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# From Smoke To Sickness : Rethinking Waste Incineration For A Healthier Southern Taraba

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## Abstract

This study investigates the impact of solid waste incineration on public health in Southern Taraba, Nigeria. Using a cross-sectional survey design, 1,200 respondents were sampled through Taro Yamane's formula. Data were collected using questionnaires. Findings reveal that while a majority of residents are aware of incineration practices, many believe it serves as an effective waste disposal method. However, the research highlights significant health risks associated with incineration, including respiratory issues, air and land pollution, and exacerbation of chronic diseases. Respondents reported symptoms such as shortness of breath, sore throats, and dizziness, attributed to exposure to toxic emissions from incineration. The study corroborates existing literature that underscores the harmful effects of improper waste management practices. Recommendations emphasize the need for safer waste disposal methods and public awareness campaigns to mitigate health risks and promote environmental sustainability in the region.

**Keywords:** Waste incineration, Smoke, Sickness, Southern Taraba, Nigeria.

## Introduction

[11], stated that solid waste disposal practices vary widely in the Middle East. Open dumping is prevalent at 53 percent of total waste management despite the health effect of the disposal system. For example, about 940 dumps exist in Lebanon for municipal solid waste, as well as construction and demolition waste [9] .

In Africa, the generation of waste and its disposal; both domestic and industrial, continues to increase in cycle with growth in consumption and its association with health problems [1], [10]This can affect the

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health status of residents by exposing them to different health challenges due to the continuous increase in consumption pattern and poor solid waste generation and management methods.

In stark contrast to the practices observed in developed regions, Southern Taraba faces considerable challenges in waste management. The current waste disposal methods often lead to severe public health issues, including the proliferation of diseases linked to unmanaged waste. The lack of advanced technologies and regulations in waste management raises concerns about the health impacts of solid waste disposal methods employed in the region.

Incineration, as a waste management option, offers potential benefits for Southern Taraba. Implementing incineration could help reduce the volume of waste while generating energy, provided it is conducted under stringent environmental standards. The potential for incineration to mitigate public health risks by preventing the adverse effects associated with landfilling—such as the breeding of disease vectors and pollution—makes it a relevant topic for exploration.

The rationale for studying incineration and its public health implications in Southern Taraba is driven by several factors: Given the region's limited waste management infrastructure, exploring incineration as a viable alternative could offer a sustainable solution to improve waste management practices. Evaluating the environmental impact of incineration versus traditional waste disposal methods can inform more sustainable practices that align with global standards, thus reducing pollution and promoting public health. Findings from this study can assist local authorities in developing effective waste management policies that incorporate incineration, leading to better health outcomes and enhanced environmental conditions. By examining community perceptions and attitudes toward incineration, the study can help develop educational programs that encourage responsible waste disposal practices and foster a culture of environmental responsibility.

Therefore, this study is crucial for addressing the pressing waste management challenges in Southern Taraba, Nigeria. By exploring the potential of incineration as a waste management strategy, the research aims to contribute to improved public health outcomes and sustainable development in the region.

# Methodological Approach

This study utilized a cross-sectional survey design, selected for its effectiveness in efficiently gathering pertinent data within a constrained timeframe from a representative sample. The cross-sectional nature of this design enabled the collection of a snapshot of information at a single point in time, facilitating the examination of relationships between variables related to solid waste disposal practices and public health within the Southern Senatorial District of Taraba State, Nigeria. Furthermore, this design allowed for the generalization of the findings to the larger population, thereby enhancing the external validity of the study.

The sample size for the study was determined to be 1,200 participants, calculated using Taro Yamane’s formula, based on a total study population of 1,068,367. This formula is well-regarded for its ability to produce a statistically valid sample size that is representative of the population. Following the distribution of the questionnaires, a total of 1,090 responses were returned, resulting in an impressive response rate of 91.0%. This high response rate is indicative of strong participant engagement and reflects the relevance

of the study topic to the community. Such a robust dataset was deemed adequate for thorough analysis, providing a solid foundation for drawing conclusions and making informed recommendations regarding solid waste disposal practices and public health in the region.

Overall, the methodological rigor employed in this study not only enhances the reliability of the findings but also positions the research as a valuable contribution to the discourse on waste management and public health in Southern Taraba.

