost-effective solutions.

The research highlights the importance of a well-rounded strategy in improving the practices for handling household solid waste. Infrastructure development, environmental education, gender-related policies, and financial incentives can all support sustainable behaviour. Through the promotion of knowledge, community involvement, and traditional practice, policy options regarding waste management in Bhaktapur and similar areas can be developed.

Figure 3

KAP Model of Management of Household Waste



Concluding the Chapter

This study shows that school students generally have moderate to high knowledge and mostly positive attitudes toward household waste management, with active participation, especially in waste segregation, supported by Bhaktapur's effective municipal system. Female students tend to exhibit higher knowledge and better practices, influenced by traditional gender roles, though gender alone is not a strong predictor of behaviour. Parental socio-demographic factors, such as family structure, gender roles, remittance status, and living arrangements, significantly shape students' knowledge, attitudes, and practices, emphasizing the importance of the household environment. In contrast, parental education level does not significantly affect students' waste management behaviours, highlighting the greater role of infrastructure accessibility and municipal support. Students living with their families benefit from established routines and adult modelling, while those living independently face challenges like limited time and facilities. Economic factors influence attitudes more than behaviours, reflecting the complexity behind waste practices. Sustainable waste behaviours arise from the interaction of social, economic, and environmental factors, underscoring the need for integrated family-centred education, community involvement, and effective service delivery to promote lasting pro-environmental habits.

CHAPTER VI
RECAPITULATIONS, CONCLUSION AND IMPLICATIONS

This final chapter provides a recapitulation of the key findings of the study. After the recapitulations, the author presented a conclusion based on the findings of this research. Following this, the practical implications for the students, institutions, teachers, parents of the students, and policymakers are presented. Finally, the author concluded this study with personal remarks.

Recapitulations of the Study

Waste management is a pressing global issue, impacting health, sustainability, and economic growth. Both developed and developing countries face growing waste volumes, requiring integrated strategies and broad engagement. In Nepal, rapid urbanization, especially in municipalities like Bhaktapur, has strained waste systems. Poor infrastructure and low public awareness further worsen the problem.

Despite ongoing efforts, Bhaktapur Municipality faces persistent challenges in waste management, including limited landfill space, poor waste segregation, and rising waste due to urbanization. Harmful practices like open burning and river dumping continue, leading to environmental damage, health risks, and pollution from the overfilled Sisdol landfill. Addressing these issues requires collaboration among authorities, households, and schools. Schools play a vital role in fostering environmental awareness, with students acting as key change agents. However, their waste-related KAP are also shaped by parental education and socio-economic status—a relationship that remains underexplored in Nepal.

Addressing this gap, this study examines the KAP of secondary school students in Bhaktapur, Nepal, on the management of household waste and how their behaviours are impacted by parental socio-demographic and educational factors. Based on public high school 11th- and 12th-grade students, the study offers a localized perspective on youth engagement in sustainability despite limitations, including self-report data use and limited generalizability.

The value of this study is that it may further local and global sustainability debates. It offers actionable insights for policymakers, educators and community groups working to enhance environmental awareness and improve the management of

household waste practices. It also emphasizes how education can serve as a powerful driver in encouraging environmentally responsible behaviour among youth.

In addition to the above-mentioned problems, the previously referred publications identify environmental, social and economic impacts derived from improper waste management, especially in developing countries, which are facing severe problems due to fast urban growth and deficient infrastructure. Priority areas include dependence on landfills, open dumping and unsafe conditions for informal waste pickers. To combat these issues, several solutions have been recommended, such as promoting the waste hierarchy (reduce, reuse, recycle), community involvement and by-law enforcement. The roles of different stakeholders, such as governments, private sector members, NGOs and the public, are important, and this highlights the need for holistic (context-specific) strategies.

Theoretical perspectives also inform these processes. This research combines environmental education with the KAP model to measure the students' KAP regarding waste problems. While the theory highlights the role of education in building awareness and actionable behaviour, the KAP model is a structured way to measure behavioural determinants. This double frame of reference is especially pertinent in the study of how students' waste management behaviours are influenced by their parents' socio-demographic and educational backgrounds.

Despite existing policies like Nepal's Solid Waste Management Act (2011), enforcement remains weak, particularly at the household level. Awareness alone is insufficient for behavioural change; infrastructure, parental involvement, and socioeconomic status are also key factors (NLC, 2011). Parental modelling significantly influences students' environmental behaviour, with schools playing a vital role. However, research in Bhaktapur is limited, and the link between parental education, students' KAP, and policy remains poorly understood. This review highlights the need for an empirical study to address these gaps and support improved waste management in Bhaktapur.

