Impact of Household Waste on Public Health

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ABSTRACT

Household waste has become an increasingly prominent environmental and health problem along with population growth, urbanization, and changes in people's consumption patterns. This research uses the literature review method. Household waste is a complex environmental problem, requiring an integrated approach through outreach to increase public awareness of good management. The 3R principle (Reduce, Reuse, Recycle) is applied by reducing the amount of waste, utilizing items that are still useful, and separating waste for recycling. Separation of waste from its source, reducing the use of single-use plastics, as well as support for modern technology and government policies such as Extended Producer Responsibility (EPR) are very important. Waste bank programs and community-based management encourage active community participation in creating sustainable solutions to waste problems.

Keyword : Environmental pollution; household waste; public health; sustainable development ; waste management

Introduction

Household waste has become an increasingly prominent environmental and health problem along with population growth, urbanization, and changes in people's consumption patterns[1]. In general, household waste is defined as waste generated from daily activities in the household environment, such as food waste, plastic packaging, paper, metal, and other materials that are no longer used. This type of waste can be categorized into two main groups, namely organic waste that can decompose naturally (such as food waste and leaves) and inorganic waste that is difficult to decompose (such as plastic and metal). The problem of household waste occurs not only in developing countries, but also in developed countries.

In Asia, which is home to more than 60% of the world's population, the volume of household waste generated is enormous and continues to grow. According to World Bank data, East Asia and the Pacific contributes about 23% of the global waste, while South Asia contributes about 16%.

Countries such as China, India, Indonesia, and the Philippines are among the largest contributors of household waste in the world. Outside Asia, countries such as the United States and European countries also face similar challenges, albeit with more advanced waste management systems.

The main causes of large household waste generation include population growth, rapid urbanization, lifestyle changes, and unsustainable consumption patterns[2]. In many countries, especially in Asia, Africa, and Latin America, inadequate waste management systems, lack of public awareness, limited infrastructure, and weak regulations exacerbate the problem. Meanwhile, in developed countries, high levels of consumption and reliance on single-use packaging remain major challenges.

The impact of household waste accumulation on public health is very serious and multidimensional. First, waste that is not managed properly can pollute the environment, including water, soil, and air. Decomposing organic waste produces methane gas and unpleasant odors, while inorganic waste such as plastic can release toxic chemicals into the environment. Second, piles of waste become breeding grounds for disease vectors such as flies, mosquitoes, and rats, which can spread diseases such as diarrhea, dengue fever, and leptospirosis[3].

In addition, psychological impacts such as stress and decreased quality of life are also often experienced by people living near waste disposal sites. In this context, this journal review article aims to examine in more depth the causes, impacts, and solutions related to household waste on public health. By analyzing various studies and recent data, this article will provide a comprehensive overview of how consumption patterns, waste management systems, and environmental policies affect the volume and impact of household waste.

Material and Methods

This study uses the literature review method, literature review is a research approach that aims to collect, analyze, and synthesize information from various academic sources that are relevant to the topic being studied. This method is used to understand the development of research in a field, identify research gaps, and formulate theories or concepts that can be used for further research.

The steps in conducting a literature review include formulating research questions, searching for relevant literature using academic databases such as Scopus, PubMed, or Google Scholar, selecting and screening sources, thematic analysis, and compiling a synthesis of research findings. Inclusion and exclusion criteria should be applied to ensure that only relevant and high-quality sources are used in the study.

The advantage of the literature review method is its ability to identify patterns, trends, and gaps in previous research without the need for primary data collection. However, the challenge lies in the subjectivity in the selection and interpretation of literature and the possibility of publication bias. Therefore, the use of transparent and systematic methods is essential to increase the validity and reliability of the study results.

Results

The included studies were systematically reviewed to examine their methodological approaches and principal findings related to household waste and public health. A detailed summary of the characteristics and key findings of these studies is presented in Table 1.

