



## The Effect of Urban Expansion and Solid Waste Management: Implications for Health and Wealth in Nnewi, Anambra State, Nigeria

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### ABSTRACT

This study looked at the complex interactions between many aspects of solid waste management and how those interactions affect Nnewi's health and economic growth. The study used a focused strategy to look at waste materials utilization, people competency, data adequacy, urbanization consequences, pollution sources, and collecting procedures. Nnewi was divided up according to a thorough data collecting plan for a thorough waste characterization, which included quantitative and qualitative analysis with organized questionnaires. The technique was based on predefined significance levels for statistical studies, particularly the One-Sample T-test. Findings supported earlier research by highlighting the serious health risks associated with improper garbage management. In addition, the study corroborated earlier findings in the literature by highlighting systemic inefficiencies in Nnewi's waste management infrastructure. The outcome of the study promoted integrated waste management solutions and highlighted the negative effects of unethical work practices. In the end, the study clarifies the complexity of waste management in Nnewi, requiring cooperation from legislators, urban planners, and community leaders. It becomes clear

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that recycling, reuse, and reduction strategies are essential to turning trash into a growth and sustainability engine.

**Keywords:** Economic growth, Health, Pollution, Urbanization, Waste Management.

## INTRODUCTION

The developing city of Nnewi is faced with enormous Solid Waste Management challenges which are a result of solid waste mismanagement. The generation and disposal of unwanted materials which, in the estimation of their owners, have become worthless, defective, and no longer of any use did not start today. It has been there right from the beginning of time. It is only that in the past, management of such unwanted and discarded materials has not been much of a problem at Nnewi.

The quantity was not much, the land was more than enough, and rapid population increases that came with growth in industrialization and urbanization had not come to be. As things are at the moment, population, industrialization, and urbanization are all growing fast, so fast that waste management facilities in place can no longer cope with astronomical increases in volumes of solid waste being generated. Moreover, waste management facilities in place are the outdated; obsolete, and inappropriate waste management methods that gave room to the solid waste management challenges facing the people at Nnewi is what is being applied. The economically viable and environmentally friendly reduce, reuse, and recycle strategies that are capable of turning Nnewi from a linear economy into a circular economy are yet to be brought to bear.

Solid wastes are still being dumped indiscriminately and allowed to accumulate over time, spill into the streets and drainage channels where they obstruct flood and traffic flow, decompose, and become breeding sites for rodents and vectors of diseases that cause air, water, land, and noise pollution and invariably causes the solid waste management challenges that are ravaging the populace must be turned from being nuisances into a resource. Road junctions, school fronts, markets, hospitals, drains, and street corners at Nnewi are not spared. They are seen littered with heaps and piles of garbage laden with medical, toxic, flammable, corrosive, and reactive components that come from human activities, industrial activities, markets, departmental stores, and especially the teaching hospital.

Nobody and nowhere is spared the threat posed to the health and wealth of the populace at Nnewi by solid waste mismanagement.

The threat has become such that the realization of the 17 sustainable development goals with 169 targets which 191 Heads of States of Member Nations of the United Nations agreed on and adopted for total implementation between 2015 and 2030 to

