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Original Research Article

Waste and Waste Management Strategies for Human Well-Being and Sustainable Development: An Overview

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Abstract

Waste management can be seen as the biggest global issue that affects people's well-being, our communities, and the natural world. This study goes into detail about how we can plan for waste; recycle what we can, and find effective ways to get rid of the rest. It looks at different types of waste, where it comes from, and the importance of finding balanced solutions. The study adopted a qualitative research approach while drawing from books, journals and articles. The study advocated for the importance of a nuanced understanding of waste and highlighting the existing practices while proposing the areas for improvement. It calls for taking into account diverse perspectives from NGOs, policy makers and government agencies for a sustainable and inclusive future. The study also offered some new ideas for how we can manage waste in a clever way that shows we're leading the way in innovation.

Keywords: Waste Management, well-being, Recycling, Sustainable, Inclusive.

1. INTRODUCTION

In the present scenario, reckless growth of the population, urbanization, industrialization, modernization and digitalization results in the rise of several kinds of waste such as domestic, industrial, commercial, radioactive, agricultural, hospital, electronic wastes and many more. Most human activities produce waste (Brunner and Rehberger, 2014). In modern days, the rate and quantity of waste generation have been on the steady rise. As the capacity of waste increases, so does the variety of the waste increases (Vergara and Tchobanoglous, 2012). Humans are depending on the environment for numerous things to satisfy their needs of food, dress materials, devices, building constructions, vehicles, etc; and those are received from our environment and used by us in our daily activities (Vijayalakshmi, M., 2020). Protecting our mother earth from the pollution has become a massive challenge for all of us. In order to preserve our natural resources, waste materials should be appropriately managed; so that all living beings on this earth can live safely and securely and can benefit from it. Waste has so many synonyms – such as trash, garbage, junk or anything worthless. Waste can be perceived as any unwanted or undesirable material that is they are no longer needed or does not have any function anymore. Waste Management can be defined as a process of collecting, processing or disposal, managing, recycling and monitoring different types of waste materials. The term usually related to materials produced by human activity, and the process as generally undertaken to reduce their harmful effects on human health, environment and aesthetics. The process of managing waste is called as waste management. Wastes can be in different forms such as solid, liquid or gaseous and are generally generated through several human activities.

2. Critical analysis of earlier studies: The review covers many studies on sustainable waste handling with a wide array of options. It adequately brings out both global and local perspectives, which show how waste management practices relate to Sustainable Development Goals (SDGs). Low-income countries are mostly affected by the problems mentioned, hence the reasons why there is an appeal for strategic frameworks. Also, we realize through these investigations that people have poorly been informed on e-waste treatment methods stressing education as key. Generally, this review offers insights that can be relied upon while conducting a critique into whether what has been proposed can indeed work in reality or not.

After doing a thorough study of the related literature the researchers found that there might be relatively fewer researches in the area of waste management and human well-being for sustainable future in Indian context; so, they attempted to work in this area.

3. Significance of the study:

The present study will help in highlighting the present scenario of the waste management. Nowadays a massive amount of population growth worldwide led to more deposit of waste materials in all places and due to which undesirable materials are increased and contributes to the different types of pollution and also to the spread of deadly diseases. As results, people suffer from various types of diseases and remain unhealthy. All these are now creating an environment which is not so liveable. So, it is high time to adopt a proper waste management system to control various types of pollution, breakout of diseases and strategize to restore the environment with all its resources as far as possible. The waste management Planning and recycling for all of the garbage produced in this country is a massive task and which involves both logical systematic planning and scientific knowledge and understanding of the problem so that we can balance the negative influence on the human health, environment and economy as well. Waste collecting, processing and garbage disposal play a vital role in global cleanliness and sustainable energy conservation, alongside people's health and the preservation of natural resources being the accountability of every government. In this study, investigator outlines various advances in the area of waste management. It emphasises current practices associated with waste management approaches and initiatives taken by India. So, it's very significant to build understanding about various initiatives and approaches in our country and chalk out the scope for improvement in the management of waste. Hence, this kind of study is pressing need of the hour.