Table 1. Characteristics and Key Findings of Included Studies

No.	Author and year	Title	Research methods	Results
1.	(Goss et al., 2025)[4]	Let's Get Flexible: Exploring Adaptable Consumption Toward Reducing Household Food Waste in The Netherlands	In this journal, the method used is a qualitative approach through cultural probes and semi-structured interviews with 11 households in the Netherlands. Cultural probes serve to collect data on consumption behavior and food waste management, while interviews explore participants' experiences.	The research identified 3 opportunities to support adaptable consumption to reduce food waste: first, supporting flexible eating moments for recipe experimentation; second, claiming the worthiness of food using the senses; third, reintegrating food into routines to utilize leftovers.
2.	(Sembiring et al., 2024)[5]	Improving Household Waste Management in Indonesia: A Mixed-Methods Approach For	In this journal, the method used is a mixed-methods approach, which combines surveys, experiments, and semi-structured interviews.	The results showed that interventions involving labels, descriptions, and social campaigns significantly increased participants' knowledge about waste sorting and reduced errors in sorting.
3.	(Sarker et al., 2024)[6]	Household Solid Waste Management In A Recently Established Municipality Of Bangladesh: Prevailing Practices, Residents' Perceptions, Attitude And	In this paper, the method used is survey and key interviews to examine household solid waste management practices in Mymensingh City Corporation, Bangladesh.	The results showed that the average household produces about 0.62 kg of waste per day, with 99% of it being organic waste. Most respondents are satisfied with the existing waste collection system and indicated a willingness to pay for environmentally friendly waste management.
4.	(Dlamini & Zikhali, 2024)[7]	Management Of Solid Waste By Households At Nkayi Growth Point In Zimbabwe	In this paper, the method used is mixed-methods combining survey and key interviews to evaluate household solid waste management practices in Nkayi growth point, Zimbabwe. Data were collected through questionnaires completed by 165 households and interviews with local officials and members of environmental	The results showed that the majority of households (86.06%) did not separate their waste, while 56.97% of respondents recycled or reused materials. Most respondents (59.39%) believed that waste management was the responsibility of local authorities.

			management institutions.	
5.	(Ascher et al., 2024)[8]	Trigeneration Based On The Pyrolysis Of Rural Waste In India: Environmental Impact, Economic Feasibility And Business Model Innovation	In this journal, the method used is a mixed methods research design, which includes a survey and economic analysis and environmental impact of developing pyrolysis-based trigeneration for waste management in rural India.	The results showed that the trigeneration system could avoid emissions of about 350 kg CO2-eq per capita per year. Although most respondents expressed a desire to switch to healthier cooking practices, there was a large gap between the expected waste feedstock prices and those in the literature, resulting in the economic infeasibility of the initial model.
6.	(Tursunov et al., 2024)[9]	Comprehensive Study On Social, Compositional And Thermal Aspects Of Household Solid Waste For Waste-To-Energy Potential Estimation In Tashkent City Solid Waste For Waste-To-Energy Potential Estimation In Tashkent City	In this paper, the method used is a mixed research design that includes social surveys, waste composition analysis, and thermal analysis to estimate the energy potential of household solid waste in Tashkent, Uzbekistan.	The results showed that around 52% of respondents were willing to separate their waste, with food waste, plastic, and paper being the three most common types of waste. The composition of waste showed that food waste accounted for 59% of the total waste, making it a significant source of energy.
7.	(Juvakoski et al., 2023)[9]	Evidence Of Waste Management Impacting Severe Diarrhea Prevalence More Than WASH: An Exhaustive Analysis With Brazilian Municipal-Level Data	In this paper, the method used is regression analysis with annual data at the municipal level in Brazil, as well as social surveys to evaluate the relationship between housing features and the prevalence of severe diarrhea. This study involved data from 5,570 municipalities and included six categories of household features, such as waste management, water supply, and sanitation.	The results showed that waste management had a greater impact on diarrhea prevalence compared to WASH (Water, Sanitation, and Hygiene) factors. Specifically, diarrhea mortality in children under five years was higher in the "basic" housing cluster compared to the "advanced" cluster. The regression model showed that household characteristics were better at explaining diarrhea prevalence in the "advanced" cluster (R^2 = 16–22%) than in the "basic" cluster (R^2 = 6–12%).
8.	(Bonan et al., 2025)[9]	Social Norms and Tariff Salience: An Experimental Study On Household Waste Management	In this paper, the method used is a field experiment involving the testing of a social information program related to household waste management in the context of a two-part tariff system in Italy.	The results showed that the social information program could reduce the volume of unseparated waste by about 5-6%. The group that received information about tariff limits showed a lower reduction than the group that only received social information.
9.	(Baliwati et al., 2023)[9]	Development And Validation Of A Social Impact	In this journal, the method used is a mixed methodology that includes qualitative and	The results of the study showed that the developed questionnaire had a content validity index (I-

