Federal University Wukari General Studies Journal
Division of General Studies,
Federal University Wukari
Journal homepage: https://journal.quantapub.com/index.php/fuwgestj

GEOSPATIAL TECHNIQUE IN MAPPING FOOD WASTE FOR SOME SELECTED HOTEL IN SOME PARTS OF PLATEAU STATE

Chuma Obiamaka Vivian[1] Daor Nanmet Othniel[2]
[1]*Department of Hospitality and Tourism Management, Federal University Wukari, Taraba State, Nigeria*
[2]*Department of Hospitality and Tourism Management, Federal University Wukari, Taraba State, Nigeria*
E-mail: viamaka2010@yahoo.com

ABSTRACT
Food waste remains a critical global challenge with implications for food security, environmental sustainability, and resource efficiency. This study applies geospatial techniques to map the distribution of food waste in selected hotels in Jos South, Plateau State, Nigeria. A total of 30 hotels were selected from registered establishments, and their geographic coordinates were collected using handheld Global Positioning System (GPS) devices. Spatial analysis was conducted using Geographic Information System (GIS) tools, specifically ArcMap, integrating Grid 3 datasets to aggregate waste data into broader zones. The findings revealed distinct spatial patterns categorized into low, medium, and high food waste regions. High waste areas were predominantly associated with locations hosting frequent social and special events. The study highlights the usefulness of geospatial technologies in identifying waste hotspots and provides actionable insights for improving waste management practices. Recommendations include enhanced staff training, improved food storage systems, regular waste audits, and policy interventions to promote sustainable consumption and production.

Keywords: Food waste; GIS; spatial analysis; hotels; sustainability; Jos South.

INTRODUCTION

Food waste refers to food that is discarded despite being suitable for human consumption (Food and Agriculture Organization [FAO], 2016). Mapping, as defined by the International Cartographic Association (ICA, 2003), represents geographic reality by depicting selected spatial features, making it a valuable tool for analyzing spatial phenomena such as food waste distribution.

Despite the long-standing existence of Jos South, there is limited information on the spatial distribution of food waste within the region. Food waste reduces food availability and depletes resources needed for future production. Adjusting consumer behavior, particularly at the downstream level, is essential to mitigating this issue (Pandey, 2021).

Globally, about 821 million people lack sufficient food, with one in every nine individuals going to bed hungry (World Health Organization [WHO], 2018). Food waste therefore undermines efforts to combat hunger and improve food security (Gustavsson et al., 2011). To address this, the FAO developed indicators such as the Food Loss Index and Food Waste Index (United Nations Environment Programme [UNEP], 2018).

Geospatial technology provides an effective framework for data acquisition, processing, and visualization of spatial patterns. This study aims to map food waste

generation and distribution in selected hotels in Jos South. The study is significant in providing spatial insights that can guide hotel managers, environmental agencies, and policymakers in developing effective waste management strategies and promoting sustainable environmental practices.

STUDY AREA

The study was conducted in Jos South Local Government Area, Plateau State, Nigeria, covering locations such as Gyel, Bukuru, Kuru, Lamingo, and surrounding areas. The region is characterized by a hilly landscape with prominent rocky outcrops. Culturally, the area hosts events such as the Nzem Berom festival and benefits from a cool climate. Its proximity to tourist attractions such as Jos Wildlife Park and Shere Hills supports a thriving hospitality sector, making it suitable for this study.

MATERIALS AND METHODS

Research Design

The study adopted a spatial analytical approach using field data collection and Geographic Information System (GIS) techniques to assess food waste distribution.

Data Collection

Thirty (30) hotels were purposively selected to represent luxury, mid-range, and budget categories from approximately 85 registered hotels in Jos South (Plateau State Tourism Board, 2025). Geographic coordinates were collected using handheld GPS devices. Questionnaires were also administered to support data collection, although the primary emphasis was on spatial analysis.

Data Analysis

Spatial analysis was conducted using ArcMap software. Grid 3 datasets, including administrative boundaries and land use classifications, were integrated to define broader spatial zones such as the Bukuru Corridor and semi-rural districts.