To fill the above knowledge gaps, a KAP survey among the students of Bhaktapur was carried out to assess the management of household waste habits. The research was informed by a post-positivist approach that combined empirical evidence with sensitivity to the effect of the socio-demographic context on the perspectives and behaviour of students. Such an approach was especially relevant as waste

management is so multifaceted and influenced by economic situations, educational levels and collective and practical knowledge.

The survey collected quantitative data on three main components: knowledge (16 closed and multiple-choice questions), attitudes (19 Likert items), and practices (18 Likert questions) through structured questionnaires, and data collection was done in a hybrid of Google Forms and hardcopy. The analysis employed descriptive statistics to illustrate trends, alongside inferential methods, including chi-square tests and logistic regression, to examine associations between variables like parental education and students' waste management behaviours.

A total of 327 students from six public higher secondary schools of Bhaktapur Municipality were surveyed to know their involvement in waste management at their homes. Students were chosen through a stratified random sampling method to ensure representative coverage. The sample size was calculated based on Cochran's formula and was proportionally allocated across the selected schools. A pilot test was performed to ensure reliability and validity, which resulted in modifications to the questions in terms of clarity and cultural suitability. The Cronbach's alpha test resulted in internal consistency of the final scale (Cronbach's $\alpha = 0.891$).

The ethical principles were strictly observed (informed consent, confidentiality and ethical standards of their institutional guidelines). The results are anticipated to offer evidence-based implications for policymakers and educationists in designing the best model or strategy for raising awareness of waste education.

The research gave key insight into students' KAP and the practice of managing household waste in Bhaktapur. The demographic profile indicated a relatively even gender split (52% female, 48% male) and that most of the participants were in Grade 12 (52%). The Janajati students were the largest ethnic group (45%), and 58% were from migrant families. Overall levels of parental education were low; 77.7% of mothers and 66.7% of fathers had not completed secondary school, suggesting potential restrictions in the intergenerational transfer of information.

There was a medium level of awareness among students, with recycling (48.6%) and waste segregation (41.9%) receiving relatively high scores, whilst the students' awareness of waste minimization was low. Gender greatly affected the knowledge about recycling and reusing, attitudes and segregation practices, as female students demonstrated higher knowledge and involvement in segregation practices as well as more positive attitudes. Male students who were responsible for household

disposal had significantly lower recycling knowledge ($p = 0.004$). Family type also had an impact; students in joint families had much greater awareness of segregation and solid waste management.

Sentiments towards waste management were found to be predominantly positive, with reuse (70.3%) uptake and reduction (59%) being the most common. However, those from remittance-receiving households had significantly lower attitudes towards segregation ($p = 0.012$), which might result from lesser involvement in handling household waste. Practices differed according to accommodation; students living with family members were more involved in reuse practices ($p =0.030$), presumably as a result of household practices and sharing of the workload.

No statistically significant associations were observed between the students' KAP and parental education and occupation. Other family background characteristics, earnings source and structure, though, mattered for outcomes. Knowledge and practice - good knowledge and better practices were positively associated with joint family and cohabitation. A discrepancy was observed between students' awareness and actions, indicating contextual or facilities-related restrictions beyond mere knowledge or intention.

The findings align with widely accepted theories suggesting that environmental conditions significantly shape societal structures and cultural understanding. While talking about gender dimensions in waste management, women were found to be more engaged in waste management than was perceived. Household structure affected knowledge transmission, especially in extended families, and it also warranted community learning. Economic factors, remittance income, priority given for sustainable production, and focus on incentives and infrastructure were significant.

It also shows that gaps exist in knowledge and practice despite overall modestly positive attitudes. Interventions may include gender-sensitive education, family and community involvement and financial motivation for sustainable behaviours. These results provide information for more general sustainability directions and can also be used as a guide for policy and educational changes in Bhaktapur and elsewhere.

This study highlights the complex nature of waste management behaviours, influenced by educational, socio-cultural, and economic factors. While students show awareness and a positive attitude, consistent practice requires stronger support from schools, families, and policymakers. Future interventions should focus on integrating

environmental education into school curricula, enhancing community participation, and addressing structural barriers to sustainable waste management. Beyond contributing to academic discourse, the study seeks to drive practical change and foster a new generation of informed, engaged citizens to tackle Nepal's waste management challenges.

Conclusion

Students' knowledge of the management of household waste is shaped by their family environment rather than their education level and the occupation of their parents. The knowledge of the students is connected to their attitude and their practices. When students have knowledge, their attitude toward waste reuse and segregation can be positive, and their practices also improve. Therefore, knowledge of the management of household waste helps to promote students' positive attitudes and responsible practices.