achieve a world free of poverty, hunger, disease and want, stands to be frustrated. It will go a long way in addressing the problems that are due to solid waste mismanagement at Nnewi and beyond. Modern methods appropriate to the needs of the people must be embraced and this requires a proper understanding of the nature of the wastes that are generated, the problems associated with them, and how to deal with them in a manner that ensures that all unhygienic disposal methods that caused the problems are discarded and the reduce, reuse and recycle strategies embraced instead. Solid waste management issues in fast urbanizing Indian cities were examined by Jesudaas *et al.*, (2019), who emphasized the complexity brought about by increased urbanization and economic growth. The study made clear how difficult it will be to manage solid waste if India's economy develops quickly, resulting in more industry and urban migration. The paper emphasizes how these problems are made worse by concentrated urban growth. It also raises questions about how to achieve sustainability in the face of fast economic growth that frequently disregards environmental protection. Therefore, to address the expanding environmental and public health consequences in rapidly urbanizing areas, the research highlights the urgent need for integrated and sustainable waste management approaches. The influence of educational interventions on the management of household solid waste was investigated by La Riva *et al.*, (2019), who positioned this approach as a sustainable one within municipal environmental policy. The study emphasizes how important household waste management is to maintaining the environment and human well-being. Worrysome World Bank estimates indicate that municipal solid trash will double by 2025, raising serious problems. According to the report, the main causes of rising waste output include population growth, economic development, fast urbanization, and improved community quality of life. As a result, increasing affluence and urbanization exacerbate trash accumulation, highlighting the necessity of efficient management techniques and public awareness campaigns. In their investigation of the effects of solid waste on human health in Varanasi City, Pragma *et al.*, (2013) linked rising trash rates to population increase and urbanization, which presented serious management issues for local government entities. The study draws attention to direct health risks to garbage workers as well as possible risks from improper treatment of medical waste. Risks are indirectly experienced by the general people through disease vectors such as rats and flies. When hazardous industrial waste and municipal garbage mix, there is an increased risk to public health due to possible toxic leaks and dangerously high concentrations of heavy metals in the food chain. The study highlights the interrelated difficulties in managing industrial wastewater and solid waste. Solid waste management methods in Onitsha Metropolis, Nigeria

were studied by Emelumadu *et al.*, (2016), who found that irregularities in home trash management patterns were a serious problem for regional environmental organizations. A survey conducted on 425 homes found that although most of them used government facilities (57.4%), a significant proportion (11.1%) disposed of garbage inappropriately in streets and drains. Sixty-nine percent of people used waste segregation. Based on residential regions, statistical analysis revealed considerable differences in trash disposal practices. The study highlights the shortcomings in current waste management procedures and highlights the need for focused approaches to improve Onitsha's municipal solid waste management. Otti (2021) examined the effects of careless solid waste disposal in Nigeria, highlighting the connection between infectious illnesses and serious health issues. To improve waste management, the paper presents a deterministic model specifically designed for Anambra State's sanitation and environmental agency (ANSEPA). With the least amount of maintenance required, this approach seeks to discover integrated waste management techniques that are both cost-effective and environmentally beneficial. The approach helps decision-makers achieve environmental, economic, and social goals by integrating several variables such as staff, equipment, maintenance, and other assorted issues. Nigeria's budgetary limitations, however, provide difficulties that might reduce the model's effectiveness and call for the use of system engineering techniques for intricate waste management planning.

The influence of effective solid waste management on sustainable development in Anambra State was examined by Okeke *et al.*, (2019), who concentrated on issues such as insufficient financing, ineffective recovery and recycling programs, poor laws, and insufficient infrastructure. Their study used multiple regression, correlation, and descriptive analyses on a sample of 309 respondents from three large cities. The findings showed that the region's sustainable growth is severely hampered by these issues. To improve solid waste management standards for sustainable development in Anambra State, the research emphasizes the critical role that sound waste management practices play and makes recommendations for improved infrastructure, professional training, and regulatory changes. The influence of Municipal Solid Waste (MSW) on inland water bodies in Nigeria was examined by Sowunmi (2019), who also highlighted the difficulties caused by insufficient waste management techniques in the face of economic growth. Given Nigeria's expanding population and rising MSW production, the study emphasized the harm that uncontrolled dumpsites and landfills provide to human health and water quality. To inform effective MSW strategies and reduce ecological and health risks, the research emphasized the urgent need for comprehensive waste management approaches, including data collection on

dumpsites, landfill characterization, geophysical assessments, regular water quality monitoring, waste sorting at the source, recycling initiatives, and spatial analyses.