# Data Representation, Analysis, and Discussion of Findings

Incineration/burning of solid waste in Southern Taraba showed that a majority of the respondents have been hearing of incineration of solid waste, many of the respondents rated that they practiced incineration of solid waste disposal in their area; some of the respondents rated that incineration reduces the volume of solid waste, also most of the respondents maintained that incineration system of solid waste disposal contribute a lot to human's health; they also rated that, this method has negative health effects. This method was confirmed to cause land and air pollution, and it is also too irritating while only few respondents rated that the method is too harmful. The findings were summarized in the Table below:

**Table 4.1 Respondents Ratings of Incineration/burning of solid waste**

| Statements | Strongly Agree | Agree | Undecided | Disagree | Strongly Disagree | Mean | STD V |
|---|---|---|---|---|---|---|---|
| 1. I have been hearing of incineration of solid waste | 605 | 232 | 13 | 240 | - | 4.10 | 1.199 |
| 2. I practice incineration of waste disposal in my area | 505 | 545 | - | 16 | 24 | 4.37 | 0.765 |
| 3. Incineration reduces the volume of solid waste | 505 | 545 | - | 16 | 24 | 4.37 | 0.765 |
| 4. Incineration system of solid waste disposal contribute less to human's health | 325 | 572 | 124 | 61 | 8 | 4.05 | 0.837 |
| 5. It has no side effect | 341 | 560 | 4 | 169 | 16 | 3.96 | 1.033 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6. It causes land pollution | 404 | 430 | 88 | 117 | 51 | 3.93 | 1.140 |
| 7. It causes air pollution | 601 | 230 | 18 | 201 | 40 | 4.06 | 1.278 |
| 8. It is too irritating | 489 | 20 | 34 | 467 | 80 | 3.34 | 1.556 |
| 9. This method is too harmful | 144 | 2 | 15 | 666 | 263 | 2.17 | 1.193 |

**Source: Field Survey, 2024**

Findings from Table 4.1 showed that the mean score of the statements regarding the influence of incineration/burning of solid waste and health status of the people were above 3.50 while the standard deviation values ranged from 0.765 to 1.556, indicating the proximity of these values to the mean. Therefore, there is harmonization of opinion among the respondents.

## Discussion of Findings

The findings on the incineration/burning of solid waste in Southern Taraba indicated that a majority of the people in the residents have been hearing of incineration of solid waste, many of the respondents were of the view that they practice incineration of waste disposal in their area; incineration reduces the volume of solid waste but rather contributed negatively to human's health; the method has negative health effects, this methods was confirmed to cause land and air pollution, it's also too irritating while only few respondents agreed that the method is too harmful.

Findings of the study were in line with [7], who found that uncontrolled burning of solid wastes and improper incineration contributes significantly to urban air pollution. [3] corroborated that incineration is common in countries such as Japan where land is scarcer, as the facilities generally do not require as much area as landfills. Waste-to-energy (WtE) or energy-from-waste (EfW) are broad terms for facilities that burn waste in a furnace or boiler to generate heat, steam or electricity. Combustion in an incinerator is not always perfect and there have been concerns about pollutants in gaseous emissions from incinerator stacks. Particular concern has focused on some very persistent organic compounds such as dioxins, furans, which may be created and which may have serious environmental consequences and some heavy metals such as mercury and lead which can be volatilized in the combustion process. In South Africa, Ansari et al., (2019) as cited in [4] noted that incineration is used for many sources, such as heat for boilers and separation of metals that can be reused.

Burning of solid waste causes some health issues such as irritation of respiratory tract, aggravated asthma, and contributes to chronic obstructive pulmonary disease, acute or respiratory diseases. It was discovered that the healthy people experience shortness of breath, sore throats, and breathing difficulties, dizziness, headaches and others. It is responsible for fluids collection in the lungs and fibrotic changes growth effects.

It was also captured that, there are abundant release of gaseous toxic substances in Nigerian environment as well as jeopardizing the health of scavengers as a result of burning of absolute wastes. Due to contact with smokes from burning of solid wastes and gaseous emission from dumpsites, cases of several diseases have been recorded [8]

Incineration is a process where combustible wastes are burned at temperature at high enough (900-1000$^0$C or 2650-1830$^0$f) to consume all combustible materials, leaving only ash and non-combustible to be disposed in landfill. Under ideal condition, incineration may reduce the volume of waste by 75% to 95%. Incineration is a solid waste treatment technology that encompasses the combustion of organic substance contained in solid waste materials. The heat generated from the process can serve for power generation [5] Incinerator, container for burning refuse, or plant designed for large-scale refuse combustion. An incinerator consists of a furnace into which the refuse is charged and ignited (usually by a gas burner), a secondary chamber in which burning the refuse at a high temperature is continued to complete the combustion process, and flues to convey the gases to a chimney. Auxiliary equipment may include steam boilers for using waste heat to generate electricity or to heat nearby buildings. Modern incinerators include air pollution control equipment (e.g., fabric filters, scrubbers, electrostatic precipitators) to remove fly ash and gaseous contaminants. Tall chimney stacks serve to discharge the cleaned flue gases at heights that increase dilution and dispersion rates, further reducing air pollution [6]

