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CONTRIBUTION TO THE IDENTIFICATION OF MEANS, METHODS, AND TECHNIQUES FOR COMBATING SANITARY CONDITIONS IN THE CITY OF KISANGANI: A STUDY CONDUCTED IN THE TSHOPO DISTRICT

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ABSTRACT

Introduction: The issue of unsanitary conditions is becoming increasingly prominent among current urban environmental challenges. Household waste management is complex, and its impact on the environment is far from negligible. This study aims to determine the factors contributing to unsanitary conditions in the city of Kisangani, identify the methods households use to combat unsanitary conditions, and demonstrate methods and techniques for addressing unsanitary conditions.

Methods: We adopted a descriptive cross-sectional approach to conduct this study in the Tshopo Commune from January 15 to March 31, 2026. Through structured face-to-face interviews, we collected data from 95 households. The chi-square test allowed us to identify significant differences between variables at the 0.05 significance level.

Results: Most of the study participants (49.5%) believed that unsanitary conditions are characterized by the presence of trash on the streets and puddles of water on public roads (32.6%); the difference is statistically significant (p=0.000). Furthermore, ignorance regarding waste management, tied with a lack of public awareness (32.6%), and the absence of public trash cans (27.4%) are the main factors associated with unsanitary conditions (p=0.000). The installation of public trash bins (80.0%) is the ideal means of combating unsanitary conditions in the municipality of Tshopo, with a significant difference (p=0.000). Disposing of waste in public trash bins was the most frequently cited method of waste disposal, at 51.6% (p=0.000).

Conclusion: The absence of public trash bins in municipalities and the lack of adequate measures to combat unsanitary conditions contribute to the accumulation of waste in the city. It is therefore imperative to implement hygiene and sanitation education programs to promote health and reduce health risks to the population.

Keywords: Contribution, Identification, Resources, Methods, Techniques, Sanitation.

1 INTRODUCTION

Global health issues stem from environmental conditions that significantly influence people's health. It is also clear that human activities (such as deforestation and industrial carbon emissions) have an impact on the environment. These interactions between humans and the environment should ensure a true balance: preventing environmental pollution as well as diseases that claim human lives [1].

We speak of unsanitary conditions when living conditions in the environment are deplorable and threaten public health (significant fungal infestation, humidity, pest infestations. etc.) and/or when minimum safety standards are not met (CO poisoning, gas leaks, risk of collapse, etc.) [2]. The presence of household waste on public roads affects environmental hygiene; it leads to unsanitary conditions and can be a factor in certain diseases, some of which may be epidemic. Over the past two decades, the issue of waste management has become increasingly complex for both developed and underdeveloped countries. In terms of the environment, the impact of unsanitary conditions results in flies, foul odors, mice, and other pests invading homes located near these public garbage dumps [3].

Waste generated by businesses and households remains a major challenge due to poor management in cities, villages, municipalities, communities, chiefdoms, territories, etc. Among other issues, there is a lack of public dumps, an absence of trash cans and garbage pits, etc. Added to this is the absence and/or insufficiency of public latrines and inadequate drainage systems. All the reasons mentioned above lead to widespread unsanitary conditions in developing countries [4].

According to Yankel and Maresca [5], unsanitary conditions are a public health issue related to preventive medicine, the primary cause of which is the absence or inadequacy of environmental hygiene and sanitation measures. It is clear that waste of any kind left on the ground where people live, posing varying degrees of risk to their lives, is classified as unsanitary conditions. Unused objects littering the ground in the heart of cities, towns, and villages contribute significantly to unsanitary conditions in living spaces. To add value to household waste and any waste polluting the environment, it is essential to manage them effectively. In this way, unsanitary conditions will be minimized.

The Democratic Republic of the Congo is not spared from this scourge. Indeed, the management of solid and liquid waste is one of the major challenges facing the city of Kinshasa today. This issue demands even greater attention given the growing pressures on the city's environment. Sustainable waste management requires a comprehensive approach that takes into account all the problems, constraints, and challenges of the area in question. The unplanned urbanization of Kinshasa has harmful consequences for the environment, resulting in a deterioration of the quality of life in the urban area. Public health issues associated with the growing production of municipal waste are reaching alarming proportions for human health and the environment. Regarding the wastewater disposal system, out of a total of 227 households surveyed, 100% rely in part on a hole on their property, 60% use gutters, 40% discharge into the street, and 27% discharge into waterways. The main causes of illegal dumping are as follows: lack of trash bins (44%), lack of a participatory management system (24%), lack of waste collectors (55%), lack of information (34%), lack of monitoring by authorities (38%), and no awareness programs (32%). Regarding methods of waste disposal, 46% use rickshawbased collection services, 28% dump waste in illegal dumps, 34% dispose of it, 19% compost it, 26% bury it on their property, 20% prefer to burn it, 30% dump it in rivers, and 24% throw it in the street [6].