4. Objectives of the study:

The objectives of the Study are –

- To identify how the effective waste management practices affect the sustainable future of human well being
- To identify the role of education for sensitizing individuals to promote the efficient utilization of resources.

5. Research Questions:

- How the effective waste management practices affect the sustainable future of human wellbeing?
- What is the role of education for sensitizing people for efficient utilization of resources?

6. METHOD AND METERIALS

This study is basically a review-based study. Qualitative exploratory research design was adopted for gaining in-depth insights into waste management practices and their perceived impact on human well-being and sustainable development. The study was based on primary and secondary data both. Field observation and Focus group discussion was also conducted by the researcher for collecting stakeholders' perspectives, beside that various secondary data such as article, journal, books, newspapers etc was taken. The researchers were purposively choosing divers location for comparative insights. The study was theoretically analysed with the help of various article, reviews, journals, books and newspapers etc. In this study, investigators utilized this method to observe what different researchers have highlighted on waste management practices and a sustainable future of human wellbeing.

7. ANALYSIS AND DISCUSSION

In Indian context, the concept of waste and waste management is of greater significance because of the huge population density of our country and also the fast-growing settlements in urban spaces. Waste could bring health, environmental and also economic hazards before us. Waste management is a complex process which encompasses waste collection, transportation, treatment and the disposal of waste without harming the environment while ensuring a safe, responsible and sustainable living.

In India, the waste management problem is very complex and poses various challenges. The amount of waste is being produced every day is pretty alarming which involves numerous kinds of wastes like municipal solid wastes (MSW), industrial waste, e-waste (electronic waste), biomedical waste, and hazardous waste. The huge rise of industrialization and urbanization is a great contributor for increasing waste production that in turn puts pressure on the existing waste management practices and also exacerbates the environmental pollution.

Land filling is the most predominant practice of waste disposal and thus it significantly causing pollution of air, nearby soils and also the fresh water and thereby posing consistent health hazards of people around these areas. Trade sector with the practice of informal waste picking and recycling often is critical and acts in conjunction with formal sector, especially in urban areas, but these activities is mostly conducted without safety equipment and pre-primary health checks.

In order to overcome on the increasing pollution problem, the Indian government has rolled out different schemes and policies designed to improve waste management practices throughout the nation. The Swachh Bharat Abhiyan (Clean India Mission), one of the main projects that were launched in 2014 is another example of such mission focusing on upgrading

infrastructure, running awareness programs, and encouraging communities to make efforts towards cleanliness and proper waste management.

Besides that, the Solid Waste Management Rules, 2016, introduced the regulations for solid waste management, and in particular they stipulate source segregation, recycling, and the setup of waste processing facilities. Many cities have also adapted to novel approaches including the area-based waste management systems and waste – energy projects, public-private partnership and projects as ways of enhancing the efficiency and sustainability.

However, these are still a hurdle to be overcome where gaps exit in the existing framework, such as poor infrastructure, low knowledge and involvement, limited budget and capacity building of institutions. Remedying those problems is to be carried out through an integrated approach, comprising the governmental measures, social practices, technology advances and the private sector participation leading to the construction of a useful waste management practice and the offsetting of acute damage, on health and the environment, provoked by waste.

India's waste can be divided into separate groups in accordance to sources and composition.

Municipal Solid Waste (MSW): It embraces domestic refuse, commercial waste, and solid waste from buildings. It comes from us, i.e., residences, work places, shops and public places.

Industrial Waste: These are generated in the process of manufacturing in industries, technically-oriented factories, construction sites and industrial centers. It very often does contain dangerous dispersions and chemicals.

Biomedical Waste: They are mainly products from hospital facilities, clinics, and laboratories. It has types of waste known as infection waste, sharps, pathological waste, and medicine waste.

E-waste: Consumer electronics that include computers, mobile phones, and household appliances that are discarded which may contain pollutants like lead, mercury and cadmium.