A zonal analysis approach was adopted to aggregate food waste data while maintaining the anonymity of individual hotels. The processed data were visualized to produce a map showing spatial variations in food waste distribution.

RESULTS AND DISCUSSION

Figure 1 illustrates the spatial distribution of food waste across the study area, revealing clear variations in waste generation among different locations. The analysis shows that areas categorized as low food waste (represented in green) include Fobur B West, Shen, parts of Zobwo, Tahu, Sot, Bum, Vwang, Chugwi, Turu A, Kushe, Turu B, and Kuru A. These areas are characterized by relatively efficient food management practices and lower levels of excess food preparation. In contrast, regions classified as medium food waste (represented in blue), such as Gyel B, Tanchoi, Du B, Du A, and parts of Zobwo, exhibit moderate levels of waste generation, suggesting inconsistencies in food handling and consumption patterns.

Furthermore, areas identified as high food waste zones (represented in red) include Jenta Adamu, Howlshe, Tundun Wada, Dashonong, Giring, Lamingo, Zawan B, Bukuru, Gyel A, Zawan A, and Kuru B. These locations show significantly higher levels of food waste, which may be attributed to increased hospitality activities and demand fluctuations. The observed spatial pattern indicates that food waste is not uniformly distributed but instead concentrated in specific zones within the study area.

The findings further reveal that high food waste levels are strongly associated with areas that frequently host social gatherings and special events, which often result in over-preparation of food. This observation aligns with existing studies that identify consumer behavior and event-based catering as major contributors to food waste generation. Additionally, the application of Geographic Information System (GIS) techniques proved effective in identifying spatial disparities and waste hotspots, thereby providing a reliable framework for analyzing and visualizing food waste distribution. The integration of geospatial tools into this study highlights their importance in environmental management, particularly in supporting data-driven decision-making and targeted interventions for waste reduction.

CONCLUSION AND RECOMMENDATIONS

The study concludes that food waste in hotels within Jos South represents a significant operational and environmental challenge. The major sources of food waste identified include excessive food preparation, poor storage practices, and activities related to special events. Beyond operational inefficiencies, food waste also contributes to environmental problems such as unpleasant odors, attraction of pests, and potential water pollution, thereby posing risks to both public health and environmental sustainability.

To mitigate these challenges, it is essential for hotels, particularly those located in high and medium food

waste regions such as Jenta Adamu, Howlshe, Tundun Wada, Dashonong, Giring, Lamingo, Zawan B, Bukuru, Gyel A, Zawan A, Kuru B, Gyel B, Tanchoi, Du B, Du A, and parts of Zobwo, to adopt improved waste management strategies. These strategies should include regular waste audits to monitor waste generation patterns, improved food storage and refrigeration systems to minimize spoilage, and continuous staff training on best practices for waste reduction. In addition, hotels should implement effective monitoring of food preparation processes to avoid overproduction, encourage customer feedback to better align food supply with demand, and invest in modern waste management technologies.

Furthermore, the development and enforcement of practical policies on food waste management are necessary to ensure long-term sustainability. By adopting these measures, hotels can significantly reduce food waste, enhance operational efficiency, and contribute to sustainable consumption and production practices within the study area.