Furthermore, the results of a study conducted in Mbuji-Mayi in the Kasaï-Oriental Province in 2022 revealed that 40% of the plots observed were unsanitary, 24% were completely unsanitary, 35% of households dispose of their waste through uncontrolled dumping, 26% through incineration, 25% bury their waste or use waste pits, 14% use trash bins, 51% of households do not have waste pits; 86% do not use trash bins to store their household waste. The reckless disposal of waste results in air, water, and soil pollution. Thus, this discarded waste heavily pollutes the air we breathe in various ways because it contains carbon dioxide [7].

Today, environmental issues remain a pressing concern worldwide. In Kisangani, the public health crisis is evident. Sewer systems are non-operational due to the presence of garbage, which reduces their capacity to drain rainwater and domestic wastewater, leading to overflows and/or flooding. There is no awareness program on solid waste management. Raising awareness of the interaction between human activities, the environment, and health remains a goal to be achieved by this research. The worsening of unsanitary conditions and the degradation of nature have reached alarming proportions. Deeply entrenched, this state of affairs has plunged people into an unprecedented state of apathy and has become a widespread phenomenon. One of the major threats to human health worldwide is the lack of access to adequate sanitation facilities for an ever-growing population.

The study aims primarily to contribute to improving the living conditions of urban populations by promoting sanitation and protecting the environment. Specifically, the study aims to determine the factors contributing to unsanitary

conditions in the city of Kisangani, identify the methods used by households to combat unsanitary conditions, and demonstrate methods and techniques for combating unsanitary conditions.

2 METHODS

2.1 Description of the Study Context

The Tshopo Commune served as the setting for our research. It is one of six municipalities that make up the city of Kisangani, including the Lubuya-Bera Sector. This municipality borders the Makiso Commune to the east, the Mangobo Commune to the west, the Banalia Territory to the north, and the Makiso Commune to the south.

2.2 Study Population

The population covered by this study consists of all households in the Tshopo commune during the period from January 15 to March 31, 2026. It should be noted, however, that it was difficult for us to count all households because the study area is relatively large; this population was therefore infinite.

2.3 Study Sample

In this methodological approach, we opted to recruit a non-probabilistic convenience sample. This is a convenience sample because it did not include all households in the Tshopo commune, given that the total number was deemed too large. To achieve the objectives of this study, we deemed it useful to work with all targeted households by recruiting 95 individuals, selected at random from the Stade neighborhood—comprising 19 avenues—with 5 respondents per avenue participating in the survey.

2.4 Selection Criteria

To assemble our sample, we established inclusion and exclusion criteria:

2.4.1 Inclusion Criteria

- Be a resident of the Quartier du Stade;
- Have agreed to participate in the survey;
- Be present at the time of the survey.

2.4.2 Exclusion Criteria

Consequently, all subjects who did not meet the inclusion criteria mentioned above were excluded.

2.5 Methods

2.5.1 Study Design

We opted for a cross-sectional descriptive approach to conduct this study in the Municipality of Tshopo, from January 15 to March 31, 2026.

2.5.2 Data Collection Techniques and Instruments

2.5.2.1 Data Collection Techniques

Data collection is a crucial step in conducting a study. To this end, the descriptive analysis of responses was supplemented by structured face-to-face interviews, which enabled us to collect data from households in the Tshopo Commune regarding their contributions to identifying the means, methods, and techniques for combating unsanitary conditions in the city of Kisangani. The interview technique is one that allows the interviewer to ask the respondent a series of questions in order to gather the information that is the subject of the research.

2.5.2.2 Data Collection Tool

The tool we used to collect data from households in the Tshopo Municipality was the interview guide that we developed and had approved by the study's supervisory team. This interview guide enabled us to gather the necessary information on waste management and unsanitary conditions from households in the Tshopo Commune and included the variables analyzed in this study.