Agricultural Waste: Agriculture produces this waste from their farming activities; the residues of crop farming such as animal manure are included.

Construction and Demolition Waste (C&D): It could be originated from the generators of construction sites, renovation projects and demolition. It includes bricks, concrete, wood, metals and other stuff such as rags and trash.

Plastic Waste: It includes items such as plastic bottles, bags, packing materials, and plastic products. Non-degraded nature of this material is a big environmental concern.

Hazardous Waste: Contains debris that can be harmful to health or environments — these dangerous susceptibilities may come from chemicals or biological processes.

These wastes may arise from several sources including homes, industries, agriculture, and medical facilities, among other commercial places. Putting orders to the hunt for the convenient services and approaches to the waste management are of a great importance for preserving the ecosystem and also for people's health concerns. Monitoring waste management, separation and reprocessing of waste and raising awareness about the importance of effective waste management are some necessary ways of the building of a clean and eco-friendly India.

Statistical facts: In the year 2023, India has processed 76% of total waste generated and there has been a steady increase in the rate from the year 2016 (17.97 % has been processed)

Financial Year	Share of waste processed
2016	17.97%

2017	23.14%
2018	28.57%
2019	53%
2020	65%
2021	68.18%
2022	73%
2023	76%

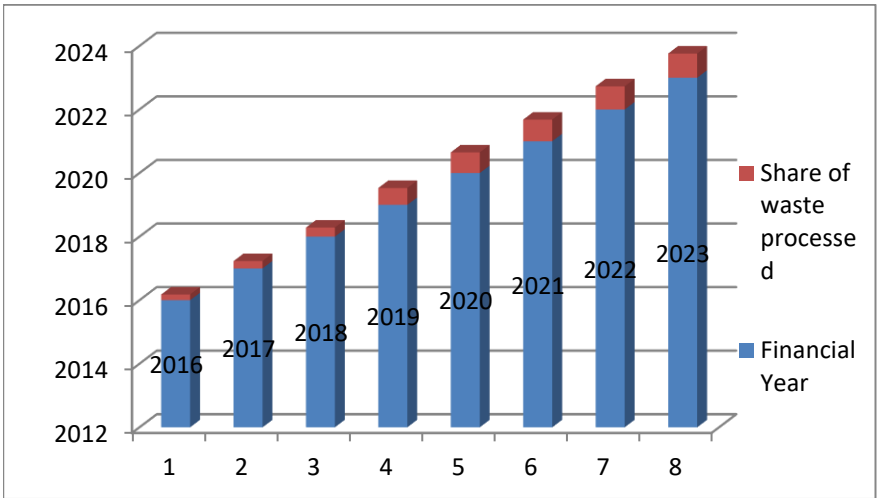

Figure 1

The obstacle of waste disposal in India is by no means trivial, but at the same time there is room for insightful and sustainable resolutions that can even channelize the flow of the future. The coeval to that is the implementation of the best waste treatment approaches.

Through the precondition of separating waste at the source, this is the crucial first measure. When encouraging people in households and protect the world from pollution by recycling, the source separation of waste (biodegradable, non-biodegradable, and hazardous) provides a strong base for recovery and refining.

Next, devoting the capital in the strong recycling infrastructure is also important. Constructing recycling centers from local communities and supporting recycling businesses are able to significantly increase the level of waste in to landfills or incinerators. This not only preserving the resources but also generates the elaborate employment.

Meanwhile, organic waste composting constitutes a valuable aspect of greater objective of alleviating landfill pressure as well as getting fertilizer inputs. Creation of community composting schemes together with public awareness programs will facilitate this environmentally sustainable activity across urban and rural regions.