Parental education level does not influence the development of children's KAP, whereas gender, gender responsibility, family structure, remittance status, and living with parents significantly affect it. The level of knowledge of the students is associated with their family structure. Students from joint families show a better understanding of segregation and reuse. This may be because knowledge is shared and transferred between generations in joint families. At the same time, students who live with their families are more likely to practice reuse and segregation. The learning from the household is largely responsible for shaping how students manage waste.

Gender also affects how students manage waste. Female students show better knowledge and more frequent practices of segregation and reuse. But gender alone does not explain all the behaviours. Other factors, such as household roles, education and family support, also matter. Even though girls do better in many aspects, both boys and girls can improve if they are supported with the right knowledge and guidance.

Remittance as an economic factor of the family significantly influences the students' attitude. Students from remittance-receiving households have less positive attitudes toward segregation. When families get income from abroad, they may focus more on consumption and depend on waste collection services. The sense of responsibility for managing household waste becomes lower. Therefore, income through remittance can reduce active participation in waste management.

There is a close association between knowledge, attitude and practice. When students have good knowledge, their attitudes become better, and their practices improve. But there is still a gap between what they know and what they do. This gap may be because of a lack of infrastructure or support at home and in the community.

Traditional practices such as composting and reuse are still found in the community. These practices can support formal waste management systems. Learning from community and household traditions may be combined with formal education. This helps students to follow sustainable practices at home and in school.

Management of HH waste among students is shaped by their family background, gender, economic situation and living arrangements. The KAP of the students is closely linked with their immediate social environment, particularly their families. When students learn from their families, they develop better habits. At the same time, school education and community support are also important. While students learn from their families and develop better habits, they can also influence family members and parents, creating a two-way dynamic of environmental behaviour. Waste management behaviour is not shaped by one factor alone. It is shaped by the household, the school and the community together. Therefore, improving students' knowledge and involving families alongside schools and communities can promote better waste management practices.

Implications

The results of this study are significant and relevant for policymakers, educators and local authorities in Bhaktapur Municipality and similar regions. Based on the study's findings, the following suggestions are proposed:

Policy Development

For policymakers, three priority areas emerge from these findings. First, waste management programs may account for gender dynamics by both recognizing women's existing contributions and actively engaging men through targeted campaigns. Secondly, economic policies may be redesigned to avoid the sustainability trade-offs seen in remittance households, potentially through incentives that reward waste segregation. Thirdly, educational efforts would gain strength by combining formal environmental curricula with informal, traditional knowledge of practices such as composting, which may strengthen overall sustainability efforts by bridging modern systems with local customs.

Educational Interventions

Schools play a major role in narrowing the knowledge-practice divide. Additional project-based activities that can help incorporate simulation-based problem-solving within the field of waste management can be built into environmental education outside of the classroom. Perhaps some provision may be made for those students from nuclear families, without the opportunity of intergenerational learning in the joint family setup, if any at all initially, that used to be part of the normal setup. Career training for teachers focusing on these peculiar needs of the students may better enable teachers to focus on the peculiar needs of the students and better enable them to respond to these diverse student needs.

Community Engagement

The study points to several potentially innovative initiatives at the community level. Local governments could establish neighbourhood composting hubs that build on existing traditional practices while meeting modern urban needs. Community organizations might develop peer education programs where students from joint families share waste management strategies with their nuclear family peers. Particular effort may be made to engage remittance-receiving households through culturally appropriate messaging about sustainable consumption.

Future Research

The following are emerging lines of inquiry suggested by this investigation. Longitudinal research in the future could assess whether policies result in the continuation or reinforcement of the state rather than just attitude changes over time in the household. Causal comparative and case control analyses among cities with similar urbanization pressures may also illustrate the context differences or commonalities that are crucial for the generalization of the findings. More importantly, there is an immediate requirement for studies that examine the means by which Indigenous knowledge can be integrated with modern waste management systems that focus on culturally appropriate, sustainable solutions and community ownership. Future investigations might also examine how students, through their knowledge and practices, can influence the waste-related attitudes and behaviours of their family members and parents, creating a two-way flow of environmental learning between schools and households. Additionally, future research could adopt a sequential mixed-methods approach, combining quantitative and qualitative

techniques, to address the limitations inherent in single-method studies and provide a more comprehensive understanding of household waste management behaviours.

Finally, this research shows that sustainable management of household waste is not just a question of individual choice; it is instead a complicated systemic problem that simultaneously depends upon and creates intersecting social, economic and cultural problems. Although students in Bhaktapur are aware of the waste problems, their actions are limited by infrastructural and gendered divisions of labour and economic paradoxes, in which remittances make convenience a priority over environmental sustainability. The findings also underscore that top-down policy interventions will be unsuccessful unless they connect in innovative ways to three pivotal factors: (1) valuing women's unpaid waste labour through formal recognition and support; (2) mobilizing traditional knowledge as a link between community practices and modern systems; and (3) building economic incentives that reconcile financial survival and ecological stewardship. In the future, the key to tackling waste might involve resisting off-the-shelf remedies and embracing place-based, gender-responsive and economically inclusive options. It is only by addressing these overlapping layers that Bhaktapur and cities globally turn shit-management from the daily chore that it is for millions of people into a collective practice that is viable in the long term.