2.5.3 Data Analysis and Processing Plan

The collected data were organized into tables of absolute frequency distributions and then converted into percentages for interpretation. To process this data, we used SPSS version 21, which enabled us to perform univariate analyses to determine frequencies and proportions. Pearson's chi-square test allowed us to identify comparisons between variables at the 0.05 significance level.

2.6 Ethical Considerations

Participation in this study was voluntary. Consent was freely given, informed, but only verbal. Participants were told that if they agreed to participate in this study, they would be asked to complete a questionnaire. Participants who freely agreed to be included in the study could withdraw at any time without any adverse consequences.

2.7 Limitations of the Study

The study was conducted using a quantitative approach. Although households were selected at random, the study does not possess the same characteristics as a quantitative study that has adhered to all the rules of statistically representative sampling. The statistics presented here should not be used for inferential extrapolations.

3 RESULTS

3.1 Univariate Analysis

3.1.1 Profile of Respondents

Table 1: Distribution of study participants by sociodemographic characteristics

Sociodemographic characteristics	Effectives	Percentage
Age groups		
18 – 35	53	55.8
36 – 53	34	35.8
54 – 71	8	8.4
Gender		
Female	42	44
Male	53	56
Education level		
None	4	4.2
High school	25	26.3
Higher education and university	66	69.5
Marital status		
Married	63	66
Single	31	33
Widow	1	1
Principal Occupation		
Civil servant	39	41.1
Homemaker	17	17.9
Taxi driver	17	17.9
Sales person	14	14.7
Unemployed person	3	3.2
Student	3	3.2

Seamstress	2	2.1

An analysis of this table shows that the ages of the respondents ranged from 18 to 71 years old, with most—55.8%—being between 18 and 35 years old. The average age was 35.76 years, with the extremes being 18 and 71; males predominated at 56% compared to 44% for females, with a sex ratio of 0.78. The majority of the study participants had a high school or college education, accounting for 69.5%. Married individuals were the largest group at 66.3%, followed by singles (32.6%). Regarding occupation, 41.1% of the study participants were government employees, followed by homemakers (17.9%) and taxi drivers (17.9%).

3.1.2 Measures to Combat Unsanitary Conditions

Table 2: Distribution of study participants by means of combating unsanitary conditions

Measures to combat unsanitary conditions	**Effectives**	**Percentage**
Knowledge of methods to combat unsanitary conditions		
No	10	10.5
Yes Identification of unsanitary conditions	85	89.5
Presence of litter on the streets	47	49.5
Presence of puddles on public roads	31	32.6
Litter in public places	13	13.7
Lack of cleanliness	2	2.1
Presence of dirt Factors associated with unsanitary conditions	2	2.1
Lack of knowledge regarding waste management	31	32.6
Lack of public awareness	31	32.6
Lack of public trash cans	26	27.4
Lack of a sanitation crew Measures to combat unsanitary conditions	7	7.4
Installation of public trash cans	76	80.0
Establishment of a sanitation and hygiene service Disposal methods and techniques	19	20.0
Disposal in a trash can	49	51.6
Waste incineration	20	21.1
Landfilling	15	15.8
Waste recycling	6	6.3
Never know	5	5.3

This table shows that the majority of the study participants (89.5%) were aware of ways to combat unsanitary conditions. As a result, we found that 49.5% identified unsanitary conditions by the presence of trash in the streets, and 32.6% by the presence of puddles on public roads. Several factors contributing to unsanitary conditions were reported, notably a tie between a lack of public awareness and ignorance regarding waste management (32.6%), followed by the absence of public trash cans (27.4%). Furthermore, the measures to combat unsanitary conditions include the installation of public trash bins in the municipality of Tshopo (80.0%), compared to the establishment of a sanitation and hygiene service (20.0%); Disposal of waste in public trash bins was the most frequently cited method of disposal, at 51.6%, followed by waste incineration (21.1%) and burial in trash pits (15.8%).