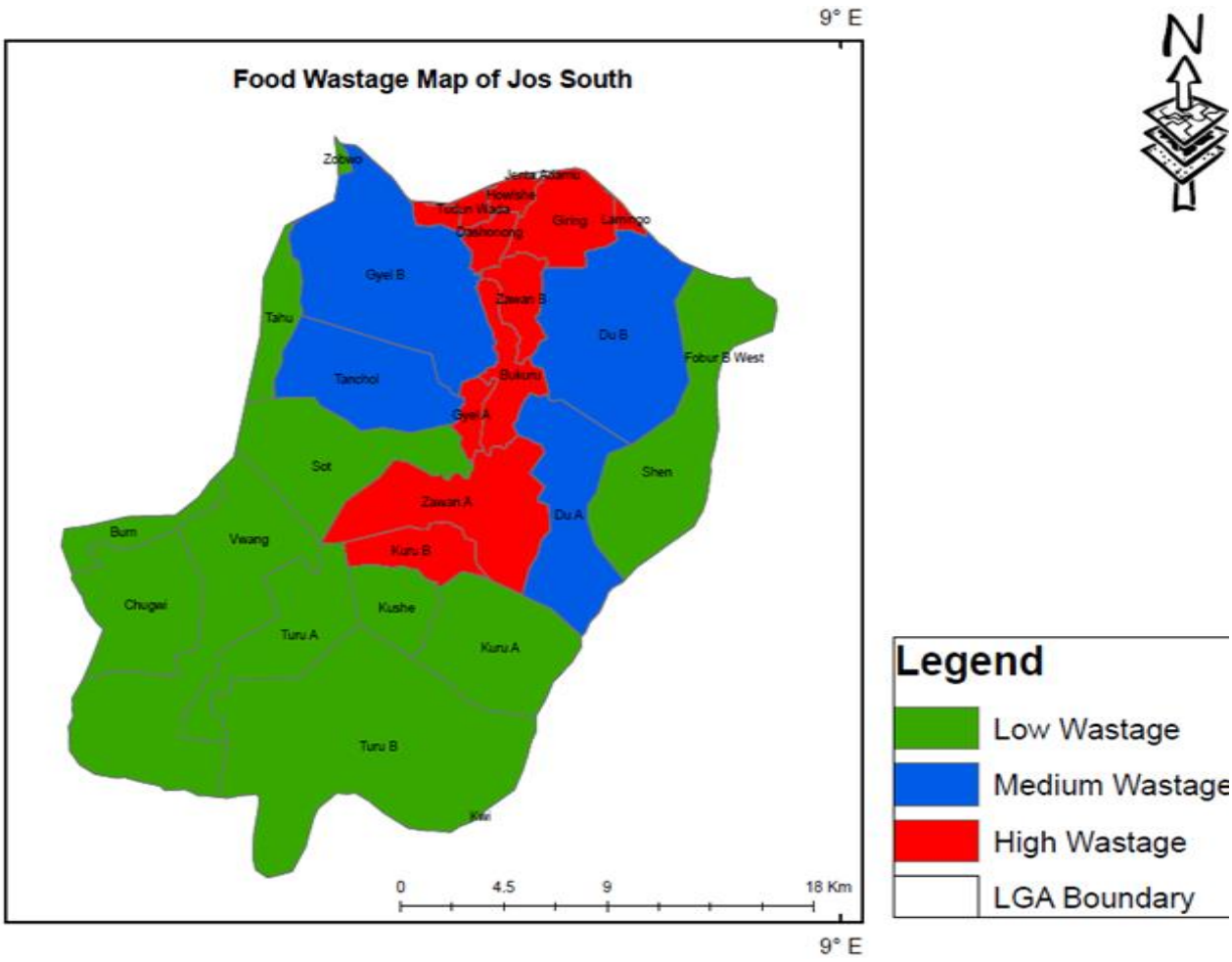

Fig. 1: Form the map above, it can be summarized that the green portion are hotels with low wastage which are Fobur B West, Shen, part of Zobwo, Tahu, Sot, Bum, Vwang, Chugwi, Turu A, Kushe, Turu B and Kuru A. Then the blue portion signifies regions of medium wastage such as Gyel B, Tanchoi, Du B, Du A and parts of Zobwo. Additionally, the red portion shows at a glance regions of high food wastage namely, Jenta Adamu, Howlshe, Tundun Wada, Dashonong, Giring, Lamingo, Zawan B, Bukuru, Gyel A, Zawan A, Kuru B.

REFERENCES

Food and Agriculture Organization. (2016). *Food wastage footprint and impacts*.

Gustavsson, J., Cederberg, C., Sonesson, U., van Otterdijk, R., & Meybeck, A. (2011). *Global food losses and food waste: Extent, causes and prevention*. FAO.

International Cartographic Association. (2003). *Strategic plan 2003–2011*.

Pandey, A. (2021). Food wastage: Causes, impacts and solutions. *Science Heritage Journal (GWS).* https://doi.org/10.26480/gws.01.2021.17.20

United Nations Environment Programme. (2018). *Global food waste index*.

World Health Organization. (2018). Global hunger continues to rise. https://www.who.int/news-room/detail/11-09-2018