		Questionnaire For Household Food Waste	quantitative approaches to develop and test the validity of a questionnaire on the social impact of food waste at the household level.	CVI) between 0.86 and 1.00 and a Cronbach's alpha value of 0.743, which indicates that the instrument is valid and reliable for measuring the social impact of food waste.
10.	(Gebrekidan et al., 2024)[9]	Impact Of Improper Municipal Solid Waste Management On Fostering One Health Approach In Ethiopia — Challenges And Opportunities: A Systematic Review	In this journal, the method used is a systematic review to analyze the impact of improper solid waste management on the implementation of the One Health approach in Ethiopia. This study collected and evaluated data from peer-reviewed publications, government documents, and relevant non-governmental organization publications, especially after 2014.	The study results show that poor solid waste management causes serious environmental pollution, which has negative impacts on human and animal health and environmental sustainability. In addition, the study identified challenges such as lack of sector integration, limited financial support, and lack of research that hamper the implementation of the One Health approach.
11.	(Vittuari et al., 2021)[9]	Does The COVID-19 External Shock Matter On Household Food Waste? The Impact Of Social Distancing Measures During The Lockdown	In this paper, the method used is a survey conducted on 1,500 households in Italy to investigate the influence of the COVID-19 pandemic on food waste behavior. This study develops and validates a structural model that integrates elements of the Motivation, Ability, and Opportunity (MOA) framework with the addition of Uncertainty elements.	The results showed that during the lockdown period, more than 51% of respondents reported reducing food waste. The study found that uncertainty and greater availability of time at home contributed positively to reducing food waste. In addition, the Opportunity factor proved to be the strongest influence on reducing food waste, while Motivation and Ability had a smaller impact.
12.	(Malik et al., 2024)[10]	Assessing Waste And Carbon Impacts Of Health Systems At A Regional Level	In this paper, the method used is multi-regional input-output analysis (MRIO) and life cycle assessment (LCA) to evaluate the impact of carbon emissions and waste from the health system at the local district level in New South Wales, Australia. This study integrates economic data related to health expenditure with physical data on carbon emissions and waste to measure the carbon footprint and waste generated by the health district.	The results showed that over 76.8% of the carbon footprint came from the health district's supply chain, while 40% of the waste footprint was related to supply chain dependencies. Overall, the health district generated 9.7 kilotons of waste, with 42% being general waste destined for disposal and 58% being recycled or used for energy recovery.
13.	(Ek & Söderberg, 2024)[11]	Norm-Based Feedback On Household Waste: Large-Scale Field Experiments In Two Swedish Municipalities	In this paper, the method used is a randomized controlled trial to evaluate the impact of norm-based feedback on household waste reduction in two cities in Sweden.	The results showed that during the intervention period, there was a reduction in residual waste of 7% to 12% across all treatments, largely due to increased packaging recycling. This effect remained significant and long-lasting, with most of the reported waste reduction still visible one year after the intervention ended.