In their examination of the environmental issues arising from unchecked urbanization, Nwakoby *et al.*, (2020) emphasized the vital significance of efficient garbage disposal and management. The study, which included three local governments, brought to light the negative effects of inadequate waste management, such as illness outbreaks, contamination of the environment, and deterioration of aesthetics. The results emphasized the value of system theory and survey research methodology, and they also highlighted the need for appropriate urban planning and policy. Important concerns including pollution, unchecked street commerce, and air pollution from several sources were found in the investigation. The emphasis of the recommendations was on working together with communities, governmental organizations, and other stakeholders to develop efficient waste management techniques that would enhance environmental quality and public health. Ezeudu *et al.*, (2021) investigated the circular economy (CE) model's use in Anambra State, Nigeria's metropolitan marketplaces, evaluating both its advantages and disadvantages. The study used the strength, weakness, opportunity, and threat (SWOT) analysis to identify current recycling practices, regulations, and institutions as possible internal facilitators for CE adoption using interviews, literature reviews, and field observations. On the other hand, it recognized one major external impediment as the absence of sophisticated waste disposal facilities. While pointing out obstacles like antiquated garbage disposal techniques and insufficient rules, the research also identified important facilitators such as institutional structures, policy frameworks, and public engagement. Using low-cost technology like biowaste composting for better waste management was one of the recommendations. The major environmental and health concerns associated with rural solid waste management in Aguata Local Government Area, Anambra State, Nigeria, were highlighted by Igwe and Evan (2020) in their study. They used structured surveys and traps, together with a quantitative technique, to evaluate waste management procedures in 18 studied communities. According to their research, there is a worrying positive link ( $r=0.842$ ,  $p<0.05$ ) between hazards to the public's health, such as cholera, Lassa fever, malaria, and poor waste management. The analysis underlined the necessity for immediate intervention and the inadequacy of the Anambra State Waste Management Agency. Improved garbage collection infrastructure, community education, stakeholder cooperation, and the implementation of creative waste reduction techniques were among the recommendations. The waste management practices of women merchants in Owerri, Nigeria's largest urban market were investigated by Ezedike *et al.*, (2020) in their quest for health. The purpose of

the study was to determine how committed they were to sustainable waste management techniques, what variables influenced their attitudes toward trash management, and how common waste-related illnesses were among them. Results from a survey of 739 women showed that the kind of trade item had a big impact on how motivated women were to manage trash. However, there was inconsistent evidence linking knowledge of the reduction, reuse, and recycling (3Rs) with approaches to health. The research underscored the importance of information transmission tactics in fostering sustainable waste management practices among market women and stressed the government's leading role in garbage disposal. Nkwocha *et al.*, (2023) examined the problems associated with sustainable solid waste management in Southeast Nigeria, with a particular emphasis on cities such as Aba, Nnewi, and Onitsha. The study, which employed a mixed-method approach, brought to light problems like inadequate infrastructure, subpar waste disposal procedures, and low public awareness. The challenges included a lack of finance from the government, inadequate supplies for garbage collectors, and an increase in waste as a result of urbanization and population development. The study highlights how urgently the area needs sustainable waste management techniques. It emphasizes how important it is for the public, business, and governmental sectors to work together to adopt efficient waste reduction, recycling, and safe disposal practices that will contribute to a healthy environment.

The study aimed to investigate the relationship between various factors related to solid waste management, including pollution sources, urbanization, collection methods, data adequacy, personnel competence, and waste materials usage, and their impact on the health and wealth of the people in Nnewi. The specific objectives include: to determine if air, land, and water pollution resulting from solid waste mismanagement significantly cause health and wealth challenges for the residents of Nnewi; to examine if rapid urbanization, industrialization, and population growth lead to increased solid waste generation, which in turn significantly affects the health and wealth of Nnewi's residents; to investigate whether inefficient collection methods, insufficient coverage of the collection system, and improper disposal of solid waste significantly contribute to health and wealth problems in Nnewi; to assess if inadequate data regarding solid waste generation and collection, coupled with insufficient resources and a lack of competence among municipal waste management personnel, significantly affect the health and wealth of Nnewi's residents; to examine if corrupt work attitudes of waste collecting personnel, along with inadequacies in plants and machinery for solid waste recycling and conversion, contribute significantly to the health and wealth problems of Nnewi; and to assess if the



increasing use of disposable packaging materials like metals, plastics, wood, paper, etc., combined with ignorance of waste generation rates due to poor urban planning, significantly impacts the health and wealth of Nnewi's residents.