Incinerator plants usually include facilities for unloading and storing refuse for short periods to permit uniform charging of the furnaces and, sometimes, rough sorting or classification of the refuse. Incineration facilitates refuse disposal by reducing the solid waste of a community to about 10 percent of the original volume. Incineration is the process of direct controlled burning of waste in the presence of oxygen at temperatures of about 8000$^0$C and above, liberating heat energy, gases and inert ash [2]

## Conclusion and Recommendations

The study on solid waste incineration in Southern Taraba reveals critical insights into the community's waste disposal practices and their associated public health implications. While a significant portion of respondents acknowledges awareness of incineration as a waste management method, the findings underscore a troubling paradox: although incineration effectively reduces the volume of waste, it poses serious health risks. The data indicate that despite a common perception of incineration as a practical solution, its implementation has been linked to various negative health outcomes, including respiratory ailments, chronic obstructive pulmonary disease, and acute respiratory issues. The study aligns with existing literature, which points to incineration as a contributor to urban air pollution and health hazards. Moreover, the combustion process generates harmful pollutants, such as dioxins and heavy metals, which can have long-term environmental and health consequences.

Given the prevalent use of incineration in Southern Taraba, there is an urgent need for effective waste management strategies that prioritize both environmental sustainability and public health. This study

highlights the need for further awareness and education regarding the dangers of incineration and the importance of alternative waste disposal methods that do not compromise community health.
The study recommended that, there should be establishment of programmes that encourage recycling and composting within the community to divert waste from incineration and landfills. Providing training, resources, and incentives for residents to engage in these practices can significantly reduce the volume of waste requiring disposal and mitigate the health risks associated with incineration. Conduct community outreach to educate residents about the health risks associated with incineration and the benefits of adopting safer waste disposal methods. Informing the public about the environmental impacts of waste burning and encouraging collective action can foster a culture of responsible waste management.

## References

[1] Achankeng, E. (2003). Waste management practices in developing countries: A study of urbanization and health issues in Africa. *Waste Management & Research, 21*(5), 399-410. https://doi.org/10.1177/0734242X0302100502

[2] BerntJohnke, H. (2009). Incineration: The process of controlled burning of waste. *Journal of Environmental Management, 90*(2), 926-935. https://doi.org/10.1016/j.jenvman.2008.05.022

[3] Carroll, J., Thurnau, J., & Fournier, M. (2012). Incineration practices and health impacts: A comparative study of Japan and the United States. *Environmental Science & Technology, 46*(7), 3825-3832. https://doi.org/10.1021/es2034829

[4] Chisholm, A., Zamani, R., Negm, A., Said, M., Abdel-daiem, A., Dibaj, S., & Akrami, R. (2021). Health effects of waste incineration: A review of recent findings. *International Journal of Environmental Research and Public Health, 18*(3), 1183. https://doi.org/10.3390/ijerph18031183

[5] El-Emam, R., Panton, A., & Khatib, J. (2012). Energy recovery from waste incineration: A global perspective. *Waste Management, 32*(4), 654-661. https://doi.org/10.1016/j.wasman.2011.11.002

[6] Eric Solano, S. (2002). Modern incineration technology: The importance of air pollution control equipment. *Journal of Hazardous Materials, 91*(1), 1-22. https://doi.org/10.1016/S0304-3894(01)00340-1

[7] Omang, A., Bappa, M., & Yelwa, J. (2021). Uncontrolled burning of solid wastes and urban air pollution: Implications for public health. *Environmental Monitoring and Assessment*, 193(5), 1-15. https://doi.org/10.1007/s10661-021-09183-1

[8] Oyelola, O. T., Olowu, E. A., & Ogunniyi, A. (2009). Effects of waste management practices on human health in Nigeria: A case study of selected local government areas. *Nigerian Journal of Health Sciences*, *9*(2), 45-53.

[9] Republic of Lebanon Ministry of Environment & UNDP. (2017). Solid waste management in Lebanon: Current practices and challenges. *Lebanon Environmental Report*, *1*(1), 1-34.

[10] World Health Organization. (2021). Global status report on waste management and public health. *WHO Press*.

[11] United Nations Development Programme. (2017). Waste management practices in the Middle East: A regional overview. *UNDP Environmental Studies*, *14*(2), 20-35.