14.	(Taiwo & Coker, 2025)[12]	Health Risk Assessment Of Potentially Toxic Elements In Public Pipe-Borne Water From Selected Households In Abeokuta, Southwestern, Nigeria	In this paper, the methods used are water quality analysis and health risk assessment to evaluate the impact of toxic elements that may be present in public piped water in Abeokuta, Nigeria.	The results showed that although the physicochemical parameters of water were within the permissible limits, some toxic elements such as Cd, Cr, and Pb exceeded the standards set by the World Health Organization (WHO). The health risk assessment showed that the Hazard Quotient (HQ) values for Cd and Cr exceeded the safe limits, especially in children and infants, indicating potential serious health effects.
15.	(Chowdhury et al., 2023)[13]	A Global Review Of The State Of The Evidence Of Household Air Pollution's Contribution To Ambient Fine Particulate Matter And Their Related Health Impacts	In this journal, the method used is a literature review to evaluate the contribution of household air pollution (HAP) to ambient air fine particle pollution (AAP) and its impact on health.	The analysis results show that HAP is a major source of PM2.5 globally, contributing about 20% of total PM2.5 exposure, with significant regional variations. In South Asia, the contribution of HAP can reach 50%, while in high-income countries such as North America, the contribution is lower, about 7%.
16.	(Olawale & Oladapo,[14]	Impact Of Community-Driven Biogas Initiatives On Waste Vegetable Reduction For Energy Sustainability In Developing Countries	In this paper, the method used is a mixed approach that combines quantitative and qualitative data collection to evaluate vegetable waste management in Lagos, Nigeria.	The study found that the amount of vegetable waste in Lagos increased from 120,000 tonnes in 2016 to 140,000 tonnes in 2020, with most of the waste being disposed of in open dumps. However, composting and biogas production initiatives have shown promising results, reducing landfill use from 100% in 2019 to 60% in 2024.
17.	(Eshete et al., 2024)[14]	Investigation Of Environmental And Health Impacts Solid Waste Management Problems And Associated Factors In Asella Town, Ethiopia	In this journal, the method used is a cross-sectional study with a household survey approach to evaluate the health and environmental impacts of solid waste management problems in Asella city, Ethiopia.	The results showed that around 34.2% of respondents experienced water pollution, 31.6% experienced air pollution, and 13.4% experienced soil contamination due to inadequate waste management. In addition, significant health impacts included respiratory diseases (49.5%), asthma (18.2%), and diarrhea (15.8%).
18.	(Hiew & Low, 2025)[14]	A Systematic Review Of The Knowledge, Attitude And Practice Of Healthcare Professionals And Healthcare Professional Students Towards Household Pharmaceutical Waste Disposal	In this journal, the method used is a systematic review to evaluate the knowledge, attitudes, and practices (KAP) of health professionals and health students regarding household pharmaceutical waste disposal. This study involved a literature search in three online databases (PubMed, Scopus, and Web of Science) to identify relevant articles	The results of the study indicate that there is a lack of knowledge and training regarding safe medication disposal practices among healthcare professionals. Many healthcare professionals consider public education about safe medication disposal as not part of their responsibilities, resulting in a lack of communication about disposal methods to patients.