## **RESEARCH METHOD**

### **Study Area**

**Nnewi**, often called the Japan of Africa, with coordinates 6° 1' N, 6° 55' E is a fast-growing commercial and Industrial city with an urban status located within the rainforest region of southeast Nigeria. It is the second largest and second most populated city in Anambra State.

**Nnewi** in Nnewi North Local Government Area is a one-town local government area surrounded by the following towns namely Nnobi, Awka-Etiti, Amichi, Utuh, Ukpok, Ozubulu, Oraifite, Ichi, and Ojoto.

Nnewi is made up of four traditionally autonomous nearly equal component communities namely, in order of seniority, Otolo, Uruagu, Umudim, and Nnewichi, which when put together gives a land area of 518 square miles.

According to weather.com, the average temperature for Nnewi is 34°C; the wind is northeast at 11km/h and 28% humidity. The landscape is fairly undulating and has been home to many schools, markets, hospitals, public places, and industrial concerns that are indicative of the highly enterprising lifestyle of the people.

Census figures released by the National Population Commission of Nigeria showed that the population of Nnewi in 2006 was 155,443(National Population Commission of Nigeria (web) National Bureau of Statistics (web). Of this figure, 77,517 were male while 77,926 were females. 55,784 were aged between 0-14 years of age, 93,239 were aged between 15-64 years, 6,420 were 65+. Apart from the figures for the 2006 headcount, all population figures released by the National Population Commission of Nigeria afterward have shown a high error rate, and as a result census figures have been widely disputed.

### **Method of data collection and Method of data analysis**

#### ***Data Collection and Waste Characterization Methodology***

The direct collection of data was the main focus of this study. Because urban solid wastes are made up of a wide variety of constituents, it is essential to comprehend their complex physical and chemical makeup to effectively manage them. Nnewi was carefully divided into segments so that the solid wastes could be examined in detail. The waste from each section was carefully examined to ascertain its distinct makeup.

Distribution of the Survey: Detailed questionnaires were sent to a wide range of

individuals, including locals, garbage collectors, physicians, market sellers, and Garbage Management Agency staff.

The following describes the structured sampling approach that was used:

- i. Residential Sampling: Twelve residential buildings were found in certain localities. Trash cans placed in strategic locations made rubbish collection easier and more effective.
- ii. Quantitative Analysis: A weighted estimate of the total amount of solid waste generated was obtained. At the same time, the total population in these territories was calculated. To calculate the total amount of waste produced in Nnewi, the cumulative waste weight was divided by the population. This yielded information on the daily amount of rubbish generated per person.



**Fig 1. Map of Southern Nigeria Showing Nnewi**

iii. Qualitative Sorting: The components of the produced solid wastes were recognized, classified, and quantified by hand segregation. Making judgments on disposal techniques—direct disposal, recycling, garbage, or treatment—was made easier by this classification.

iv. Density Evaluation: Using the mass-volume analysis method, the densities of different waste materials were measured. The design decisions, if appropriate, were then guided by these density measurements.



A thorough inspection of many trash dumpsites in Nnewi was conducted to obtain a comprehensive understanding. The weekly trash creation trends were revealed by extracting representative samples, sorting them, and characterizing them. The quantification which was given in kilograms provided crucial information for the analytical framework of the investigation.



**Fig. 2: Solid waste at Nnewi High School Nnewi- Nnobi road**



**Fig. 3: Solid waste at Nnewi High School Nnewi- Nnobi road on a different day**



**Fig. 4: Solid waste at Igwe Orizu road Nnewi**



**Fig. 5: Solid waste blocking drains**

In this study, the data collected was subjected to statistical analysis using the One-Sample T-test methodology. To be more precise, the test was configured using 2.5000 as the predefined test value. A crucial decision rule was developed to direct the interpretation of the test's outcomes. This rule states that if the estimated p-value from the test was less than the predefined significance level of 0.05, the null hypothesis would be rejected. On the other hand, the null hypothesis would be accepted if the p-value was greater than or equal to 0.05.

The research questions adopted by the study include:

- i. Does air, land, and water pollution resulting from solid waste mismanagement cause health and wealth problems for people at Nnewi?