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ANNEX

घरायसी फोहोर व्यवस्थापनमा विद्यार्थीको ज्ञान, दृष्टिकोण र अभ्यासमा
अभिभावकको सामाजिक-सांस्कृतिक तथा शिक्षाको प्रभाव
सर्वेक्षण प्रश्नावली

नमस्ते! मेरो नाम **श्रुतिना धन्छा** हो र म काठमाण्डौ विश्वविद्यालयमा एमफिल (MPhil) गर्दैछु। म हाल भक्तपुर नगरपालिकामा घरायसी फोहोर व्यवस्थापनको गतिशीलता पत्ता लगाउन अनुसन्धान गरिरहेको छु। वातावरणीय स्थायित्व र फोहोर घटाउने अभ्यासहरूमा गहिरो चासोको साथ, म यस क्षेत्रका स्कूलका विद्यार्थीहरूको ज्ञान, मनोवृत्ति र अभ्यासहरू अनुसन्धान गर्न लागिरहेको हो । प्रभावकारी फोहोर व्यवस्थापन स्वस्थ वातावरणको लागि महत्त्वपूर्ण छ। आमाबाबुको शिक्षा र तथा पारिवारिक सांस्कृतिक पृष्ठभूमिले बालबालिकाको फोहोर व्यवस्थापन व्यवहारमा महत्त्वपूर्ण प्रभाव पार्छ। यी तत्वहरू अनुसन्धान गरेर, हामीले हाम्रो समुदायमा दिगो फोहोर व्यवस्थापनका अभ्यासहरू प्रवर्द्धन गर्न महत्वपूर्ण ज्ञान प्राप्त गर्ने आशा गरिएको छ। ज्ञान बढाउन र दिगो फोहोर व्यवस्थापन प्रवर्द्धन गर्न तपाईंको विचारहरू महत्त्वपूर्ण छन्। तपाईंका जानकारी तथा प्रतिक्रियाहरू गोप्य रहनेछन्, र त्यहाँ कुनै सही वा गलत जवाफहरू भनेर मानिने छैनन्। हामी तपाईंको इमान्दार प्रतिक्रियाको कदर गर्छौं । यी प्रश्नावली लगभग २५ मिनेटको हुनेछ। यदि तपाइँसँग जवाब दिने क्रममा कुनै प्रश्नहरू छन् भने, कृपया सोध्न नहिचकिचाउनुहोस्। यस महत्त्वपूर्ण अनुसन्धान अध्ययनमा तपाईंको समय र सहभागिताको लागि धन्यवाद। यदि तपाइँसँग यस अध्ययनको बारेमा कुनै प्रश्न बारेमा जिज्ञासा वा गुनासा छन् भने मलाई ९८४१४३२३९९ मा फोन वा shrutina_mpds2023@kusoed.edu.np मा इमेल मार्फत सम्पर्क गर्नसक्नुहुनेछ ।

कृपया सबै प्रश्नहरू ध्यान दिएर पढेर प्रश्नहरूको उत्तर दिनुहोस्

खण्ड A: जनसांख्यिकीय प्रश्नहरू (Demography)

	प्रश्न		प्रतिक्रिया विकल्प	
A.1	विद्यार्थीको नाम:		.....	
A.2	लिंग (एकमा मात्र ठीक चिन्ह)		☐ महिला ☐ पुरुष ☐ अन्य	
A.3	पढिरहको ग्रेड (कक्षा):		☐ ११ ☐ १२	
A.4	उमेर:		.....	
A.5	जात/जाति (एकमा मात्र ठीक चिन्ह)		☐ ब्राह्मण/क्षेत्री/ठकुरी/संन्यासी ☐ जनजाति ☐ दलित ☐ मुस्लिम ☐ नेवार ☐ मधेसी ☐ अन्य	
A.6	मूल निवास (एकमा मात्र ठीक चिन्ह)		☐ स्थानीय ☐ अर्को क्षेत्रबाट बसाई सरेको	
A.7	परिवारमा अपाङ्गता (disable family member):			☐ छ ☐ छैन
A.8	पछिल्लो १२ महिनामा परिवारले विदेशबाट रकम प्राप्त गरेको (remittance):			☐ छ ☐ छैन
A.9	अभिभावकको जानकारी	उमेर	शिक्षा	पेशा
A.10	बुबा (एकमा मात्र ठीक चिन्ह)	....	☐ निरक्षार (Illiterate) ☐ साक्षर (Literate) ☐ आधारभूत तह (Basic) ☐ माध्यमिक (Secondary) ☐ स्नातक (Bachelor) ☐ स्नातकोत्तर वा माथि (Master and above) ☐ अन्य, उल्लेख गर्नुहोस्	.....
A.11	आमा (एकमा मात्र ठीक चिन्ह)	.....	☐ निरक्षार (Illiterate) ☐ साक्षर (Literate) ☐ आधारभूत तह (Basic) ☐ माध्यमिक (Secondary) ☐ स्नातक (Bachelor) ☐ स्नातकोत्तर वा माथि (Master and above) ☐ अन्य, उल्लेख गर्नुहोस्	.....