			from 2014 to 2023. From a total of 10,381 records, 21 articles were selected for further analysis.	
19.	(Wheeler et al., 2025)[14]	Exploring South Australian Households' Perceptions Towards Various Food Waste Policies	In this journal, the method used is a systematic review involving an online survey to evaluate the knowledge, attitudes, and practices (KAP) of health professionals and health students regarding household pharmaceutical waste disposal.	The results showed that although respondents had a good understanding of the environmental risks of improper disposal of medicines, there was a lack of knowledge regarding proper disposal channels and methods. Proposed policies such as assessments based on collection frequency and penalties for pollution were considered the most effective, but were poorly accepted and considered unfair by many respondents.
20.	(van Rooijen et al., 2024)[1]	Optimizing Household Food Waste: The Impact Of Meal Planning, Package Sizes, And Performance Indicators	In this journal, the method used is mathematical modeling with a mixed-integer programming approach to optimize household food planning, with a focus on reducing food waste.	The results showed that the developed model can produce healthy and affordable meal plans without waste, taking into account the existing package size. The study also found that meal plans that minimize waste often have a higher carbon footprint compared to plans that minimize emissions, highlighting the importance of considering greenhouse gas emissions as a performance indicator in food waste disposal.
21.	(Manalu et al., 2022)[15]	Barriers to Implementing Household Waste Management Policy in Binjai City	In this journal, the method used is qualitative research with a case study approach to evaluate the implementation of household waste management policies in Binjai City. The research was conducted through in-depth interviews, direct observation, and document studies with subjects consisting of Environmental Service officials and field facilitators.	The results of the study found that obstacles in the implementation of waste management policies in Binjai City include the absence of specific regional regulations regarding waste management, lack of leadership support to make this program a priority, and human resources that are quantitatively available but less productive.
22.	(Cantona Atrisna et al., 2022)[16]	Knowledge Description Of Household Waste Handling In Muara Kumpeh Village	In this journal, the method used is descriptive research with a cross-sectional design to evaluate community knowledge about household waste management in Muara Kumpeh Village, Kumpeh Ulu District, Muaro Jambi Regency.	The results showed that 49.4% of respondents had poor knowledge about waste management, while 50.6% had good knowledge. Statistical analysis showed a significant relationship between knowledge and household waste management, with a p value of 0.002, indicating that people with good knowledge are better able to handle waste properly.

23.	(Gitaharie et al., 2022)[16]	Is There An Ex-Ante Moral Hazard On Indonesia's Health Insurance? An Impact Analysis On Household Waste Management Behavior Impact Analysis On Household Waste Management	In this journal, the method used is quantitative research with an impact analysis approach using nationally representative longitudinal survey data, namely the Indonesia Family Life Survey (IFLS).	The results of the study show evidence of ex-ante moral hazard, where households receiving subsidized health insurance tend to pay less attention to their waste disposal, such as reduced use of trash bins to dispose of waste.
24.	(Izzan Naser et al., 2022)[17]	Investigation On Waste Management Training Effectiveness On Community Behavior In Household Waste To Reduce The Waste Number Into The River In Penawar Village, Kerinci Regency	In this journal, the method used is quasi-experimental research with a single-group pretest-posttest design to evaluate the effectiveness of waste management training on community behavior in managing household waste in Muara Kumpeh Village, Kerinci Regency.	The results of the study showed that before the training, the majority of respondents had poor knowledge (34.8%), negative attitudes (69.6%), and bad actions (71.7%) in waste management. After the training, respondents' knowledge increased to good (89.1%), positive attitudes (100%), and good actions (73.9%).
25.	(Farizqiani et al., 2024)[18]	The Effectiveness Of The Citizen Waste Bank (BASWARA) In Managing Household Waste In The Village Gulang, Mejobo, Kudus	In this journal, the method used is quasi-experimental research with a qualitative descriptive approach to evaluate the effectiveness of the Citizens' Waste Bank (BASWARA) program in managing household waste in Gulang Village, Mejobo District, Kudus.	The results of the study showed that the BASWARA program successfully increased public awareness of the importance of waste management. Before the training, many residents littered, but after participating in the program, active community participation in sorting and managing waste increased significantly.
26.	(Madden, 2023)[19]	Examining Resource Recovery Pathways For Low Carbon Waste Management In New South Wales, Australia	In this thesis, the method used is a hybrid modeling approach and multi-criteria analysis to evaluate household organic waste management in New South Wales, Australia.	The study found that emissions associated with organic waste management in NSW were approximately 245,000 tonnes of CO2-e, with the majority of emissions coming from waste disposal to landfill. The use of separate collection of waste (FOGO) and anaerobic digestion were identified as the most effective methods for reducing emissions and increasing resource recovery.
27.	(Chenxi Lu, 2022)[20]	The Environmental Impacts And Health Co-Benefits Of Climate Mitigation Measures On Household Consumption In	In this thesis, the method used is an integrated assessment framework that combines energy inventory data, the GAINS (Greenhouse Gas and Air pollution Interactions and Synergies) model, the Global Exposure Mortality Model (GEMM), and a health economic model.	The results of the study showed that household energy consumption in China reached 10,500 PJ for direct consumption and 20,000 PJ for indirect consumption in 2015. This thesis also found that 17% of premature deaths in China were caused by PM2.5 generated from the household energy sector.