- ii. Does rapid urbanization, industrialization, and population growth cause increased generation of solid waste which affects the health and wealth of the people at Nnewi?
- iii. Do inefficient collection methods, insufficient coverage of the collection system, and improper disposal of solid waste cause the health and wealth problems of the people at Nnewi?
- iv. Does inadequate data regarding solid waste generation and collection, inadequate resources, and lack of competence of municipal waste management personnel cause the health and wealth problem of the people at Nnewi?
- v. Does corrupt work attitudes of waste collecting personnel, the inadequacy of plants and machinery for solid waste disposal, and the conversion of landfills to other uses cause the health and wealth problem of the people at Nnewi?
- vi. Does the increasing use of disposable packaging materials like metals, plastics, wood, paper, etc cause the health and wealth problems of the people at Nnewi?

## RESULTS AND DISCUSSIONS

Questionnaires were prepared and distributed to establishments and individuals to gather empirical information concerning the meaning, generation, treatment methods available disposal methods, and other aspects of solid waste management in Nnewi.

These questions were drawn to collect information from both experts and laymen on solid waste generation treatment and disposal in the study area, Nnewi. Answers to these questions will help me to fashion out a comprehensive and sustainable solid waste management scheme for the area, of Nnewi. The results obtained are summarized in table appendix (2).

### Research Question 1

Does solid waste known to be majorly responsible for pollution of air, water, and land cause health and wealth problems to people at Nnewi?

The result obtained in Table 1 showed that the T-value was 4.5390 with a *p*-value of 0.0450 which was lower than the significance value of 0.05; this shows that solid waste, majorly responsible for pollution of air, water, and land significantly poses health challenges to the people at Nnewi.



**Table 1: Analysis for how far solid waste known to be majorly responsible for pollution of air, water and land pose health challenges to the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Solid waste is known to pollute the air which people breathe thereby posing health and wealth challenges like cough, catarrh, etc to the people at Nnewi.	2.9800
2	Solid waste is known to pollute the water which people drink thereby posing health and wealth problems like cholera, diarrhea, dysentery etc to the people at Nnewi.	2.8200
3	Solid waste is known to pollute the land, on which people plant their crops thereby posing health and wealth problems which causes soil contamination and poor agricultural yield etc to the people at Nnewi.	3.2000
	<b>T Statistic-value</b>	<b>4.5390</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0450</b>

**Table 2: Analysis of how far solid waste known to be majorly responsible for pollution of air, water, and land poses health challenges to the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Solid waste is known to pollute the air that people breathe thereby posing health and wealth challenges like cough, catarrh, etc to the people at Nnewi.	3.7200
2	Solid waste is known to pollute the water that people drink thereby posing health and wealth problems like cholera, diarrhea, dysentery, etc to the people at Nnewi.	3.7100
3	Solid waste is known to pollute the land, on which people plant their crops thereby posing health and wealth problems which causes soil contamination and poor agricultural yield etc to the people at Nnewi.	3.8200
	<b>T Statistic-value</b>	<b>35.5930</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0010</b>

The result obtained in Table 2 showed that the T-value was 35.5930 with a *p*-value of 0.0010 which was lower than the significance value of 0.05; this shows that solid waste known to be majorly responsible for pollution of air, water, and land significantly pose health challenges to the people at Nnewi.

**Research Question 2**

Does rapid urbanization, industrialization, and population growth cause increased generation of solid waste which affects the health and wealth of the people at Nnewi? The result obtained in Table 3 showed that the T-value was 5.9600 with a  $p$ -value of 0.0270 which was lower than the significance value of 0.05; this shows that rapid urbanization, industrialization, and population growth cause increased generation of solid waste which significantly affects the health and wealth of the people at Nnewi.