3.2 Bivariate analysis

3.2.1 Comparison between knowledge of methods to combat unsanitary conditions and the identification of unsanitary conditions

Table 3: Chi-square test to determine the association between variables

		Knowledge of methods to combat unsanitary conditions	
		No	Yes
		Number	Number
Identification of unsanitary conditions	Lack of cleanliness	2	0
	Presence of trash on the streets	6	41
	Presence of puddles on public roads	0	31
	Presence of dirt	2	0
	Presence of litter in public places	0	13

Pearson's Chi-square test		
		Knowledge of methods to combat unsanitary conditions
Identification of unsanitary conditions	Chi-square	39,427
	df.	4
	Sig.	,000*,b,c

Bivariate analysis of the data revealed that knowledge of methods to combat unsanitary conditions influences the identification of unsanitary conditions. The difference is statistically significant (χ^2 = 39.427; df = 4; p = 0.000).

3.2.2 Comparison between the underlying factors of unsanitary conditions and methods for combating them

Table 4: Chi-square test to determine the association between the underlying factors of unsanitary conditions and methods for combating them

		Factors underlying unsanitary conditions			
		Lack of a sanitation brigade	Lack of public trash cans	Lack of awareness regarding waste management	Lack of awareness
		Number	Number	Number	Number
Means to combat unsanitary conditions	Installation of public trash cans	2	18	25	31
	Establishment of a sanitation service	5	8	6	0

Pearson's Chi-square test		
		Factors underlying unsanitary conditions
Means to combat unsanitary conditions	Chi-square	21,214
	df	3
	Sig.	,000*

The bivariate analysis revealed that the factors determining unsanitary conditions influence the use of measures to combat unsanitary conditions. The difference is statistically significant (χ^2 = 21.214; df = 3; p = 0.000).

3.2.3 Comparison between knowledge of methods to combat unsanitary conditions and the use of such methods

Table 5: Chi-square test to determine the association between knowledge of methods to combat unsanitary conditions and the use of such methods

		Knowledge of methods to combat unsanitary conditions	
		No	Yes
		Number	Number
Measures to combat unsanitary conditions	Installation of public trash cans	2	74
	Establishment of a sanitation and hygiene service	8	11

Pearson's Chi-square test		
		Knowledge of methods to combat unsanitary conditions
Measures to combat unsanitary conditions	Chi-square	25,147
	df	1
	Sig.	,000*,b

The bivariate analysis revealed that knowledge of methods to combat unsanitary conditions influences the use of such methods. The difference is statistically significant (χ^2 = 25.147; df = 1; p = 0.000).

3.2.4 Comparison between knowledge of methods to combat unsanitary conditions and waste disposal methods and techniques

Table 6: Chi-square test to determine the association between knowledge of methods to combat unsanitary conditions and waste disposal methods and techniques

		Knowledge of methods to combat unsanitary conditions	
		No	Yes
		Number	Number
Waste disposal methods and techniques	Disposal in garbage pits	8	7
	Disposal in a trash can	0	49
	Waste incineration	2	18
	Don't know	0	6
	Waste recycling	0	5

Pearson's Chi-square test		
		Knowledge of methods to combat unsanitary conditions
Waste disposal methods and techniques	Chi-square	36.249
	df	4
	Sig.	.000*.b.c

The bivariate analysis revealed that knowledge of methods to combat unsanitary conditions has a positive impact on the use of such methods. The difference is statistically significant (χ^2 = 36.249; df = 4; p = 0.000).

4 DISCUSSION

4.1 Awareness of Methods to Combat Unsanitary Conditions

The results of this study indicate that the majority of respondents, or 89.5%, were aware of methods to combat unsanitary conditions. Awareness of such methods influences the identification of unsanitary conditions. The difference is statistically significant (p=0.000). Similarly, Kayobola [8], in his study focused on "Public Waste Management and Its Benefits for Public Health," found that 63.1% of the study participants were aware of ways to combat unsanitary conditions. The same observation was made by Ngambi [3] in his series on popular practices in support of urban sanitation: pre-collection, an alternative service to the shortcomings of the formal waste management system in Yaoundé, which found that 76.5% of respondents were aware of ways to combat unsanitary conditions in the city of Yaoundé, Cameroon. The fight against public unsanitary conditions is an issue that concerns everyone, rich or poor, as it is a health problem that must be addressed with great care.

4.2 Identification of Unsanitary Conditions

It was observed that 49.5% of the study participants indicated that unsanitary conditions are identified by the presence of trash in the streets and the presence of puddles on public roads (32.6%). Thus, knowledge of methods to combat unsanitary conditions influences the identification of such conditions; the difference is statistically significant (p=0.000). This result corroborates the literature cited by Ngambi [3], who emphasizes that it is evident that waste of any kind abandoned on the ground where humans live and posing a risk to their lives to varying degrees is classified as unsanitary conditions.