		China		
28.	(Stubnitzky, 2012)[21]	Household Sanitation, Social Norms, And Public Policy In India	In this thesis, the method used is an empirical analysis based on survey data with the difference-in-difference (DiD) and triple difference (DDD) approaches to evaluate the impact of the "No Toilet, No Bride" program in Haryana, India, on toilet adoption.	The results showed that the program successfully increased toilet ownership in households with marriageable sons by 15% from the baseline average. Moreover, the program's effect was greater in marriage markets with a shortage of women, where toilet adoption increased by 26%.
29.	(Khajevand, 2016)[21]	The Great Recession, Environmental Awareness, And Philadelphia's Waste Generation	In this thesis, the methods used are multiple linear regression analysis and time series analysis to model and predict the amount of solid waste generated in Philadelphia. This study also applies the difference-in-difference (DiD) and triple difference (DDD) approaches to evaluate the impact of the "No Toilet, No Bride" program on household toilet adoption.	The results showed that toilet adoption increased by 15% in households with marriageable sons as a result of the program. In addition, the impact of the program was greater in marriage markets with a shortage of women, where toilet adoption could increase by up to 26%.

Discussion

Household waste is a complex and multidimensional environmental problem, requiring an integrated approach to reduce its impact on the environment and public health[12]. An important initial step is to conduct outreach to the community to increase awareness and understanding of the importance of good waste management and its negative impacts. This outreach provides practical knowledge on how to reduce, manage, and utilize household waste effectively.

One of the basic approaches in waste management is the 3R principle (Reduce, Reuse, Recycle). Reduce is done by reducing the amount of waste by purchasing sufficient products, avoiding single-use items, and choosing products with minimal packaging. Reuse involves utilizing items that can still be used, such as using used bottles as storage or donating unused clothes. Meanwhile, Recycle is done by separating organic and inorganic waste to facilitate the recycling process, where plastic, paper, and metal waste can be processed into new products[1].

Waste separation from the source (household) is an important step to facilitate further processing. Organic waste, such as food scraps and leaves, can be processed into compost, while inorganic waste, such as plastic, metal, and glass, can be recycled[10]. This separation reduces the burden on landfills (TPA). Composting organic waste is an effective method to reduce waste volume and produce fertilizer that is beneficial for agriculture and plants.

According to researcher[10], reducing the use of single-use plastic is also an important step. This effort can be done by bringing your own shopping bag, using a refillable drinking bottle, and avoiding

plastic straws. Government policies, such as a ban on the use of single-use plastic bags, can encourage changes in people's behavior. In addition, education and public awareness play a key role in good waste management. Educational campaigns through social media, seminars, or community programs can increase active community participation.

The application of modern technologies such as incinerators (environmentally friendly waste burning), biogas (converting organic waste into energy), and Waste-to-Energy (WtE) (converting waste into electricity or heat) can process waste efficiently[8]. On the other hand, government policies such as Extended Producer Responsibility (EPR), sanctions for violators, and incentives for sustainable practices are very important in waste management.

Conclusion

Household waste poses a growing environmental and public health challenge, driven by population growth, urbanization, and unsustainable consumption patterns. Improper waste management contributes to environmental pollution and increases the risk of disease transmission through vectors such as flies, mosquitoes, and rodents, while also affecting quality of life. Effective management requires an integrated approach, including the application of the 3R principles (Reduce, Reuse, Recycle), source separation of waste, and the reduction of single-use plastics. Community-based programs play a vital role in raising public awareness and participation. Additionally, strong government policies, such as Extended Producer Responsibility (EPR), and the use of modern technologies like waste-to-energy conversion are essential. Collaboration between the public and policymakers is key to achieving sustainable waste management and protecting public health.

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