**Table 3: Analysis of how far rapid urbanization, industrialization, and population growth cause increased generation of solid waste which affects the health and wealth of the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Rapid urbanization causes increases in a solid waste generation which affects the health and wealth of the people at Nnewi in turn causes poor solid waste disposal with attendant health problems for the people at Nnewi.	2.9000
2	Rapid industrialization leads to increases in solid waste generation which for lack of proper disposal facilities gets discharged into streams and rivers where they poison drinking water and so cause health and wealth problems to the people at Nnewi.	2.7400
3	Rapid population growth leads to increases in solid waste generation with attendant indiscriminate dumping of refuse that block gutters and roadways which causes health and wealth problems to the people at Nnewi.	2.7600
	<b>T Statistic-value</b>	<b>5.9600</b>
	<b>Test value</b>	<b>2.5000</b>
	<b><math>p</math>-value</b>	<b>0.0270</b>

The result obtained in Table 4 showed that the T-value was 16.3660 with a  $p$ -value of 0.0040 which was lower than the significance value of 0.05; this shows that rapid urbanization, industrialization, and population growth cause increased generation of solid waste which significantly affects the health and wealth of the people at Nnewi.



**Table 4: Analysis of how far rapid urbanization, industrialization, and population growth cause increased generation of solid waste which affects the health and wealth of the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Rapid urbanization causes increases in a solid waste generation which affects the health and wealth of the people at Nnewi in turn causes poor solid waste disposal with attendant health problems for the people at Nnewi.	3.5800
2	Rapid industrialization leads to increases in solid waste generation which for lack of proper disposal facilities gets discharged into streams and rivers where they poison drinking water and so cause health and wealth problems to the people at Nnewi.	3.3800
3	Rapid population growth leads to increases in solid waste generation with attendant indiscriminate dumping of refuse that block gutters and roadways which causes health and wealth problems to the people at Nnewi.	3.5400
	<b>T Statistic-value</b>	<b>16.3660</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0040</b>

### Research Question 3

Does inefficient collection methods, insufficient coverage of the collection system, and non-recycling of solid waste cause the health and wealth problems of the people at Nnewi?

**Table 5: Analysis of how far inefficient collection methods, insufficient coverage of the collection system, and non-recycling of solid waste cause the health and wealth problem of the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Inefficient solid waste collection methods caused the health and wealth problems of the people at Nnewi.	2.7300
2	Insufficient coverage of the solid waste collection system caused health and wealth problems to the people of Nnewi.	2.9800
3	Improper disposal of solid waste caused the health and wealth problems of the people at Nnewi.	2.6900
	<b>T Statistic-value</b>	<b>3.3060</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0810</b>

**Table 6: Analysis of how far inefficient collection methods, insufficient coverage of the collection system and non-recycling of solid waste caused the health and wealth problem of the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Inefficient solid waste collection methods caused the health and wealth problems of the people at Nnewi.	3.6800
2	Insufficient coverage of the solid waste collection system caused health and wealth problems for the people of Nnewi.	3.6500
3	Non-recycling of solid waste caused the health and wealth problems of the people at Nnewi.	3.5500
	<b>T Statistic-value</b>	<b>28.6690</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0010</b>

The result obtained in Table 6 showed that the T-value was 28.6690 with a  $p$ -value of 0.0010 which was less than the significance value of 0.05; this shows that inefficient collection methods, insufficient coverage of the collection system, and non-recycling of solid waste significantly caused the health and wealth problem of the people at Nnewi.

#### Research Question 4

Does inadequate data regarding solid waste generation and collection, inadequate resources, and lack of competence of municipal waste personnel cause the health and wealth of the people at Nnewi?

**Table 7: Analysis of how far inadequate data regarding solid waste generation and collection, inadequate resources, and lack of competence of municipal waste personnel caused the health and wealth of the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Inadequate data regarding solid waste generation and collection caused the health and wealth problems of the people at Nnewi.	2.900
2	Inadequate resources for solid waste management caused the health and wealth problems of the people at Nnewi.	2.8500
3	Lack of competence of solid waste management personnel caused the health and wealth problems of the people at Nnewi.	2.7500
	<b>T Statistic-value</b>	<b>7.5590</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0170</b>

The result obtained in Table 7 showed that the T-value was 7.5590 with a  $p$ -value of 0.0170 which was less than the significance value of 0.05; this shows that inadequate data regarding solid waste generation and collection, inadequate resources, and lack of competence of municipal waste personnel significantly caused the health and wealth problems of the people at Nnewi.