A.12	परिवार सदस्य संख्या:	महिला (N)	पुरुष (N)	अन्य (N)	जम्मा (N)
		…….	……	……	……
A.13	पारिवारिक संरचना:	☐ एकल (Nuclear) ☐ संयुक्त (Joint)			
A.14	के तपाई आफ्नो परिवारसँग बस्दै आउनुभएको छ?	☐ छ ☐ छैन			
A.15	+२ अध्ययनका लागि अभिभावकको आर्थिक सहयोग:	☐ पूर्ण ☐ आंशिक ☐ कति पनि छैन ☐ अन्य संस्था वा व्यक्तिबाट (Sponsorship)			
A.16	बसोबास गरिएको घरको स्थिति:	☐ आफ्नै घर ☐ भाडामा ☐ अन्य भए उल्लेख गर्नुहोस् ..			
A.17	तपाईंको घरमा फोहोर व्यवस्थापनको लागि मुख्य रूपमा कसले काम गर्छ? (एकमा मात्र ठीक चिन्ह)	☐ हजुरआमा ☐ हजुरबुवा ☐ आमा ☐ बुवा ☐ काकी/ठुलोआमा ☐ काका/ठुलोबुवा ☐ दिदी/बहिनी/भाउजू ☐ दाजु/भाइ ☐ म आफै			

खण्ड B: घरेलु फोहोर व्यवस्थापन तर्फ विद्यार्थीहरूको ज्ञान

कृपया दिइएको तालिकाहरूमा "√" राखेर एक विकल्पह छनौट गर्नुहोस्।

QN	सर्वेक्षण प्रश्न	प्रतिक्रिया विकल्प
B.1	डम्पिङ साइट (dumping site) के हो?	☐ सुरक्षात्मक उपायहरुका साथ फोहोर बिसर्जन गर्न छुट्याईएको क्षेत्र वा ठाउँ (A regulated site with protective measures)
		☐ कुनै नियामक निरीक्षण बिना फोहोर फाल्ने क्षेत्र (A place where all waste is dumped without any planning)
		☐ विशेष ठाउँ जहाँ प्लास्टिकका बोतलहरू बिसर्जन गरिन्छ (A site where plastic bottles are disposed)
		☐ जोखिमजन्य फोहोरको लागि मात्र छुट्याईएको क्षेत्र वा ठाउँ (A site for hazardous waste only)
B.2	ल्यान्डफिल साइट (landfill site) के हो?	☐ कुनै नियामक निरीक्षण बिना फोहोर फाल्ने क्षेत्र (area where waste is disposed of without any regulatory oversight)
		☐ सुरक्षात्मक उपायहरुका साथ फोहोर बिसर्जन गर्न छुट्याईएको क्षेत्र वा ठाउँ (A regulated site with protective measures)
		☐ फोहोर पुन:प्रयोग गर्ने क्षेत्र वा ठाउँ (A regulated site with protective measures)
		☐ फोहोर थुपारिने ठाउँ (Waste is just piled up)
B.3	डम्पिङ साइटहरूले के के वातावरणीय प्रभावहरू पार्दछन्? (multiple answer) (एकभन्दा बढि मा ठीक चिन्ह लगाउन सकिन)	☐ वायु प्रदूषण, स्वास्थ्य जोखिम (Air pollution, health hazards) ☐ कुनै महत्त्वपूर्ण प्रभाव छैन (No significant impact) ☐ पानी प्रदूषण (Water contamination) ☐ माटो प्रदूषण (Soil contamination)
B.4	फोहोर व्यवस्थापनका हानिकारक वा गलत अभ्यासहरू के के हुन्? (एकभन्दा बढि मा ठीक चिन्ह लगाउन सकिन)	☐ खुलेआम फोहोर जलाउने ☐ सबै फोहोर एकै ठाउँमा मिसाउने ☐ जैविक फोहोरलाई मल बनाउने ☐ फोहोर छुट्याउने
B.5	घरको फोहोरलाई विभिन्न प्रकारमा वर्गीकरण गर्न सकिन्छ?	☐ सकिन्छ ☐ सकिंदैन