Across Africa in general and the Democratic Republic of the Congo in particular, environmental issues are of urgent and pressing importance. In the city of Kinshasa, the increase in unsanitary conditions and the degradation of nature have reached alarming proportions for a healthy and pleasant living environment. This state of affairs plunges the population and its surroundings into an unprecedented state of apathy and becomes a secondary manifestation that arises simultaneously with a primary symptom, without being directly linked to it [9]. We believe that the subjects of the study were sufficiently informed about the identification of unsanitary conditions in the Tshopo commune. A commune that was once sanitary but has changed its identity due to unsanitary conditions that dare not speak their name.

4.3 Factors Associated with Unsanitary Conditions

This study found that 32.6% of respondents cited a lack of knowledge about waste management—tied with a lack of public awareness—followed by the absence of public trash cans (27.4%) as the main factors associated with unsanitary conditions. The factors determining unsanitary conditions influence the use of measures to combat unsanitary conditions, with a statistically significant difference (p=0.000). Lack of knowledge about waste management was highlighted in Manongo's [9] study in Kinshasa, which emphasizes that residents of the capital do not know how to manage household waste, discarding it indiscriminately in the environment without regard for environmental hygiene [10]. We believe that low educational attainment is a key factor in sanitation management for most of the study subjects, as the lower the level of education, the higher the likelihood of unsanitary conditions.

4.4 Measures to Combat Sanitation Issues

Several measures exist to combat sanitation issues. In this study, 80.0% of respondents cited the installation of public trash bins as a measure to combat sanitation issues in the municipality of Tshopo. Knowledge of methods to combat unsanitary conditions influences the use of such methods, with a statistically significant difference (p=0.000). According to Zino Diasitua Zingu [11], unsanitary conditions in the city of Kinshasa: a major public health problem. One of the greatest threats to human health worldwide is the lack of access to adequate sanitation facilities for an ever-growing population. Effective waste management is crucial for preventing unsanitary conditions [12]. It is essential to establish appropriate waste collection and treatment systems. Recycling and waste reduction must also be encouraged.

4.5 Waste Disposal Methods and Techniques

We noted that disposing of waste in public trash cans was the most commonly cited disposal method, at 51.6%, followed by waste incineration (21.1%) and burial in trash pits (15.8%). Knowledge of waste management methods influences the use of such methods. The difference is statistically significant (p=0.000). According to Mangenda [13], the social and economic changes that most African countries have undergone since the 1960s have also led to an increase in per capita waste generation. However, the same author emphasizes that "it is not the quantity of waste that poses a problem, but rather the inability of governments and waste management companies to dispose of it" [14]. In doing so, he draws attention to another equally important issue: the question of financing the sanitation sector.

According to Yankel and Maresca [5], unsanitary conditions are a public health issue related to preventive medicine, the primary cause of which is the absence of inadequacy of environmental hygiene and sanitation measures. It is clear that waste of any kind left on the ground where people live, posing varying degrees of risk to their lives, is classified as unsanitary conditions. Unused objects littering the ground in the heart of cities, towns, and villages contribute significantly to unsanitary conditions in living spaces [15]. To add value to household waste and any waste polluting the environment, it is essential to manage it effectively. In this way, unsanitary conditions will be limited.

5 CONCLUSION

Access to sanitation aims to improve public health and protect the natural environment. The challenge of ensuring access to water is twofold: on the one hand, providing every individual with safe drinking water, and on the other, reducing the burden of water collection, which is primarily carried out by women and children. Improving health and increasing life expectancy necessarily require enhanced access to water and sanitation.

The lack of public trash bins in municipalities and insufficient resources to combat unsanitary conditions contribute to the accumulation of waste in the city. To ensure a healthy environment, it is imperative to implement hygiene and sanitation education programs to promote health and reduce health risks to the population. The goal of health education is also to encourage households to change their behavior to better manage waste.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The author declares that this study presents no conflict of interest.

Authors' contributions

Annie BOLESHE SALABA designed and wrote the study and collected the data; Raymond ASSANI RAMAZANI reviewed and edited the text.

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