Besides that, researching on new waste-to-energy technologies like anaerobic digestion and pyrolysis diversifies the means of energy retrieval and thereby limit the effect on the environment. These practices are a sort of multipurpose approach to renewable energy goals and waste problems in our country

Moreover, devising proper laws and regulations and ensuring their strict enforcement are very critical for ensuring adherence to guidelines relevant for waste disposal. Rigorous penalties should be assigned for all illegally dumped wastes and financial incentives should be offered for encouraging the adoption of environmentally friendly practices by both citizens and enterprises.

Coordination of the efforts of various government structures, non-governmental organizations, private companies and local communities will lay the foundations for vulnerability minimization while enhancing the rate of progress to cleaner and better environment within a shorter time.

One can suggest that sound waste disposal system is an unavoidable component of a viable green development of India. The act of sorting out the waste, recycling, composting, and learning the right technologies are some of the strategies that can help us to combat environmental destruction and making possible the conservation of the resources by showing a sense of ownership towards environmental sustainability.

8. Waste management practices and human wellbeing

Accurate waste management plans and programs are the key to creating a future for the wellbeing of all people. Proper handling of waste should be considered the first priority of the society. Doing so will enable mitigation of environmental pollution, conservation of resources and overall wellbeing of mankind.

Resource conservation can be promoted through proper waste management practices while encouraging two other critical elements namely recycling and reusing. Effective practices which can divert the waste from the landfills and incinerator should be incorporated so that materials like paper, metals, plastics could be reclaimed and reused in the production cycle and thereby contribute in making a sustainable future. This practice can also help in reduction of rate of raw material extraction and thus can contribute to resource conservation which guarantees a lively environment to both present and future generations.

Apart from that waste management also consider as mitigating global climate change. The emissions of greenhouse gases from landfills and incinerators which generate the hazardous gases, such as methane and carbon dioxide, are one of the crucial sources. Through measures like recycling, composting, and waste-to-energy trials, the number of waste materials dumped to these dumpsites can be reduced, which will in turn lower the carbon footprint of society and combat global warming.

Appropriate waste management methods not only improve the general well-being but also ensure that the quality of public health is upgraded. When to improperly dispose of waste it can result to water sources pollution and the spreading of deadly diseases. Communities can enhance public health, thus contributing to a more stable locality, through imposing sanitation activities and proper solid waste treatment. Maintaining good resource management is key to ensuring sustainability and shrinking down human suffering while maximizing the human wellbeing. Lowering pollution levels, as well as preservation of resources and the mitigation of climate change, would be the only possible way out of this destructive environment thus paving the way to a future more resilient and stable to the changes.

In India, effective waste management practices are crucial to realize and translate the dreams of sustainable future ensuring human wellbeing into an everyday reality. In the fast-growing population and higher waste generation, this prevailing scenario poses significant challenges, but it also presents before us immense opportunities for improving the existing scenario.

Here's how effective waste management can positively impact human well-being in India:

Environmental benefits:

Reduced pollution: Systematic collection, treatment and disposal of waste minimizes contamination of air, water and soil which otherwise caused by improper dumping and burning. These practices preserve our ecosystem and contribute to human wellbeing.

Resource conservation: Recycling, reusing and composting preserve the usage of limited natural resources like wood, water and minerals, respectively, which cuts down the demand for primary resources and prevent environmental degradation.

Climate change mitigation: The waste decomposition in the landfills creates methane which is known as a hot house or a strong greenhouse gas. Successful implementation leads for a decrease in emissions and mitigates climate change.

Economic benefits:

Job creation: A robust waste management system involves the informal jobs in waste picking, sorting, recycling, and composting so the workforce grows in these areas and is formalized. This capacity-building effect allows for the low-income communities to excel and the economy to flourish.

Resource recovery: Recycling and composting provide the raw materials and products of very high value thus offering economic incentive and help in reducing resilience on imports.

Reduced healthcare costs: Health problems, promoted by pollution, give rise to the extra burden to healthcare system. Cleaner environments which are achieved by proper waste management can solve this problem and reduce the cost.

Social benefits:

Improved public health: By effective waste management, people will be proportionately less exposed to harmful microorganisms and pollutants, therefore, have healthier environment to live in and overall improved public health.