QN	सर्वेक्षण प्रश्न	प्रतिक्रिया विकल्प
B.6	यदि सकिन्छ भने, घरायसी फोहोरका किसिम के के हुन्? (एकभन्दा बढि मा ठीक चिन्ह लगाउन सकिन)	☐ अर्गानिक (Organic) ☐ पुन:प्रयोग गर्न मिल्ने (Recyclable) ☐ जोखिमजन्य (Hazardous) ☐ पानी (water)
B.7	घरायसी फोहोर छुट्याउनका उद्देश्य के हो?	☐ रिसाइकल र उचित फोहोर व्यवस्थापनको लागि सहजिकरण
		☐ स्थानीय नियमहरूको पालना गर्न
		☐ पैसा बचत गर्न
		☐ घरायसी ठाउँको व्यवस्थापन गर्न
B.8	कुन वस्तुहरूलाई सामान्यतया जोखिमजन्य घरेलु फोहोर मानिन्छ?	☐ ब्याट्री र फ्लोरोसेन्ट बल्बहरू, स्यानिटरी प्याड ☐ जैविक फोहोर (food waste) ☐ पेन्ट र सॉल्भेन्ट्स (Paints and solvents) ☐ प्लास्टिकका बोतलहरू
B.9	घरको जोखिमजन्य फोहोरलाई कसरी सुरक्षित रूपमा विसर्जन गर्नुपर्छ?	☐ जहाँ पनि सकिन्छ (Dump anywhere)
		☐ जोखिमजन्य फोहोर सङ्कलनका लागि छुट्टै व्यवस्था नभएसम्म सुरक्षित भण्डारण
		☐ नियमित फोहोरसँगै मिसाएर फाल्ने (Dispose of in regular trash)
		☐ थाहा छैन (Not sure)
B.10	मल बनाउनको लागि कुन सामग्री उपयुक्त छन् ?	☐ प्लास्टिक, गिलास, धातुहरू ☐ मासु, दुग्ध उत्पादन, बोसो ☐ फलफूल र तरकारीका टुक्राहरू, कफी ग्राउन्डहरू, अण्डाहरू ☐ लुगा
B.11	जैविक फोहोरलाई मल बनाएबाट के फाइदा हुन्छ?	☐ मिथेन उत्सर्जन घटाउँछ, माटोको उर्वरता सुधार गर्छ, ल्यान्डफिल फोहोर घटाउँछ
		☐ पानी प्रदूषण बढाउँछ (Increases water pollution)
		☐ ल्यान्डफिलमा फोहोर कम गर्ने काम मात्र गर्दछ (Just reduces landfill waste)
		☐ कुनै लाभ छैन
B.12	तलका मध्ये कुन कार्यले "न्यूनिकरण" सिद्धान्तको उदाहरण दिन्छ? (Which of the following actions exemplifies the "Reduce" principle?)	☐ पुराना कपडाहरू दान गर्ने
		☐ प्लास्टिकको झोलाको सट्टा कपडाको झोला प्रयोग गर्ने
		☐ रिसाइक्लिङका लागि कागज अलग्याउने
		☐ माथिका कुनै पनि होइन
B.13	निम्न मध्ये कुन कार्यले "पुन: प्रयोग" सिद्धान्तको उदाहरण दिन्छ? (Which of the following actions exemplifies the "Reuse" principle?)	☐ न्यूनतम प्याकेजिङ भएका उत्पादनहरू किन्ने
		☐ एकचोटी प्रयोग गरेर फ्याँकिने सामान र भाँडाहरू प्रयोग गर्ने
		☐ पुराना जारहरूलाई भण्डारणको लागि प्रयोग गर्ने
		☐ भान्साबाट निस्कने फोहोरलाई मल बनाउने
B.14	तलका मध्ये कुन घरायसी सामानहरू फ्याँकिनुको सट्टा पुन: प्रयोग गर्न सकिन्छ? (household items can be reused instead of being thrown away)	☐ एकचोटी मात्र प्रयोग हुने प्लास्टिक झोला ☐ प्रयोग गरिएको टिस्युहरू ☐ कागजका प्लेटहरू ☐ सिशाका जारहरू
B.15	आधा मात्र लेखिएको नोटबुक/कापी कसरी प्रयोग/बिसर्जन गर्नुहुन्छ?	☐ यसलाई जलाउँछु ☐ नोट गर्नको लागि प्रयोग गर्छु ☐ फोहोरको रूपमा विसर्जन गर्छु ☐ कवाडी संकलकहरूलाई बेच्छु
B.16	वस्तुहरूको पुन: प्रयोगले कसरी फोहोर घटाउन मद्दत गर्नसक्छ?	☐ प्रयोग भईसकेका सामानहरूको प्रयोग आयु बढाउँदै ☐ नयाँ सामानहरू प्रयोगमा न्यूनिकरण ☐ स्थानीय व्यवसायहरूलाई सहजिकरण ☐ घरखर्च न्यूनीकरणमा सहयोग