**Table 8: Analysis of how far inadequate data regarding solid waste generation and collection, inadequate resources, and lack of competence of municipal waste personnel caused the health and wealth problems of the people at Nnewi.**

ITEM NO	DESCRIPTION	SCORE
1	Inadequate data regarding solid waste generation and collection caused the health and wealth problems of the people at Nnewi.	3.7000
2	Inadequate resources for solid waste management caused the health and wealth problems of the people at Nnewi.	3.7000
3	The lack of competence of solid waste management personnel caused the health and wealth problems of the people at Nnewi.	3.4000
	<b>T Statistic-value</b>	<b>11.0000</b>
	<b>Test value</b>	<b>2.5000</b>
	<b><math>p</math>-value</b>	<b>0.0080</b>

The result obtained in Table 8 showed that the T-value was 11.0000 with a  $p$ -value of 0.0080 which was less than the significance value of 0.05; this shows that inadequate data regarding solid waste generation and collection, inadequate resources, and lack of competence of municipal waste personnel significantly caused the health and wealth problems of the people at Nnewi.

### Research Question 5

Does corrupt work attitudes of waste collecting personnel, the inadequacy of plants and machinery for solid waste recycling, and the conversion of landfills to other uses cause the health and wealth problem of the people at Nnewi?

The result obtained in Table 9 showed that the T-value was 11.0000 with a  $p$ -value of 0.0080 which was less than the significance value of 0.05; this shows that the corrupt work attitudes of waste collecting personnel, inadequacy of plants and machinery for solid waste recycling and conversion of landfills to other uses significantly caused the health and wealth problem of the people at Nnewi.

**Table 9: Analysis of how far corrupt work attitudes of waste collecting personnel, the inadequacy of plants and machinery for solid waste recycling, and the conversion of landfills to other uses caused the health and wealth problem of the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Corrupt work attitudes of solid waste collecting personnel caused the health and wealth problems of the people at Nnewi.	3.62
2	The inadequacy of plants and machinery for solid waste disposal caused the health and wealth problems of the people at Nnewi.	3.81
3	Conversion of landfills to other uses caused the health and wealth problems of the people at Nnewi.	3.52
	<b>T Statistic-value</b>	<b>11.0000</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0080</b>

### Research Question 6

Does the increasing use of disposable packaging materials like metals, plastics, wood, paper, etc yet to be recycled and ignorance of the waste generation rate due to poor urban planning cause the health and wealth problem of the people at Nnewi?

**Table 10: Analysis of how far increasing use of disposable packaging materials like metals, plastics, wood, paper, etc, and yet to be recycled and ignorance of waste generation rate due to poor urban planning caused the health and wealth problem of the people at Nnewi**

ITEM NO	DESCRIPTION	SCORE
1	Increasing use of disposable packaging materials like metals, plastics, wood, paper, etc caused the health and wealth problem at Nnewi.	2.9500
2	Ignorance of waste generation rates caused the health and wealth problems of the people at Nnewi.	2.7700
3	Poor urban planning caused the health and wealth problems of the people at Nnewi.	2.6800
	<b>T Statistic-value</b>	<b>3.7800</b>
	<b>Test value</b>	<b>2.5000</b>
	<b>p-value</b>	<b>0.0600</b>

The result obtained in Table 10 showed that the T-value was 11.0000 with a  $p$ -value of 0.0600 which was greater than the significance value of 0.05; this shows that the increasing use of disposable packaging materials like metals, plastics, wood, paper, etc, and yet to be recycled and ignorance of waste generation rate due to poor urban planning does not significantly caused the health and wealth problem of the people at Nnewi.

**Table 11:** Analysis of how far increasing use of disposable packaging materials like metals, plastics, wood, paper, etc, and yet to be recycled and ignorance of waste generation rate due to poor urban planning caused the health and wealth problem of the people at Nnewi.