Improved living conditions: Proper waste management ensures surroundings that are contamination-free, clean and sanitary. This upgrades the quality of life and promotes overall wellbeing of community.

Empowerment: Waste management practice involves community contribution, and the people in general, should have an ownership mentality towards the environment, so that civic engagement can be fostered.

Effective waste management practices should be an important tool in the efforts to achieve a sustainable future where the well-being of humanity can be realized

in India while reincarnating the enormous possibilities of waste management towards a healthier and more prosperous future for all.

8.1 Education and preservation of resources

Through education, people in India are hence able to be sensitized into the idea of using resources which they have at hand efficiently without involving the misuse of resources. The country is still facing challenges and hence needs a certain level of sensitization considering the type of resources they have and how to employ them.

Below are some key aspects:
Raising awareness:
Resource scarcity and its impact: Education can help in sensitizing people regarding the limited natural resources such as water, energy, the possible consequences of their depletion, and the negative impact on the environment. This moves towards the attitude of mindfulness and being accountable for one's action which ultimately drives a desired sustainable approach in practice.

Understanding resource lifecycles: Knowledge about the extraction, processing, using and disposal of resources teaches the people to make wise decisions. People will have the knowledge to make the conscious decision to support brands that are less harmful to the environment which leads to decreasing the amount of trash.
Local context and challenges: Educational institution must make their curricula relevant to the local contexts with focus on natural resource challenges that are faced by various communities. This empowers the citizens and enhances creative solutions that solve challenges likely to be experienced locally.

Promoting sustainable initiatives:
Skills development: Through education individuals could be well equipped with necessary and practical skills for conserving the valuable resources such as composting, rain water harvesting, using alternative sources of energy generation, systematic waste management.

Behavioral change: Education can bestow moral values such as taking care in terms of sustainable utilization, recycling, and buying products with lesser environmental footprint. In addition to that, it not only increases individual's engagement in the process of waste disposal but also makes them participate in recycling programs.

Entrepreneurship and innovation: Education will have an impact towards creating of innovations in resources management with knowledge about solution-based approaches which can produce eco-friendly technologies and practices relevant to the Indian context.

Addressing specific challenges:
Urbanization and resource demand: Education serves as the implementing mechanism employed by cities to address their growing resource requirements. To that end urban planning, green architecture and resource management systems are applied.

Rural livelihoods and resource dependence: For rural areas, where community habitats are heavily dependent on trees and other natural resources, education ensures the sustainable agriculture, resource diversification strategies and financial independence through eco-tourism or other sustainable practices.

Social inequalities and access to resources: Education can show in what way such resources are distributed and help in lobbying for fair resource allocation. Moreover, it enables the deprived sections of the society to ensure the appropriate stewardship of their resources and generates increased standards of living for them. In the Indian context, education can also Leverage cultural values: Delivering an effective curriculum integrated with traditional local knowledge and habits in using and preserving resources can prove too beneficial.

Promote community engagement: Promoting involvement in resource management activities and providing a platform for clear communication between stakeholders and decision makers is crucial to build a sustainable future.
Utilize technology: Employ digital tools and platforms to spread information, collaborate, and connect practitioners and all the stakeholders.

The balancing act between the human needs and the nature can be achieved with these elements which can help to generate more consciousness amongst people for better resources usage; thus, giving a moiety to sustainable future while ensuring human wellbeing.

9. CONCLUSIONS

To keep a healthy lifestyle, one needs to practice proper waste disposal and green strategies. Through reduction, reuse and recycling we can save natural resources and energy. It is vital to have knowledge about how waste should be disposed safely. By being friendly to the environment, one is able to prevent pollution and also conserve resources. City's general welfare mainly depends on the way it handles its refuse materials, which focuses on financial viability and socio-economic issues. In order for an individual to ensure that his or her society is clean and has hygienic conditions it is important for such people to take up waste treatment responsibilities and inspire others like their children into accepting a sustainable living approach.

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