QN	सर्वेक्षण प्रश्न	प्रतिक्रिया विकल्प
B.17	के तपाई फोहोरबाट आम्दानी गर्न सकिन्छ जस्तो लाग्छ?	☐ लाग्छ ☐ लाग्दैन
B.18	यदि लाग्छ भने, घरको फोहोरबाट कसरी आम्दानी गर्न सकिन्छ?	☐ रिसाइकल केन्द्रहरूमा पुन: प्रयोग गर्न मिल्ने सामग्रीहरू बेचेर
		☐ पुराना कपडाहरू दान गरेर
		☐ व्यक्तिगत बगैंचा प्रयोगको लागि जैविक मल बनाएर
		☐ ल्यान्डफिलमा फोहोर फालेर

खण्ड C: घरेलु फोहोर व्यवस्थापन प्रति विद्यार्थीको दृष्टिकोण

(आफ्नो दृष्टिकोणमा कुन हदमा हुनुपर्छ जस्तो लाग्छ - सबभन्दा बढिलाई ५ र कम लाई १ मानेर ५ देखि १ सम्ममा कुनै एक कोठामा "√" चिन्ह लगाउनुहोस्)

QN	कथनहरू	धेरै उच्च सीमा (५)	उच्च सीमा (४)	मध्यम रूपमा (३)	कम मात्रा (२)	अत्यन्त न्यून हदसम्म (१)
C.1	मेरो विचारमा वातावरणमा नकारात्मक प्रभाव पार्ने मूल कारक घरायसी फोहोर हो जसलाई तत्काल ध्यान दिनु आवश्यक छ।					
C.2	स्रोतमा नै फोहोरको उचित segregation ले रिसाइकल गर्न सक्छ भन्नेमा मेरो विश्वास छ ।					
C.3	जैविक फोहोरलाई मल बनाएर घरको फोहोर कम गर्ने काम व्यावहारिक छ ।					
C.4	म विश्वास गर्छु कि उचित घरेलु फोहोर व्यवस्थापन मुख्य रूपमा स्थानीय सरकार (नगर/गाउँ पालिका) ले गर्ने भन्दा पनि व्यक्तिगत जिम्मेवारी हो।					
C.5	मलाई विश्वास छ कि रिसाइकल गरेर पुन:प्रयोग गर्न मिल्ने सामग्रीहरू बेचेर आर्थिक लाभ प्राप्त गर्न सकिन्छ।					
C.6	सामुदायिक स्तरमा फोहोर पृथकीकरण (segregation) को महत्त्वबारे स्थानीय जनतालाई जानकारी दिनाले फोहोर व्यवस्थापनको राम्रो अभ्यास स्थापित गर्न सकिन्छ भन्ने मलाई लाग्छ ।					
C.7	म रिसाइकल गर्ने सामुदायीक कार्यक्रमहरूमा भाग लिन इच्छुक छु।					
C.8	सरकारी नीतिहरूले घरको फोहोर छुट्याउने व्यवहारलाई बढावा दिन महत्त्वपूर्ण भूमिका खेल्छन्।					
C.9	मलाई विश्वास छ कि वातावरणीय उत्तरदायित्वले व्यक्तिहरूलाई दिगो फोहोर व्यवस्थापन अभ्यासहरूमा संलग्न हुन उत्प्रेरित गर्छ।					
C.10	मलाई विश्वास छ कि रिसाइकलको लागि दिइने वित्तीय लाभले फोहोर घटाउने प्रयासहरूमा सहभागी हुन मानिसहरूलाई थप उत्प्रेरित गर्छ।					
C.11	मेरो विचारमा, घरको फोहोर व्यवस्थापनको लागि आफै जिम्मेवार छु?					
C.12	मेरो विचारमा, घरमा फोहोर व्यवस्थापनको बानीव्योहोरा सुधार गर्न अभिभावकहरूको सबैभन्दा महत्वपूर्ण भूमिका हुन्छ।					
C.13	मेरो विचारमा, घरमा फोहोर व्यवस्थापनको बानी सुधार गर्न समुदायको सबैभन्दा महत्वपूर्ण भूमिका हुन्छ।					
C.14	मेरो विचारमा, घरमा फोहोर व्यवस्थापनको बानी सुधार गर्न स्थानीय सरकार (नगरपालिका) सबैभन्दा महत्वपूर्ण भूमिका हुन्छ।					
C.15	प्लास्टिक प्रयोग गर्नु भन्दा पुन:प्रयोग हुने झोला प्रयोग गर्नु व्यावहारिक विकल्प हो भन्ने मलाई लाग्छ।					