ITEM NO	DESCRIPTION	X (SCORE)
1	Increasing use of disposable packaging materials like metals, plastics, wood, paper, etc caused the health and wealth problem at Nnewi.	3.7100
2	Ignorance of waste generation rates caused the health and wealth problems of the people at Nnewi.	3.4800
3	Poor urban planning caused the health and wealth problems of the people at Nnewi.	3.6100
	<b>T Statistic-value</b>	<b>16.5210</b>
	<b>Test value</b>	<b>2.5000</b>
	<b><math>p</math>-value</b>	<b>0.0040</b>

The result obtained in Table 11 showed that the T-value was 11.0000 with a  $p$ -value of 0.0600 which was less than the significance value of 0.05; this shows that the increasing use of disposable packaging materials like metals, plastics, wood, paper, etc, and yet to be recycled and ignorance of waste generation rate due to poor urban planning significantly caused the health and wealth problem of the people at Nnewi.

## CONCLUSION

The study examined the complex issues of solid waste management and its significant effects on the prosperity and health of Nnewi's citizens. A well-designed questionnaire assisted in using the main source of data collecting. Several crucial conclusions have been drawn from the data analysis conducted by the study using the One-Sample T-test in conjunction with some well-constructed research questions.

A clear disclosure of the harmful effects of pollution resulting from improper waste



treatment was at the center of the study. The pollution that was present in Nnewi's land, water, and air made the people living there sicker. These findings are consistent with other studies, such as Pragma *et al.*, (2013), which highlighted the health risks associated with poor waste management techniques. The seriousness of these health consequences highlights the urgent need for effective waste management plans and pollution control techniques. A crucial intersection was formed by the city of Nnewi's expanding industrial base, fast urbanization, growing population, and rising solid waste generation. The threats to the health and economic well-being of the population are increased by this complex web of variables. Similar to these concerns, Jesudaas *et al.*, (2019) highlighted the growing difficulties brought on by fast urbanization and the necessity of effective waste management techniques in developing metropolitan areas. Beyond the study's obvious health concerns, however, it revealed significant inefficiencies embedded in Nnewi's waste management system. Problems including inadequate collecting techniques, inadequate infrastructure, and irregularities in the recycling process jeopardize public health and fiscal soundness. These findings align with observations by Emelumadu *et al.*, (2016) and Nkwocha *et al.*, (2023), which highlighted systemic deficiencies within waste management infrastructures in other contexts. Additionally, the study highlighted the damaging effects of dishonest work ethics among waste management staff as well as structural flaws in recycling frameworks.

These anomalies worsen socioeconomic divides among the people of Nnewi while also jeopardizing the effectiveness of trash management. It is essential to promote ethical workplace cultures and strengthen infrastructure capacity to ensure sustainable waste management practices in light of these disclosures. Furthermore, even though some factors, such as the spread of disposable packaging materials, had differing effects on public health and income, the overall story emphasizes the indisputable necessity of comprehensive waste management solutions. This is consistent with findings from research like Okeke *et al.*, (2019) and La Riva *et al.*, (2019), which support integrated, comprehensive, and sustainable methods for waste management.

The findings of the present study thereby demystify the complex and multifaceted solid waste management environment of Nnewi and clarify its significant implications for both public health and economic trajectory. These realizations inspire stakeholders, including legislators, urban planners, and community leaders, to work together to address these issues. In the end, coordinated, knowledgeable, and determined efforts are required to ensure Nnewi's ascent toward a future marked by improved health outcomes, economic vigor, and environmental sustainability. Recycling, reuse, and reduction approaches become not just a choice, but a need for

turning trash into an engine of growth rather than a sign of impending collapse. As a result, the study was able to clarify the complex dynamics of Nnewi's solid waste management, highlighting its significant effects on both public health and economic growth. The findings provide a strong incentive for stakeholders, including legislators, urban planners, and community leaders, to work together synergistically by outlining the main difficulties and providing evidence-based ideas. It was discovered that Nnewi cannot successfully negotiate the challenges of solid waste management and guarantee a healthier, wealthier future for its citizens without coordinated efforts, well-informed initiatives, and unwavering dedication. The study suggested that governments adopt the reduce, reuse, and recycle strategies for converting trash into wealth rather than sticking with antiquated garbage disposal methods.

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