QN	कथनहरू	धेरै उच्च सीमा	उच्च सीमा	मध्यम रूपमा	कम मात्रा	अत्यन्त न्यून हदसम्म
		(५)	(४)	(३)	(२)	(१)
C.16	घरायसी फोहोर घटाउनका लागि वस्तुहरू फ्याँक्नुको सट्टा पुन:प्रयोग गर्न जरूरी छ भन्ने मेरो विश्वास छ।					
C.17	मलाई नयाँ किन्नुभन्दा मर्मत गरेर उत्पादनहरूको पुनः प्रयोग बढि व्यावहारिक लाग्छ।					
C.18	म विश्वास गर्छु कि घरायसी सामानको पुन:प्रयोगले वातावरण संरक्षणमा सकारात्मक योगदान पुऱ्याउँछ।					
C.19	म विश्वास गर्छु कि घरको फोहोरलाई खुल्ला रूपमा जलाउन हुँदैन।					

खण्ड D: घरेलु फोहोर व्यवस्थापनमा विद्यार्थीको अभ्यास

(आफ्नो व्यवहार कुन हदमा लागु गर्नुभएके छ जस्तो लाग्छ - सबभन्दा बढिलाई ५ र कम लाई १ मानेर ५ देखि १ सम्ममा कुनै एक कोठामा "√" चिन्ह लगाउनुहोस्)

QN	कथनहरू	सधै	प्रायः	कहिले काही	बिरलै	कहिल्यै गर्दिन
		(५)	(४)	(३)	(२)	(१)
D.1	म फोहोर बिसर्जन गर्न अघि घरको फोहोरका प्रकार अनुसार विभाजन गर्छु					
D.2	मसँग मेरो घरमा फोहोर छुट्याउनको लागि तोकिएको ठाउँ छ।					
D.3	म नियमित रूपमा रिसाइकलको लागि कागजजन्य बेच्ने गर्दछु।					
D.4	म नियमित रूपमा प्लास्टिकका बोतल/कन्टेनरहरू रिसाइक्लिंगको लागि बेच्ने गर्दछु।					
D.5	म नियमित रूपमा रिसाइक्लिंगको लागि सिसाका सामानहरू (जस्तै बोतल) बेच्ने गर्दछु।					
D.6	म नियमित रूपमा रिसाइक्लिंगको लागि धातुहरू (एल्युमिनियम क्यान, स्टिल/टिन/क्यान) बेच्ने गर्दछु।					
D.7	म किनमेल गर्दा पुन: प्रयोग हुने झोला प्रयोग गर्छु।					
D.8	म मेरो घरको जैविक फोहोरलाई मलमा परिणत गर्छु।					
D.9	म घरको फोहोर जलाउँदिन ।					
D.10	म कमभन्दा कम प्याकेजिङ भएका उत्पादनहरू किन्छु।					
D.11	म सामुदायिक सरसफाइ वा फोहोर व्यवस्थापन सम्बन्धी कार्यहरूमा नियमित भाग लिन्छु।					
D.12	म सडक वा सार्वजनिक स्थानहरूमा फोहोर फाल्दिन					
D.13	मेरो परिवारमा, हामी पुन: प्रयोगयोग्य फोहोरको उचित फोहोर व्यवस्थापन अभ्यासहरू बारे नियमित छलफल गर्छौं।					
D.14	म सक्रिय रूपमा उचित फोहोर व्यवस्थापन अभ्यासहरू बारे जानकारी राख्ने प्रयास गर्छु?					
D.15	म जोखिमजन्य (hazardous) घरेलु फोहोरहरू (जस्तै, ब्याट्री, रसायन, सेनेटरी प्याडहरू) को बिसर्जन अन्य फोहोरभन्दा अलग गर्दछु					
D.16	म मेरो परिवारका सदस्यलाई फोहोर छुट्याउने तरिकाबारे सिकाउँछु					
D.17	म प्रयोगमा आईसकेका सामानहरूको फेरि प्रयोगका लागि मर्मतका प्रयास गर्छु ।					
D.18	घरको फोहोर कम गर्न म पुन: प्रयोग गर्न मिल्ने सामानहरू प्रयोगमा ल्याउँछु ।					

विद्यालयको नामः **सहभागिताकोलागि धन्यवाद!**